UNIVERSITY ⚜ OF MYSORE
Estd.1916

——————————————— (Re-accredited by NAAC at 'A') ———————————————
——————— (NIRF-2023 Ranked 44 in University Category & 71 in Overall Category) ———————

No.: PMEB-1/Spl./10(3)/2023-24

Date: 06-01-2024

NOTIFICATION

Sub.: Syllabus and Examination pattern of **B.Des. (Hons.) (Vedic Architecture)**, **BCA (Hons.) (Artificial Intelligence & Machine Learning)**, **BCA (Hons.) (Cyber Security & Data Science)** courses under Specialized Programmes from the academic year 2023-24-reg.

Ref.: 1. Decision of the BOS Meeting held on 30-05-2023.
     2. Decision of the Academic Council meeting held on 10-11-2023.

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The Board of Studies in **B.Des. (Hons.) (Vedic Architecture), BCA (Hons.) (Artificial Intelligence & Machine Learning), BCA (Hons.) (Cyber Security & Data Science) (UG)** at its meeting held on 30-05-2023 has recommended to approve the scheme of examination and the syllabus of **1. B.Des. (Hons.) (Vedic Architecture) 2. BCA (Hons.) (Artificial Intelligence & Machine Learning) 3. BCA (Hons.) (Cyber Security & Data Science)** courses in University of Mysore under specialized/specified programs from the academic year 2023-24 as per NEP-2020.

The Academic Council has also approved the above said proposals at its meeting held on 10-11-2023 and the same is hereby notified.

The syllabus of **1. B.Des. (Hons.) (Vedic Architecture) 2. BCA (Hons.) (Artificial Intelligence & Machine Learning) 3. BCA (Hons.) (Cyber Security & Data Science)** courses may be downloaded from the University website **https://uni-mysore.ac.in/PMEB/**.

REGISTRAR
REGISTRAR
University of Mysore
MYSURU - 570 005

To,
1. The Registrar (Evaluation), University of Mysore, Mysuru.
2. The Dean, Faculty of Science & Technology, DoS in Mathematics, Manasagangothri, Mysuru.
3. Prof. Suresha, DoS in Computer Science, Manasagangothri, Mysuru.
4. The Principal, Acharya Institute for Innovation and Transformation(AIIT), 'B' Block, 18th Main Road, Vijayanagar 3rd stage, KSOU Academic Block, Mysuru.
5. The Deputy Registrar/ Asst. Registrar/ Superintendent, Examination Branch, UOM, Mysuru.
6. The PA to Vice-Chancellor/Registrar/Registrar (Evaluation), University of Mysore, Mysuru.
7. Office Copy.

To,
The Director
Planning, Monitoring & Evaluation Board
University of Mysore.

Respected Sir,

Sub:-Submission of the proceeding of the special BOS meeting held on 30th May 2023
Ref:-PMEB-5/31/Spl/2022-23 dated 24-05-2023

****

I am here by submitting the proceeding of the special BOS meeting held in connection with specialized program B.Des Hons. (Vedic Architecture), BCA Hons. (Cyber security & Data Science) & BCA Hons.(Artificial Intelligence & Machine Learning) for your kind perusal and further action, along with proposed structure and the syllabus for all the programmes .

Dr. SURESHA
Professor
Department of Studies in Computer Science
University of Mysore
Manasagangotri, Mysore - 570 006
Karnataka, INDIA

Proceedings of the Meeting of the special BOS in B.Des Hons. (Vedic Architecture), BCA Hons. (Cyber security & Data Science) & BCA Hons.(Artificial Intelligence & Machine Learning) (Under Graduate) Specialized Programme offered by Acharya Institute for Innovation and Transformation, B Block, 18th Main Road, Vijayanagar 3rd Stage, KSOU Academic Block, Mysuru-570012. Meeting was held on 30-05-2023 at 2:30 pm, at the Dept. of studies in Computer Science, Manasagangothri, University of Mysore.

Members Present:

1. Prof.Suresh   :   Chairperson, BOS
2. Ar. Sudhir Acahrya   :   Member
3. Ar. Sunny Danniel   :   Special Invitees (Subject Specialist)
4. Ar. Saikiran R Shet   :   Special Invitees (Subject Specialist)
5. Ar. Uday Kumar   :   Special Invitees (Subject Specialist)
6. Ar. Anitha Raj   :   Special Invitees (Subject Specialist)
7. Ar.Niranjan Prakash   :   Special Invitees (Subject Specialist)
8. Asst.Prof. Pavithra Prasanna   :   Special Invitees (Subject Specialist)

Members absent:

1. Navneet Kaushik   :   Member
2. Dr. Soumya Kumar   :   Member
3. Vishwanath Holla   :   Member

Chairman welcomed all the member of the board and placed the agenda of the meeting. After a depth review, it was unanimously resolved as follows:

1. Eligibility Criteria, syllabus and the Methodology of Assessment and Evaluation for B.Des Hons. (Vedic Architecture) BCA Hons. (Cyber security & Data Science) & BCA Hons. (Artificial Intelligence & Machine Learning) 4 years programme- **Prepared & approved**

    (Annexure-I)

2. Panel of Examiners- **Prepared & approved**

    (Annexure-II)

After the resolution, the Chairman thanked all the members for the total co-operation and offering valuable suggestions.

(Prof.Suresha)
Chairperson, BOS

Dr. SURESHA
Professor
Department of Studies in Computer Science
University of Mysore
Manasagangotri, Mysore - 570 006
Karnataka, INDIA

Proposed Panel of Examiners of Acharya Institute for Innovation and Transformation, , B Block, 18th Main Road, Vijayanagar 3rd Stage, KSOU Academic Block, Mysuru-570012.

Name and Address of Internal Members:

Sl. No.	Name & Address	E-Mail and Phone/Mobile No.
1.	**Prof. Suresha** DOS in Computer Science, Manasagangotri, Mysuru.	Mob: 9449810894 sureshasuvi@gmail.com
2.	**Ar. Sunny Danniel** HOD, Acharya Institute for Innovation and Transformation,, B Block, 18th Main Road, Vijayanagar 3rd Stage, KSOU Academic Block, Mysuru-570012	Mob: 9880205825 sd@acharya-iit.com
3.	**Ar. Annie Issac** Associate Professor, Acharya Institute forInnovation and Transformation, B Block, 18th Main Road, Vijayanagar 3rd Stage, KSOU Academic Block, Mysuru-570012	Mob: 8197176934 sd@acharya-iit.com
4.	**Ar.Niranjan Prakash** Associate Professor, Acharya Institute for Innovation and Transformation, B Block, 18th Main Road, Vijayanagar 3rd Stage, KSOU Academic Block, Mysuru-570012	Mob: 8088106138 niranjan09@gmail.com
5.	**Ass. Prof. Pavithra Prasanna** Associate Professor, Acharya Institute for Innovation and Transformation, B Block, 18th Main Road, Vijayanagar 3rd Stage, KSOU Academic Block, Mysuru-570012	Mob: 7259222704 pavithrapkumar30@gmail.com

Name and Address of External Examiners:

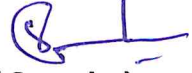|		
1.	**Ar. Sudir Acharya** Director, Acharya Institute for Innovation and Transformation,, B Block, 18th Main Road, Vijayanagar 3rd Stage, KSOU Academic Block, Mysuru-570012	Mob: 9886456000 director@acharya-iit.com
2.	**Ar. Saikiran R shet** Associate Professor, Acharya Institute for Innovation and Transformation, B Block, 18th Main Road, Vijayanagar 3rd Stage, KSOU Academic Block, Mysuru-570012	Mob: 7760433777 skr@acharya-iit.com

Dr. SURESHA
Professor
Department of Studies in Computer Science
University of Mysore
Manasagangotri, Mysore - 570 009
Karnataka, INDIA

3.	**Ar. Uday Kumar** Associate Professor, Acharya Institute for Innovation and Transformation,Belawadi, Srirangapatna Taluk, Mandya District.	Mob: 9916140049 ar.udaykumar@gmail.com

(Prof.Suresha)

Chairperson, BOS

Dr. SURESHA
Professor
Department of Studies in Computer Science
University of Mysore
Manasagangotri, Mysore - 570 006
Karnataka, INDIA

ACHARYA INSTITUTE FOR INNOVATION AND TRANSFORMATION

Regulations Governing the
Bachelor of Computer Applications (Honors)
(ARTIFICIAL INTELLIGENCE (AI) & MACHINE LEARNING (ML)/

DATA SCIENCE (DS) & CYBER SECURITY (CS))

under
CREDIT AND SEMESTER SYSTEM AND GRADING
Scheme for the Distribution of Credits, Period of
Instruction and Syllabus

PREAMBLE

We, the academic community of ACHARYA INSTITUTE FOR INNOVATION AND TRANSFORMATION, recognizing the need for qualified professionals in the fields of Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), and Cyber Security (CS), do hereby establish the course of Bachelor of Computer Applications (Honors) with specializations in AI & ML and DS & CS.

This course aims to provide a comprehensive and in-depth understanding of the theories, principles, and practices of AI, ML, DS, and CS, and to equip students with the necessary skills to become competent professionals in these fields.

The Bachelor of Computer Applications (Honors) program is designed to provide students with a strong foundation in computer science, programming, and database management, along with advanced coursework in AI, ML, DS, and CS. Students will learn how to design and develop intelligent systems, analyze and interpret complex data, and secure computer networks and systems.

The AI & ML specialization will focus on developing students' knowledge of statistical modeling, deep learning, natural language processing, computer vision, and robotics. The DS & CS specialization will cover topics such as data mining, data visualization, cloud computing, network security, and cryptography.

The course will be delivered through a combination of classroom lectures, laboratory sessions, workshops, and hands-on projects. Students will have access to state-of-the-art computing facilities and software tools, as well as opportunities to work on industry-sponsored projects and internships.

Upon completion of the Bachelor of Computer Applications (Honors) program, graduates will be able to pursue careers as data scientists, machine learning engineers, AI developers, cybersecurity specialists, and more. They will also be eligible to continue their education through advanced degree programs in related fields.

AIM

The Bachelor of Computer Applications (Honors) program with specializations in Artificial Intelligence (AI) & Machine Learning (ML) and Data Science (DS) & Cyber Security (CS) aims to provide students with a comprehensive understanding of the theories, principles, and practices of these rapidly-evolving fields, and to equip them with the necessary skills to become competent professionals in these domains.

- The program aims to produce graduates who are knowledgeable, innovative, and ethical, and who are able to apply their skills and knowledge to solve real-world problems in various industries such as healthcare, finance, entertainment, education, and more.
- The AI & ML specialization aims to provide students with a deep understanding of the algorithms, techniques, and frameworks used in developing intelligent systems, and to equip them with the skills to apply these techniques to real-world problems. Students will learn to design, develop, and optimize algorithms for tasks such as image and speech recognition, natural language processing, and robotics. They will also be able to apply machine learning techniques to analyze complex data and extract valuable insights.
- The DS & CS specialization aims to provide students with a comprehensive understanding of the theories, principles, and practices of data science and cyber security. Students will learn to design and implement data mining and visualization techniques to extract insights from large datasets, and to develop effective cybersecurity strategies to protect computer systems and networks from cyber attacks.

Overall, the Bachelor of Computer Applications (Honors) program with specializations in AI & ML and DS & CS aims to produce graduates who are not only knowledgeable in the technical aspects of these fields but also have excellent problem-solving and communication skills, and a strong sense of ethical responsibility towards the society.
The program aims to prepare students for successful careers in the computing industry and to contribute positively to society through their work.

PROGRAM OUTCOMES

Upon completion of the Bachelor of Computer Applications (Honors) program with specializations in Artificial Intelligence (AI) & Machine Learning (ML) and Data Science (DS) & Cyber Security (CS), graduates will be able to:

- Apply the principles, concepts, and techniques of computer science, programming, and database management to solve complex problems in AI, ML, DS, and CS.
- Design, develop, and optimize intelligent systems using AI and ML techniques, and apply them to various domains such as image and speech recognition, natural language processing, and robotics.
- Analyze and interpret complex data using data mining and visualization techniques, and develop effective solutions to real-world problems in data science.
- Design and implement effective cybersecurity strategies to protect computer systems and networks from cyber attacks, and understand the ethical and legal implications of cybersecurity.
- Work effectively in teams, communicate effectively with stakeholders, and demonstrate ethical and professional responsibility in all aspects of their work.
- Continue their education through advanced degree programs in related fields, or pursue careers in various industries such as healthcare, finance, entertainment, education, and more.

Overall, graduates of the Bachelor of Computer Applications (Honors) program with specializations in AI & ML and DS & CS will be well-prepared to contribute positively to the society through their work, and to meet the growing demand for qualified professionals in these rapidly-evolving fields.

DEFINITIONS OF KEYWORDS

The following are the definitions & descriptions that have been followed for the different terms used in the Regulations governing Bachelor of Computer Applications (Honors) (ARTIFICIAL INTELLIGENCE (AI) & MACHINE LEARNING(ML) / DATA SCIENCE (DS) & CYBER SECURITY (CS))

1) **Branch:** Means Specialization or discipline of Bachelor of Computer Applications (Honors) (ARTIFICIAL INTELLIGENCE (AI) & MACHINE LEARNING(ML) / DATA SCIENCE (DS) & CYBER SECURITY (CS)).

2) **Semester:** Refers to one of the two sessions of an academic year, each session being sixteen weeks duration (with working days greater than or equal to ninety). The odd semester may be scheduled from July and even semester from January of the year.

3) **Academic Year:** Refers to the sessions of two consecutive semesters (odd followed by an even) including periods of vacation.

4) **Course:** Refers to usually referred to as 'papers' and is a component of a programme. All Courses need not carry the same weight. The Courses should define learning objectives and learning outcomes. A Course may be designed to comprise lectures/ tutorials/ laboratory work/ studio/case studies/field work/thesis/ outreach activities/project work/ professional training/ viva/ seminars/ term papers/assignments/ presentations/ self-study etc., or a combination of some of these.

5) **Credit:** Refers to a unit by which the Course work is measured. It indicates the relative importance of a given course.

6) **Audit Courses:** Means Knowledge/ Skill enhancing Courses without the benefit of a grade or credit for a Course.

7) **Choice Based Credit System (CBCS):** Refers to customizing the Course work, through Core, Elective and soft skill Courses, to provide necessary support for the students to achieve their goals.

8) **Course Registration:** Refers to formal registration for the Courses of a semester (Credits) by every student under the supervision of a Faculty Advisor (also called Mentor, Counselor etc.,) in each Semester for the Faculty to maintain proper record.

9) **Course Evaluation:** Means Progressive Evaluation [Continuous Internal Evaluation (CIE)] and Semester End Examinations (SEE) to constitute the major evaluations prescribed for each Course.

10) **Progressive Evaluation:** Refers to evaluation of students' achievement in the learning process. Progressive Evaluation shall be by the Course Instructor and includes tests, homework, problem solving, reviews/juries, periodical submissions, desk – crits (criticism), quiz, mini-project and seminar throughout the Semester, with weightage for the different components being fixed at the University level.

11) **Semester end examinations (SEE):** Refers to examinations conducted at the University level in each Course covering the entire Course Syllabus. SEE shall be conducted for Term work / Theory/Viva-voce.

12) **First Attempt:** Refers to a student who has completed all formalities and has become eligible to attend the SEE and has attended at least one head of passing, such attempt shall be considered as first attempt.

13) **Credit Based System (CBS):** Refers to quantification of Course work, after a student completes Project based learning process, followed by passing in both Progressive Evaluation and SEE. Under CBS, the requirement for awarding degrees is prescribed in terms of total number of credits to be earned by the students.

14) **Credit Courses:** All Courses registered by a student in a semester to earn credits. In a widely accepted definition, students must earn credits by registering and passing the courses.

15) **Letter Grade:** It is an index of the performance of students in a said Course. Grades are denoted by letters S, A, B, C, D, E and F.

16) **Grading:** Grade refers to a qualitative measure of achievement of a student in each Course, based on the percentage of marks secured in (Progressive Evaluation and SEE). Grading is done by Absolute Grading [Refer: 23SBCA5.0]. The rubric attached to letter grades are as follows: S – Outstanding, A – Excellent, B – Very Good, C – Good, D – Above Average, E – Average and F – Fail.

17) **Grade Point (GP):** Refers to a numerical weightage allotted to each letter grade on a 10- point scale as shown:
    Letter Grade and corresponding Grade Points on a typical 10 – Point scale.
    Letter Grade S A B C D E F   Grade Point 10 09 08 07 06 04 00

18) **Passing Standards:** Refers to passing a Course only when getting GP greater than or equal to 04 (as per serial number 17).

19) **Credit Point:** Is the product of grade point (GP) and number of credits for a Course i.e., Credit points CrP =GP×Credits for the Course.

20) **Semester Grade Point Average (SGPA):** Refers to a measure of academic performance of student/s in a semester. It is the ratio of total credit points secured by a student in various Courses of a semester and the total Course credits taken during that semester.

21) **Cumulative Grade Point Average (CGPA):** Is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points earned by a student in various Courses in all semesters and the sum of the total credits of all Courses in all the semesters. It is expressed up to two decimal places.

22) **Transcript or Grade Card or Certificate:** Refers to a certificate showing the grades earned by a student. A grade certificate shall be issued to all the registered students after every semester end examination. The grade certificate will display the programme details (Course code, title, number of credits, grades secured) along with SGPA of that semester and CGPA earned till that semester.

23) **University:** University of Mysore (UoM), Mysuru.

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Regulations Governing

BACHELOR OF COMPUTER APPLICATIONS

(ARTIFICIAL INTELLIGENCE (AI) & MACHINE LEARNING (ML)/
(DATA SCIENCE (DS) & CYBER SECURITY (CS))

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23SBCA1.0	**Title, Duration and Credits of the Programme of Study**
23SBCA1.1	The programme of study shall be called the Bachelor of Computer Applications (Honors) (ARTIFICIAL INTELLIGENCE (AI) & MACHINE LEARNING (ML)/ DATA SCIENCE (DS) & CYBER SECURITY (CS)) abbreviated as **BCA (Hons) (AI&ML/ DS&CS)**
23SBCA1.2	The BCA (Hons) (AI&ML/ DS&CS) programme shall be of four(4) academic year duration divided into eight semesters and each semester is of 16 weeks duration. The actual teaching and learning days shall be for at least 90 working days in a semester.
23SBCA1.3	The calendar of events of the programme of study shall be notified by the University.
23SBCA1.4	The University examination shall be conducted at the end of each semester for all the Eight semesters.
23SBCA1.5	**Maximum Duration for Programme Completion:** (a) Students admitted to Ist year **BCA (Hons) (AI&ML/ DS&CS)** shall complete the programme. No time limit is considered. (b) As per the UGC guidelines, there are multiple exit points for a candidate admitted in this course. (c) If he/she is completing all the eight semester successfully, he/she will get **BCA (Hons) (AI&ML/ DS&CS)** (d) If he/she is completing all the six semester successfully, he/she will get **BCA (AI&ML/ DS&CS)** (e) If he/she is completing the first four semesters successfully, he/she will get an **UnderGraduate Diploma (AI & ML / DS & CS).** (f) If he/she is completing the first two semesters he/she will get a **UnderGraduate Certificate (AI & ML / DS & CS).**

23SBCA1.6	Prescribed Number of Credits for the Programme: The number of credits to be completed by students admitted for (a) BCA (Hons) (AI&ML/ DS&CS) programme shall be **203** (b) BCA (AI&ML/ DS&CS) programme shall be **170 + 6** (c) **UnderGraduate Diploma** Computer Applications (AI&ML/ DS&CS) programme shall be **120 + 4** (d) **UnderGraduate Certificate** Computer Applications (AI&ML/ DS&CS) programme shall be **60 + 2**
23SBCA2.0	**ELIGIBILITY FOR ADMISSION (AS PER THE GOVERNMENT ORDERS ISSUED FROM TIME TO TIME)**
23SBCA2.1	**Admission to 1st Semesters (1st year) :** **for Level 5 and/or Undergraduate Certificate :** (a) who have passed the two year Pre-University examination conducted by the Karnataka State Pre-University Board with any discipline; or (b) who have passed 10+2 of the Central Board of Secondary Education (CBSE)or equivalent with any discipline; or (c) Who have passed any other examination recognized by the University as equivalent thereto. **Admission to 3rd Semesters (2nd year) :** **for Level 6 and/or Undergraduate Diploma :** (d) A candidate who has passed Undergraduate Certificate - (BCA(AL/ML or DS/CS) examination or first year Bachelor's degree examination in Bachelor of Engineering of University of Mysore or any other University considered as equivalent thereto is eligible for admission to this programme as lateral entry with passing marks in aptitude test conducted by the institute or, (e) who possess Three-Year Diploma in Computer Applications or equivalent recognized by Government of Karnataka, or any other State Government or Central Government thereto is eligible for admission to this programme as lateral entry with passing marks in aptitude test conducted by the institute or, (f) who possess Three-Year Diploma in any stream recognized by Government of Karnataka, or any other State Government or Central Government thereto is eligible for admission to this programme as lateral entry with passing marks in aptitude test conducted by the institute **Admission to 5th Semesters (3rd year) :** **for Level 7 and/or BCA (AI & ML or DS & CS) :** (g) A candidate who has passed Undergraduate Diploma - (BCA(AL/ML or DS/CS) examination or second year Bachelor's degree examination in Bachelor of Engineering of University of Mysore or any other University considered as equivalent thereto is eligible for admission to this programme with passing marks in aptitude test conducted by the institute. **Admission to 7th Semesters (4th year) :** **for Level 8 and/or BCA (Honors) (AI & ML or DS & CS) :** (h) A candidate who has passed BCA (AI/ML or DS/CS) examination of University of Mysore or any other University considered as equivalent thereto is eligible for admission to this programme with passing marks in aptitude test conducted by the institute. (i) A candidate who enters Level 5 in particular specialization shall select the same specialization in Level 6 and 7.

	(j) A Candidate who enters BCA (AI/ML or DS/CS) programme from a conventional bachelors degree programme has to clear attainment of competencies required for earlier 4 Levels through on-line or off-line mode, as a part of eligibility for admission to a chosenBCA (AI/ML or DS/CS) programme.
23SBCA2.2	The candidates shall have secured a minimum of 50 % of marks in aggregate in the qualifying examination. Provided that candidates belonging to Scheduled Castes and Scheduled Tribes and any other groups classified by the Government of Karnataka for such purpose from time to time shall be considered eligible for admission, if they have passed the qualifying examination giving eligibility for the admission with 45% of marks in aggregate.
23SBCA2.3	All the candidates are seeking admission to BCA. Hons. shall pass/qualify the **Aptitude Test in Bachelor of Computer Applications (ATBCA)** conducted by the institution or any specially designed aptitude test conducted by the Competent Authority of the Central / State Government or JEE Paper-I examination conducted by CBSE . This condition shall be fulfilled by all candidates including those belonging to Scheduled Castes, scheduled tribes and other classified groups.
23SBCA2.4	Those students, who have passed a qualifying examination other than the PUC II examination of the Pre-University Education Board of Karnataka, have to obtain an eligibility certificate for seeking admission to BCA. Hons. Programme from University of Mysore in association with AIIT
23SBCA2.5	Candidates admitted to the BCA Hons programme from other Diploma streams shall not be entitled to any exemption of any Course of the programme unless and otherwise specified in 23SBCA2.1
23SBCA3.0	**Courses**
23SBCA3.1	The course includes instructions on Probability & Statistics, Machine Learning with Pattern Recognition, Neural Network & Deep Learning, Data Visualization. Electives include courses from Swayam on topics of AI and ML . AML = AI & ML core Subjects; DAE = Engineering Subjects; HAP = Humanities and Psychology Subjects. Subject Categories:- GE = General Education; CEA = Cultural & Extracurricular Activities; SDC = Skill Development Components; OE = Optional Details will be as per the scheme.
23SBCA3.2	The minimum number of students registered to any Elective Course offered by the Department/College shall be not less than ten. However, the above condition shall not be applicable if the class strength is less than 10.

23SBCA3.3	A student shall exercise his option in respect of Elective Courses and register for the same at the beginning of the semester concerned. The student may be permitted to opt for a change of Elective Course within 15 days from the date of commencement of the semester as per the calendar of the University.
23SBCA3.4	**Course Registration:** Every student shall register for the Courses of a semester (Credits) under the supervision of a Faculty Advisor (also called Mentor, Counselor etc.,) in each Semester for the Institution to maintain proper record.
23SBCA4.0	**Study Tour, Professional Training**
23SBCA4.1	**Study Tour** A minimum of One study tours each of 4 to 10 days duration shall be completed, one before the end of each semester. The students have to submit a study tour report as group work (4 to 6 students per group) within 15 days after the end of the study tour. The reports shall be evaluated by the departments/ colleges for awarding the progressive mark of the Soft skills. The average marks obtained by a student in the two study tour reports shall be the progressive marks for the course Soft skills. The department/ college shall use its discretion about the choice of places and buildings to be visited for study tour. The study tour may include places of architectural interest in India or abroad. Students who cannot attend the study tour due to ill-health or any other compelling reasons shall undertake a study assignment in lieu of study tour.
23SBCA4.2	**Professional Training** At the end of sixth semester students shall undergo Professional Training for a period of 16+16 weeks under the supervision of a practicing architect. The students are permitted to carry out the professional training anywhere in India or abroad. Students opting to undergo training abroad shall work only under the Principal architect of firms registered with the local affiliating body of architects. The University/college will not provide any kind of financial assistance to any student for carrying out the professional training.

23SBCA4.3	The commencement of professional training shall be the date as notified by the University. The duration of professional training shall be counted from the date of commencement of the training.
23SBCA4.4	The students shall undergo professional training in an individual organization only. The change of office /firm shall be permitted only under extraordinary circumstances with due approval of the Principal/HoD.
23SBCA4.5	All the students shall submit the logbook, training report along with the training completion certificate duly signed by the Manager of the firm to the principal. The report shall comprise of certified printout of relevant work carried out during the training period.
23SBCA4.6	The college / department shall maintain the record of the students undergoing training in the form of a joint report, periodical log reports, etc.

23SBCA4.7	The candidates who have completed the Professional Training shall attend the viva-voce examination conducted by two University appointed examiners, one internal examiner and one external examiner. Each candidate shall produce the logbook, training report and training completion certificate duly signed by the Manager of the firm for the examiners.
23SBCA4.8	Failing to undergo Professional Training: Professional Training is one of the head of passing. Completion of 16+16 weeks training is mandatory. If a student fails to undergo/ complete the 16-week training, he/she shall be considered as fail in BCA.-Hons course and shall not be awarded the BCA-Hons. Degree. The student shall appear for the subsequent SEE in Professional Training after repeating and satisfying the conditions prescribed for Training. The reappearance shall be considered as an attempt.
23SBCA4.9	**BCA Project (Thesis)** The thesis project is the culmination of the learning under BCA. Hons. programme. The thesis provides an opportunity for the students to experiment with an innovative idea with comprehensive application of various aspects of software and digital development.
23SBCA5.0	**Computation of SGPA and CGPA**
23SBCA5.1	I. The University adopts an absolute grading system wherein the marks are converted to grades, and every semester results will be declared with semester grade point average (SGPA) and Cumulative Grade Point Average (CGPA). The CGPA will be calculated for every semester, except for the first semester. II. The grading system with the letter grades and the assigned range of marks under absolute grading system are as given Annexure - 1
23SBCA5.2	Grade Card: Based on the secured letter grades, grade points, SGPA and CGPA, the transcript for each semester and a consolidated transcript indicating the performance in all semesters shall be issued.
23SBCA6.0	**Conversion of CGPA into Percentage of Marks and Class Equivalence**

23SBCA6.1	Formula for the conversion of CGPA into percentage is as per Mysore University framework.
23SBCA7.0	**Progressive Evaluation and Semester End Examination**
23SBCA7.1	Progressive Evaluation marks and SEE marks (Theory / Term work /Viva voce marks), shall be as prescribed in the Scheme of Teaching and Examination.

23SBCA7.2	**Progressive Evaluation**
	The minimum Progressive marks to be secured by the students in all the courses shall be 50 % of the maximum marks prescribed for the Progressive Evaluation.
	(a) In case of theory courses which are mainly lecture based as per the scheme of teaching and examinations, the Progressive Evaluation marks shall be based on the average of three tests conducted covering the entire syllabus.
	In addition, the teacher may give assignments instead of tests which may include sketching, book reviews, write-ups etc.
	(b) In case of courses which are mainly studio based as per the scheme of teaching and examinations, the Progressive marks shall be the sum total of marks given to the various drawings (plates) submitted from time to time by a student on tracing sheets / drawing sheets or Computer printouts/sketches/ models on the basis of
	(c) internal reviews / juries / desk crits (criticisms). However, if the course teacher so desires, he/she shall give some weightage for time bound exercises/ problems / tests in these courses for the award of progressive marks. In a semester, two to three such time problems / tests may be conducted.
	(d) In the case of courses which are mainly practical based as per the scheme of teaching and examinations, the Progressive marks shall be based on the assignments submitted by the students. A minimum of three assignments per semester shall be given.
	(e) In all the above three cases, viz. lectured based, studio based, and term work-based courses the concerned teacher shall give a reasonable opportunity to the student to improve his / her Progressive marks for example by re-doing the assignments or attending an additional test etc., within the time frame of the given semester.
	(f) The Progressive marks in the case of Digital Architectural Design Project (Thesis) at the end of semester shall be based on the evaluation of the project work (Thesis) through internal reviews/juries and desk crits etc., in accordance with the scheme of teaching and examination.

23SBCA7.3	All the relevant records and submissions of students pertaining to Progressive Evaluation shall be preserved by the Principal/ Head of the Department for at least six months after the announcement of university results and shall be made available for verification at the direction of the University authorities.

23SBCA7.4	(a) Students failing to secure a minimum of 50 % of the Progressive marks and students who remain absent for all the Progressive Evaluation shall not be eligible for the examination conducted by the University and they shall be considered as fail in that/those Course/s. However, they can appear for university examinations conducted in other Courses of the same semester and backlog Course/s if any. (b) Improvement in progressive marks shall only be allowed during the subsequent semester when the course is offered as per the scheme of teaching. (The students can register for improvement of marks of odd semester subjects during odd semester only, similarly the registration for improvement of marks of even semester subjects shall be permitted during even semester only) (c) Students who have satisfied the attendance requirement but not the minimum progressive marks requirements shall be permitted to register afresh and appear for SEE after satisfying the progressive evaluation requirements in the same Course/s when the course is offered during subsequent semester/s. (d) Each appearance to SEE to complete a course shall be treated as an attempt. (e) Candidates shall register their names in their college for satisfying progressive marks requirements within 15 days from the commencement of the subsequent semesters during which the course is offered as per the scheme of teaching. The college shall get permission from UoM for such cases.
23SBCA7.5	The list of such candidates, who have not secured the minimum progressive marks, shall be sent to the University along with the submission of progressive marks of the successful candidates.
23SBCA7.6	Improvement of Progressive Evaluation marks shall not be allowed in case thestudent has already secured the minimum required marks.
23SBCA7.7	The final list, incorporating corrections (if any) of Progressive Evaluation marks awarded to the students in all the courses, shall be displayed on the notice board of the college at least seven days before the closure of the semester. The institution shall enter the progressive marks of each semester in the format of the UoM online/Offline CIE marks portal and submit a certified copy of the same to the University Examination Section within the stipulated date notified by University. Every page of the Progressive Evaluation marks sheet (hardcopy) shall bear the signatures of the concerned Teacher/Teachers, Head of the Department and Principal.
23SBCA7.8	Any corrections or overwriting of Progressive Evaluation marks shall bear the signature(s) of concerned Teacher(s) and in such cases the Head of the Department shall indicate the number of corrections on every sheet and attest it with his/her signature.

23SBCA7.9	Progressive Evaluation marks shall reach the University before the commencement of examination as per the notification from the office of the Registrar (Evaluation) from time to time. After the submission of Progressive Evaluation marks to the University, any request under any circumstances for change of Progressive Evaluation marks shall not be considered.
23SBCA7.10	**Semester End Examination and Passing standards** For a pass in a course (theory/viva voce/term work), a candidate shall secure a minimum 40 % in the University examination. (a) The University examination in Term work refers to the evaluation of complete course portfolios produced by students during a semester. (b) The Term work examination shall be conducted, in the absence of candidates, by internal and external examiners appointed by the University. (c) The viva voce examination, as per scheme of teaching and examination, shall be conducted by internal examiner (Course teacher /senior faculty/ visiting teacher working as full time or part-time teacher in an institution) and external examiners (a teacher or a professional not working in the same institution) appointed by the University. Consolidated marks shall be awarded by the examiners after a joint evaluation. (d) The viva voce examination, in the Digital Architectural Design Project (Thesis) shall be conducted by one internal and two external examiners, all appointed by the university. The maximum number of candidates assigned shall not exceed 10 per batch and 3 batches per day to a panel of examiners in a day. (e) Candidates shall be present in person for Digital Architectural Design Project (Thesis) examinations and submit the portfolio of works done (detailed set of drawings, sketches and models) during the semester and answer the queries of the examiners in respect of portfolio.
23SBCA7.11	(a) Students who obtain any grade from S to E in courses prescribed for only progressive marks and for both progressive and SEE marks shall be considered as passed the course. (b) If a student secures an F grade in any of the head of passing, he/she must reappear in that head for the SEE. The Progressive Evaluation marks awarded to the student/s at first attempt in the failed Course/s shall be carried forward.
23SBCA7.12	Students who pass a Course of a semester shall not be allowed to appear for any individual course again, unless they opt for rejection of results of the entire semester.
23SBCA7.13	A student may, at his/her desire, reject the total performance of a semester (including Progressive Evaluation marks) or reject the result of his/her performance in university examination of a semester only without rejecting the progressive marks. Rejection is permitted only once during the entire programme of study.
23SBCA7.14	The student who desires to reject the results of a semester shall reject performance in all the Courses of the semester, irrespective of whether the student has passed or failed in any Course. However, the rejection of performance of each semester Professional Training shall not be permitted.

23SBCA7.15	(a) Students, who desire to reject the total performance of a semester including Progressive Evaluation marks, have to repeat that odd or even semester of the prevailing scheme by taking readmission during the subsequent academic year/s. They shall also be governed by 23SBCA11.1 and 11.2. (b) If the rejection of SEE results excluding the progressive marks is of odd semester, students shall be allowed to take admission to the immediate next even semester. If the rejection of SEE results exclude the progressive marks is of even semester, then students shall not be allowed to take admission to the next odd semester as per 23SBCA9.2. In such cases, students shall take admission to the next odd semester of the prevailing scheme during the subsequent academic year/s, after obtaining the eligibility to move to higher semester. They shall also be governed by 23SBCA11.1 and 11.2. (c) Readmission to odd/even semester as per 23SBCA7.15 (i) and (iii) shall not be considered as fresh admission and therefore students shall continue to have the same University Seat Number, which was allotted earlier. The Course duration (as per 20OBCA1.5) will be counted with reference to old USN. (d) Applications for rejection and approval to reappear for university examinations shall be sent to the Registrar (Evaluation) through the Principal of the College within 30 days from the date of announcement of the results. Late submission of applications shall not be accepted for any reason. (e) Application for approval of readmission shall be sent to the Registrar through the Principal of College within 30 days from the date of the announcement of the results. Late submission of application shall not be accepted for any reasons.
23SBCA7.16	Students who opt for rejection of results of university examination are eligible for the award of degree but are not eligible for the award of ranks.
23SBCA8.0	**Attendance Requirement**
23SBCA8.1	Courses of each semester shall be treated as a separate unit for calculation of the attendance. The candidate has to put in a minimum attendance of 85% in each Course with a provision to condone 10% of the attendance by the Vice-Chancellor on the specific recommendations of the Principal of the college where the candidate is studying, based on medical grounds, participation in University/State/ National/ International level sports and cultural activities, seminars, workshops, paper presentation etc., of significant value.
20 BCA 8 . 1 (continued)	The supporting documents for condoning the shortage of attendance are to be submitted along with the recommendations. The basis for the calculation of the attendance shall be the period prescribed by the University by its calendar of events.
23SBCA8.2	The Course Instructor/ Mentor/College shall inform the students as well as their parents about the attendance status periodically. Students who are facing the shortage of attendance be mentored to make up for the shortage. Principals shall also notify monthly, the list of candidates who are short of attendance.

23SBCA8.3	A candidate who does not satisfy the attendance requirement (in one or more Courses) as mentioned in 23SBCA8.1 shall not be eligible to appear for the SEE of that semester and shall not be permitted to take admission to the next higher semester. The candidate shall be required to repeat that semester during the subsequent year.
23SBCA8.4	The list of the candidates falling short of attendance shall be sent to the Registrar (Evaluation) at least once in a month and the final list shall be sent one week prior to the commencement of the examination. The detained students should obtain permission from Registrar, UoM for readmission to the semester concerned as a repeater.
23SBCA9.0	**Vertical Progression (Promotion/ Eligibility to higher semesters)**

23SBCA9.1	(a) There shall be no restriction for promotion from an odd semester to the next even semester, provided the student has fulfilled the attendance requirement, except in the case of promotion from VI semester to VII semester.
	
	(b) A student shall be eligible for promotion from VII semester to VIII semester provided he/she has passed the course Professional Training of VII semester. If the candidate has not undergone the training/ discontinued after registration to training/not undergone the prescribed training period of 16 weeks/ failed in viva voce examination, he/ she shall repeat the Professional Training during again to appear for the SEE.
	
	(c) A student shall be declared fail if the candidate
	  (i) Fails to satisfy the minimum progressive marks conditions.
	  (ii) Absents himself / herself to the University examination.
	  (iii) Is held guilty of examination malpractice and for any other reasons and declared the performance of any Course/s null and void by a competent authority.
	  (iv) If a student secures F grade in any of the Course/s, he/she shall reappear in that Course/s during the subsequent SEE. The progressive marks awarded to the student at first attempt in the concerned Course/s shall be carried forward. Newly earned progressive marks is considered only incases of 23SBCA7.4.

23SBCA9.2	**Vertical Progression:** (a) Each credit Course shall be treated as a head of passing. (b) Students having not more than four F grades in the two semesters of the first year of the Programme shall be eligible to move to Year II. (c) Students having not more than four F grades in the four semesters of I and II year shall be eligible to move to III year. (d) Students having not more than four F grades in the six semesters of I, II and III years shall be eligible to move to IV year.
23SBCA10.0	**Award of Degree**

23SBCA10.1	(a) Students shall be declared to have completed the BCA (Hons) (AI&ML/ DS&CS) programme and shall be eligible for the award of BCA (Hons) (AI&ML/ DS&CS) degree**,** provided the students have undergone the stipulated Course work of all the semesters under the same Scheme of Teaching and Examination and has earned the prescribed number of credits as per the provision 23SBCA1.6.
	(b) [To be read along with 23SBCA11.1 and 11.2.]
	(c) If the students exits in 3 years, they shall be declared to have completed the BCA (Hons) (AI&ML/ DS&CS) , programme and shall be eligible for the award of BCA (Hons) (AI&ML/ DS&CS)) provided the students have undergone the stipulated Course work of all the semesters under the same Scheme of Teaching and Examination and has earned the prescribed number of credits as per the provision 23SBCA1.6. [To be read along with 23SBCA11.1 and 11.2.]
	(d) For the award of Hons., a CGPA ≥5.00 at the end of Programme shall be mandatory. [to be read with 23SBCA10.0 and 11.0]
23SBCA10.2	**Noncompliance of CGPA ≥ 5. 00 at the end of the programme**
	(a) Students who have completed all the courses of the programme but do not have a CGPA ≥ 5.00 at the end of the programme, shall not be eligible for the award of the degree. In such cases, students shall be permitted to appear again for SEE in course/s [other than Professional training and BCA Project (Thesis)] of any Semester/s without the rejection of progressive evaluation marks for any number of times, subject to the provision of maximum duration of the programme to make up the CGPA equal to or greater than 5.00 for the award of the Degree.
	(b) In case, the students earn improved grade/s in all the reappeared course/s, the CGPA shall be calculated considering the improved grade/s. If it is ≥ 5.00, the students shall become eligible for the award of the degree. If CGPA <5.00, the students shall follow the procedure laid in 23SBCA10.2 (a).
	(c) In case, the students earn improved grade/s in some course/s and the same previously earned pass grade/s in the other reappeared course/s, the CGPA shall be calculated considering the improved grade/s. If it is ≥ 5.00, the students shall become eligible for the award of the degree. If CGPA <5.00, the students shall follow the procedure laid in 23SBCA10.2 (a).
	(d) (d)In case, the students earn improved grade/s in some courses and fail in the other reappeared course/s, the CGPA shall be calculated by considering the improved grade/s and the previously earned pass grade/s of the reappeared course/s in which the students have failed. If it is ≥ 5.00, the students shall become eligible for the award of the degree. If CGPA <5.00, the students shall follow the procedure laid in 18OBA10.2 (a).
23SBCA10.2 (Continued)	(e) In case the students fail (i.e., earns F grade) in all the reappeared course/s, pass grade/s of the course/s earned by the students before reappearance shall be retained. In such cases, the students shall follow the procedure laid out in 23SBCA10.2 (a).
	(f) Students shall obtain written permission from the Registrar (Evaluation) to reappear in SEE to make up the CGPA equal to or greater than 5.00.

23SBCA11.0	**Temporary Discontinuation/Break in the Program**
23SBCA11.1	(a) If a candidate, for any reason, temporarily discontinues the Programme or takes a break from the Programme during any semester intentionally, he/ she shall be permitted to continue the Programme by registering for the same semester of the prevailing scheme. The candidate shall complete all the remaining Course work subject to the provision 23SBCA1.5. Also, the Candidates may have to complete additional Course/s, if any, as per the decision of Board of Studies and approval of Dean, Faculty of BCA (Hons) (AI&ML/ DS&CS) on establishing the equivalence between two schemes. (b) A Grade card shall be issued to that effect. Additional Course/s shall not be considered for the eligibility criteria prescribed for promotion. However, based on the individual cases, they shall be considered to decide the SGPA and CGPA to admit the student for the award of degree. Such candidates shall not be eligible for the award of rank. (c) Candidates who take admission to any semester of the existing scheme from another scheme, as a repeater/fresher because of various reasons, including the case of 23SBCA11.1(a),
23SBCA11.1 (Continued)	shall attend and complete all the remaining semester/s of the Programme adhering to the regulations of the prevailing scheme, and shall complete additional Course/s, if any, as per the decision of Board of Studies in BCA (Hons.) and approval of Dean, Faculty of BCA (Hons) (AI&ML/ DS&CS) , on establishing the equivalence between two schemes. (a) A Grade card shall be issued to that effect. Additional Courses shall not be considered for the eligibility criteria prescribed for promotion. However, based on the individual cases, they shall be considered to decide the SGPA and CGPA to admit the student for the award of degree. Such a candidate shall not be eligible for the award of rank. (b) The credits to be earned by the candidates under 23SBCA11.1 (a and b) and BCA13.1 (b) and (c) shall be decided by the University along with the additional Course/s to be completed.
23SBCA11.2	(a) The candidates who have temporarily discontinued the Programme of study or changed the scheme of study from one to another because of various reasons, or transferred from autonomous/other University to non- autonomous UoM affiliated college, shall be eligible for the award of degree provided the credits earned is equal to or greater than the credits decided by the University in the individual cases. (b) In case, the credits earned is less than the credits decided by the University in the individual cases, after the completion of all the semesters of the Programme under the prevailing scheme, the candidate shall register for a Course or courses not studied earlier and make up the credits earned equal to or greater than the required for the award of degree.
23SBCA12.0	**Award of Prizes, Medals and Ranks**
23SBCA12.1	For the award of Prizes and Medals, the conditions stipulated by the Donor shall be considered subject to the provisions of the statutes framed by the University for such awards.

23SBCA12.2	(a) For award of rank in BCA (Hons.) the CGPA secured by the students from I to VIII semester shall be considered.
	
	(b) A student shall be eligible for a rank at the time of award of BCA (Hons) (AI&ML/ DS&CS), provided the student
	  (i) Has passed I to VIII semester in all the Courses in first attempt only. Is not a repeater in any semester because of rejection of result of a semester/ shortage of attendance etc.
	  (ii) Has completed all the semesters without any break/discontinuity.
	  (iii) Has completed all the semesters (I to VIII) in UoM constituent college or in any UoM affiliated non-autonomous college.
	  (iv) Has not been transferred from any autonomous institution affiliated to UoMor from any other University.
	(c) The total number of ranks awarded shall be 10% of the total number of students appeared in VIII semester subject to a maximum of 10 ranks.
	
	(d) Illustration:
	  (i) If 1333 students appeared for the VIII semester BCA (Hons) programme, the number of ranks to be awarded shall be 10.
	  (ii) If 90 students appeared for the VIII semester BCA (Hons) programme, the number of ranks to be awarded shall be 09.
	(e) In case of fractional number of ranks, it is rounded to higher integer only

23SBCA12.3	Ranks are awarded based on the merit of the students as determined by CGPA. If two or more students get the same CGPA, the tie shall be resolved by considering the number of times a student has obtained higher SGPA. If it is not resolved even at this stage, the number of times a student has obtained higher grades like S, A,B etc., shall be taken into account to decide the order of the rank.
23SBCA13.0	**Transfers of Students**
23SBCA13.1	Transfer of students from one college to another college within the Karnataka state shall be permitted only at the beginning of third, and fifth, semesters, subject to availability of seats within the permitted intake in respective colleges and subject to the prior approval of the University. Transfer of students from one non - autonomous to another non – autonomous college affiliated to UoM is permitted with the approval of the Registrar, UoM subject to provision 23SBCA9.2. **The students seeking transfer shall have to** (i) Obtain No Objection certificate for admission from the University and from both the colleges before the commencement of term as notified by UoM. (ii) Complete the Programme subject to the provision 23SBCA1.5. Transfer of students from an autonomous to non – autonomous college, affiliated toUoM is permitted with the approval of the Registrar, UoM provided the candidates have passed in all the Courses of the previous semesters.

23SBCA13.1	**The students seeking transfer shall have to** (i) Obtain No Objection certificate for admission from the University and from both the colleges before commencement of term as notified by UoM. (ii)Complete additional Course/s, if any, as per the decision of concerned Board of Studies and approval of Dean, Faculty of BCA (Hons) (AI&ML/ DS&CS) on establishing the equivalence between two schemes. A Grade card shall be issued to that effect. Additional Course/s shall not be considered for the Eligibility criteria prescribed for promotion, Class, calculation of SGPA and CGPA. However, a pass in the additional Courses, if any, is mandatory before the completion of Degree. (iii) Earn the credits decided by the University as per 23SBCA11.2.
23SBCA13.1 (Continued)	**The students seeking admission from other Universities to UoM shall have to** (i)Apply for establishment of equivalence with prescribed fees as notified by the UoM and obtain No Objection certificate for admission from the University before the commencement of term as notified by UoM. (ii) Produce No Objection certificate for admission from both the colleges before the commencement of term as notified by UoM. (iii) Complete additional Course/s, if any, as per the decision of concerned Board of Studies and approval of Dean, Faculty of **BCA (Hons) (AI&ML/ DS&CS)**, on establishing equivalence between two schemes. A Grade card shall be issued to that effect. Additional Course/s shall not be considered for the eligibility criterion prescribed for promotion, Class, calculation of SGPA and CGPA. However, a pass in the additional Courses, if any, is mandatory before the completion of Degree. (iv) Earn the credits decided by the University as per 23SBCA 11.2.
23SBCA13.2	The University may prescribe a fee for administrative purpose, which shall be notified from time to time, for transfer from one college to another (Change of College).
23SBCA14.0	**Applicability and Power to Modify**
23SBCA14.1	The regulations governing the **BCA (Hons) (AI&ML/ DS&CS)** of University of Mysore shall be a binding on all
23SBCA14.2	i) Notwithstanding anything contained in the foregoing, the University shall have the power to issue directions/ orders to address any difficulty. ii) Nothing in the foregoing may be construed as limiting the power of the University to amend, modify or repeal any or all of the above.

ANNEXURE 1

Letter Grade	Grade Point
O (Outstanding)	100
A+ (Excellent)	90-99
A (Very Good)	80-89
B+ (Good)	70-79
B(Above Average)	60-69
C (Average)	50-59
P(Pass)	40-49
F(Fail)	Below 40
Ab(Absent)	0

Note

- A student obtaining Grade I shall be considered failed and will be require to reappear in the examination

- For non-credit courses Satisfactory or "Unsatisfactory shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA

- The formula for conversion of Grade Point Average (GPA) into the Final Grade

Sl. No.	Mark From	Mark To	Grade	Grade Value	Advantage	Fail
1	0	42	F	0	No	Yes
2	43	50	E	5	No	No
3	5	60	D	6	No	No
4	61	70	C	7	No	No
5	71	80	B	8	No	No
6	81	90	A	9	No	No
7	91	100	S	10	No	No

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

BCA (Honors) Data Science (DS) & Cyber Security (CS)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Mathematical	4	2	0	6	2	50	50		100	6
2		SDC	Introduction to C Programming	0	4	4	8			50	50	100	6
3		SDC	Computer Networks	0	4	4	8			50	50	100	6
4		SDC	Fundamentals of Computers	2	2	0	4	2	50	50		100	4
5		OE	Open Elective	0	3	0	3			100		100	3
6		GE	SOFT SKILL-TECHNICAL READING, WRITING AND PEER TEACHING-I	2	1	0	3	2	50	50		100	3
7		GE	LIFE SKILL AND PUBLIC SERVICES-I	0	1	2	3			50	50	100	2
8		CEA	Yoga, Sports & Culture	0	1	0	1			100		100	1
			Total	**8**			**36**		**150**	**500**	**150**	**800**	**31**
		No. of subjects/Heads		8	No. of Theory Examinations =		3						
		HAP = Humanities and Psychology subjects											

Subject Categories :   **GE** = General Education   **CEA** = Cultural & Extracurricular Activities   **SDC** = Skill Development components   **OE** = Optional Elective

Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

BCA (Honors) Data Science (DS) & Cyber Security (CS)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Statistical Foundation	4	2	0	6	2	50	50		100	6
2		SDC	Python-Programming	0	4	4	8			50	50	100	6
3		SDC	Introduction to Data Structures & Algorithms	0	4	4	8			50	50	100	6
4		SDC	DBMS with SQL	2	2	0	4	2	50	50		100	4
5		OE	Open Elective	0	3	0	3			100		100	3
6		GE	SOFT SKILL-TECHNICAL READING, WRITING AND PEER TEACHING-II	2	1	0	3	2	50	50		100	3
7		GE	LIFE SKILL AND PUBLIC SERVICES-II	0	1	2	3			50	50	100	2
8		CEA	Yoga, Sports & Culture	0	1	0	1			100		100	1
			Total	**8**			**36**		**150**	**500**	**150**	**800**	**31**
		No. of subjects/Heads		8	No. of Theory Examinations =		3						
			HAP = Humanities and Psychology subjects										
	Subject Categories :	**GE** = General Education	**CEA** = Cultural & Extracurricular Activities			**SDC** = Skill Development components				**OE** = Optional Elective			
	Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each												
	Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.												

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

BCA (Honors) Data Science (DS) & Cyber Security (CS)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Probability and Statistics	4	2	0	6	2	50	50		100	6
2		SDC	Data Mining	0	4	4	8			50	50	100	6
3		SDC	R Language for Data Science & Data Analytics	0	4	4	8			50	50	100	6
4		SDC	Introduction to Data Science & Analytics	2	2	0	4	2	50	50		100	4
5		OE	Open Elective	0	3	0	3			100		100	3
6		GE	SOFT SKILL-TECHNICAL READING, WRITING AND PEER TEACHING-III	2	1	0	3	2	50	50		100	3
7		GE	LIFE SKILL AND PUBLIC SERVICES-III	0	1	2	3			50	50	100	2
8		CEA	Yoga, Sports & Culture	0	1	0	1			100		100	1
			Total	**8**			**36**		**150**	**500**	**150**	**800**	**31**
		No. of subjects/Heads		8	No. of Theory Examinations =		3						
		HAP = Humanities and Psychology subjects											
		Subject Categories : **GE** = General Education **CEA** = Cultural & Extracurricular Activities **SDC** = Skill Development components **OE** = Optional Elective											
		Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each											
		Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.											

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

BCA (Honors) Data Science (DS) & Cyber Security (CS)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Fundamentals of Cyber Security	4	2	0	6	2	50	50		100	6
2		SDC	Linux & Shell Programming	0	4	4	8			50	50	100	6
3		SDC	Cloud Computing	0	4	4	8			50	50	100	6
4		SDC	Cyber Law & Information Security	2	2	0	4	2	50	50		100	4
5		OE	Open Elective	0	3	0	3			100		100	3
6		GE	SOFT SKILL-TECHNICAL READING, WRITING AND PEER	2	1	0	3	2	50	50		100	3
7		GE	LIFE SKILL AND PUBLIC SERVICES-IV	0	1	2	3			50	50	100	2
8		CEA	Yoga, Sports & Culture	0	1	0	1			100		100	1
			Total	**8**			**36**		**150**	**500**	**150**	**800**	**31**
		No. of subjects/Heads		8	No. of Theory Examinations =		3						
			HAP = Humanities and Psychology subjects										
Subject Categories :	**GE** = General Education		**CEA** = Cultural & Extracurricular Activities			**SDC** = Skill Development components			**OE** = Optional Elective				
Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each													
Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.													

BCA (Honors) Data Science (DS) & Cyber Security (CS)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Data Analytics Methods and Probability Distribution	4	2	0	6	2	50	50		100	6
2		SDC	Data Analytics with Python	0	4	4	8			50	50	100	6
3		SDC	Text, Web and Social Media	2	2	0	4	2	50	50		100	4
4		SDC	Capstone Project	0	0	12	12			50	50	100	6
5		OE	Open Elective	0	3	0	3			100		100	3
6		CEA	Yoga, Sports & Culture	0	1	0	1			100		100	1
			Total	**6**			**34**		**100**	**400**	**100**	**600**	**26**
		No. of subjects/Heads		6	No. of Theory Examinations =2								
		HAP = Humanities and Psychology subjects											
		Subject Categories : **GE** = General Education **CEA** = Cultural & Extracurricular Activities **SDC** = Skill Development components **OE** = Optional Elective											
		Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each											
		Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.											

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

BCA (Honors) Data Science (DS) & Cyber Security (CS)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Cyber Security – Network Defense	4	2	0	6	2	50	50		100	6
2		SDC	Domain Specific Predictive Analytics	0	4	4	8			50	50	100	6
3		SDC	Ethical Hacking	2	2	0	4	2	50	50		100	4
4		SDC	Capstone Project	0	0	12	12			100		100	6
5		OE	Elective	0	3	0	3			100		100	3
6		CEA	Yoga, Sports & Culture	0	1	0	1			100		100	1
			Total	**6**			**34**		**100**	**450**	**50**	**600**	**26**
No. of subjects/Heads = 6					No. of Theory Examinations = 2								
HAP = Humanities and Psychology subjects													
Subject Categories : **GE** = General Education **CEA** = Cultural & Extracurricular Activities **SDC** = Skill Development components **OE** = Optional Elective													
Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each													
Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.													

BCA (Honors) Artificial Intelligence (AI) & Machine Learning (ML)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		GE	Internship			0						100	12
2		GE	Internship Report	0	0	6	6			50	50	100	6
			Total	**0**					**0**			**200**	**18**
No. of subjects/Heads				2	No. of Theory Examinations =0								
HAP = Humanities and Psychology subjects													

Subject Categories :   **GE** = General Education   **CEA** = Cultural & Extracurricular Activities   **SDC** = Skill Development components   **OE** = Optional Elective

Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

BCA (Honors) Artificial Intelligence (AI) & Machine Learning (ML)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		GE	THESIS	0	3	24	27			50	50	100	15
			Total	0					0			100	15
No. of subjects/Heads				1	No. of Theory Examinations =0								
HAP = Humanities and Psychology subjects													
Subject Categories : **GE** = General Education **CEA** = Cultural & Extracurricular Activities **SDC** = Skill Development components **OE** = Optional Elective													
Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each													
Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.													

ACHARYA INSTITUTE FOR INNOVATION & TRANSFORMATION

Bachelor of Computer Applications (Hons)
(UNIVERSITY OF MYSORE)

SYLLABUS

DATA SCIENCE & CYBER SECURITY

March 2023

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
I				**MATHEMATICAL FOUNDATION**	4	90	6
	L	T	P	**THEORY**	**INTERNAL**	**PRACTICAL**	**TOTAL MARKS**
	4	2	0	50	50	0	100

Course Objectives

In order to be able to formulate what a computer system is supposed to do, or to prove that it does meet its specification, or to reason about its efficiency, one needs the precision of mathematical notation and techniques. For instance, to specify computational problems precisely one needs to abstract the detail and then use mathematical objects such as matrices, differentiation and integration To prove that a proposed solution does work as specified, one needs to apply the principles of mathematical logic, and to use proof techniques such as induction. And to reason about the efficiency of an algorithm, one often needs to count the size of complex mathematical objects. The Mathematics foundation course aims to provide this mathematical background.

Course Outcomes

After successful completion of this course, the student will be able to;

1. Have an idea about basic mathematical techniques which are necessary to analyze the statically technique.

2. Able to know the concept of matrices and its operations.

3. Able to complete the adjoint and determinant of a square matrix, hence its inverse.

4. Capable of solving the simultaneous equations using matrix methods.

5. Understands the technique differentiation, integration and its applications.

UNIT- I

Matrix Algebra I: Introduction-Definition of Matrix-Various types of Matrices –Row Matrix- Column Matrix-Square Matrix-Rectangular Matrix-Scalar Matrix-Unit Matrix-Null Matrix- orthogonal Matrix-Addition of Matrices-Subtraction of Matrices-Multiplication of Matrices and their applications.

UNIT- II

Matrix Algebra II: Transpose of a Matrix-Symmetric Matrix-Skew Symmetric Matrix - Orthogonal Matrix - Singular Matrix - Non Singular Matrix - Determinant of a Matrix -Adjoint of a Square Matrix - Inverse of a Matrix up to 3 order only.

UNIT- III

Matrix Algebra III: Rank of a Matrix - Definition - To find Rank of a Matrix for a given Matrix.

Solutions of Linear equations: 1.Matrix inversion method

2.Cramer's Rule up to 3 order only

UNIT-IV

Numerical Integration, Finite Difference and Interpolation Numerical Integration :

1. Trapezoidal rule 2. Simpson's 1/3 rule 3.Simpson's 3/8 rule Finite Difference and Interpolation:

Finite Differences - Forward Differences - Backward differences. Newton's forward interpolation formula - Newton's backward interpolation formula.

UNIT-V

Set Theory : Definition of Set- Types of Sets-Union of Sets-Intersection of Sets-Venn diagrams- Operations on Sets-Complement of Set-Distributive Laws-De Morgan's Laws

Note:

1. Concentration on numerical problems only.

2. Proofs of theorems and Derivations of expressions are omitted.

Text Books:

1. Mathematical Methods by Dr.T.K.V. Iyengar, Dr.B.Krishna Gandhi, Dr. S.Ranganatham, and

Dr.M.V.S.S.N. Prasad by S.Chand publications 6th revised edition 2011.

2. Quantitative Techniques by C.Satyadevi by S.chand Company

Reference Book:

1. Higher Engineering Mathematics by Dr.B.S.Grewal by Karna **publisher‟s 34th edition.**

Web Resources:

1. https://www.my-mooc.com/en/categorie/mathematics
2. http://www.nptelvideos.in/2012/11/discrete-mathematical-structures.html
3. https://ocw.mit.edu/courses/mathematics/

SEME STER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
I				**FUNDAMENTALS OF COMPUTERS**	4	60	4
	L	T	P	**THEORY**	**INTERNAL**	**PRACTICAL**	**TOTAL MARKS**
	2	2	0	50	50	0	100

Course Outcomes (COs):
Introduction to computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers Operating systems, functions of operating systems, classification of operating systems, kernel, shell, basics of Unix, shell programming, booting Databases, why databases are used, users, SQL, data types in SQL, introduction of queries - select, alter, update, delete, truncate, using where, and or in not in Internet basics, features, applications, services, internet service providers, domain name system, browsing, email, searching Web Programming basics, introduction of HTML and CSS programming Introduction of computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers.

UNIT- I
Fundamentals of Computers: Introduction to Computers - Computer Definition, Characteristics of Computers, Evolution and History of Computers, Types of Computers, Basic Organisation of a Digital Computer; Number Systems – different types, conversion from one number system to another; Computer Codes – BCD, Gray Code, ASCII and Unicode; Boolean Algebra – Boolean Operators with Truth Tables; Types of Software – System Software and Utility Software; Computer Languages - Machine Level, Assembly Level & High Level Languages, Translator Programs – Assembler, Interpreter and Compiler; Planning a Computer Program - Algorithm, Flowchart and Pseudo code with Examples

UNIT -II
Introduction to computers: Characteristics of computers, Classification of Digital Computer Systems: Microcomputers, Minicomputers, Mainframes, Super computers. Anatomy of Computer: Introduction, Functions & Components of a Computer, Central Processing Unit, Microprocessor, Storage units, Input and output Devices. How CPU and memory work. Program execution with illustrative examples. Introduction to microcontrollers.

UNIT -III
Operating System Fundamentals: Operating Systems: Introduction, Functions of an operating System, Classification of Operating Systems, System programs, Application programs, Utilities, The Unix Operating System, Basic Unix commands, Microkernel Based Operating System, Booting.

UNIT IV
Introduction to Database Management Systems: Database, DBMS, Why Database -File system vs DBMS, Database applications, Database users, Introduction to SQL, Data types, Classification of SQL-DDL with constraints, DML, DCL, TCL

UNIT -V
Internet Basics: Introduction, Features of Internet, Internet application, Services of Internet, Logical and physical addresses, Internet Service Providers, Domain Name System.
Web Basics: Introduction to web, web browsers, http/https, URL, HTML5, CSS

Textbooks:
1. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition), BPB Publication
2. David Riley and Kenny Hunt, Computational thinking for modern solver, Chapman & Hall/CRC,
Reference:
1. J. Glenn Brook shear," Computer Science: An Overview", Addision-Wesley, Twelfth Edition,
2. R.G. Dromey, "How to solve it by Computer", PHI

PRACTICALS

Part A: Hardware
1. Identification of the peripherals of a computer, components in a CPU and their functions.
2. Assembling and disassembling the system hardware components of personal computers.
3. Basic Computer Hardware Troubleshooting.
4. LAN and WiFi Basics.
5. Operating System Installation – Windows OS, UNIX/LINUX, Dual Booting.
6. Installation and Uninstallation of Software – Office Tools, Utility Software (like Anti-Virus, System Maintenance tools); Application Software - Like Photo/Image Editors, Audio Recorders/Editors, Video Editors …); Freeware, Shareware, Payware and Trialware; Internet Browsers, Programming IDEs,
7. System Configuration – BIOS Settings, Registry Editor, MSConfig, Task Manager, System Maintenance, Third-party System Maintenance Tools (Similar to Cleaner and Jv16 PowerTools …)

Part B: Software
1. Activities using Word Processor Software
2. Activities using Spreadsheets Software
3. Activities using Presentation Software
4. Activities involving Multimedia Editing (Images, Video, Audio …)
5. Tasks involving Internet Browsing
6. Flow charts: Installation and using of flow algorithms software for different arithmetic tasks like sum, average, product, difference, quotient and remainder of given numbers, calculate area of Shapes (Square, Rectangle, Circle and Triangle), arrays and recursion.

NOTE: In addition to the ones listed above, universities can include other activities so as for the student to become proficient in using personal computers for multiple purposes for which modern computers can be put to use.

Reference:
1. Computational Thinking for the Modern Problem Solver, By Riley DD, Hunt K.A CRC press, 2014
2. Ferragina P, Luccio F. Computational Thinking: First Algorithms, Then Code. Springer
Web References:
http://www.flowgorithm.org/documentation/

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
				C PROGRAMMING	8	120	6
I	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	4	4	0	50	50	100

Course Objectives:
1. This course aims to provide exposure to problem-solving through programming. It introduces the concepts of the C Programming language.

Course Learning Outcomes:
Upon successful completion of the course, a student will be able to:
1. Understand the programming languages and flow charts.
2. Apply logical skills to analyze a given problem
3. Develop an algorithm for solving a given problem.
4. Understand 'C' language constructs like Iterative statements, Array processing, Pointers, etc.
5. Apply 'C' language constructs to the algorithms to write a 'C' language program.

UNIT- I
Introduction to Algorithms and Programming Languages: Algorithm – Key features of Algorithms, Flow Charts, Programming Languages – Generations of Programming Languages Introduction to C: Introduction – Structure of C Program – Writing the first C Program – Files used in C Program – Compiling and Executing C Programs - Programming
Examples

UNIT -II
C Fundamentals : Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Operators in C – I/O Statements (scanf, printf)
Decision Control Statements: Introduction to Decision Control Statements – Conditional Branching Statements : simple if, if..else, nested if, switch statements – Programming Examples

UNIT -III
Iterative Control Statements: Iterative Statements – Nested Loops – Break and Continue Statement - Goto Statement
Arrays: Introduction – Declaration of Arrays – Accessing elements of the Array – Storing Values in Array – one dimensional array for inter-function communication – Two dimensional Arrays – two dimensional arrays for inter-function communication
Strings: Introduction – String operations – String functions

UNIT IV
Functions: Introduction – using functions – Function declaration/ prototype – Function definition – function call – return statement – Passing parameters – Scope of variables – Storage Classes – Recursive functions.
Structure and Unions: Introduction – Nested Structures – Arrays of Structures – Structures and Functions – Unions – Arrays of Unions Variables

UNIT -V
Pointers: Introduction to Pointers – declaring Pointer Variables - Passing Arguments to Functions using Pointer – Pointer and Arrays – Dynamic Memory Allocation
File Handling: Introduction to Files, File modes, File operations, Using Files in C, Reading Data from Files, Writing Data from Files, Detecting the End-of-file

Text Books:

1. Computer Fundamentals and Programming in C by Reema Thareja from Oxford University Press
Reference Books:
1. E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3.
2. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publ, 2002.
3. Yashavant Kanetkar - Let Us 'C' – BPB Publications.
4. Brain W Kernighan and Dennis M Ritchie - The 'C' Programming language - Pearson publications.

Web Resources:
1. http://algorithmsforinterviews.com "Algorithms for Interviews"

 PRACTICALS:

Write, and execute C program for the following:

1. to read radius of a circle and to find area and circumference

2. to read three numbers and find the biggest of three

3. to check whether the number is prime or not

4. to read a number, find the sum of the digits, reverse the number and check it for palindrome

5. to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers

6. to read percentage of marks and to display appropriate message (Demonstration of else-if ladder

7. to find the roots of quadratic equation

8. to read marks scored by n students and find the average of marks (Demonstration of single dimensional array)

9. to remove Duplicate Element in a single dimensional Array

10. to perform addition and subtraction of Matrices

11. to find factorial of a number

12. to generate fibonacci series

13. to remove Duplicate Element in a single dimensional Array

14. to find the length of a string without using built in function

15. to demonstrate string functions

16. to read, display and add two m x n matrices using functions

17. to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.

18. to Swap Two Numbers using Pointers

19. to demonstrate student structure to read & display records of n students

20. to demonstrate the difference between structure & union.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
I				**COMPUTER NETWORKS**	**8**	**120**	**6**
	L	**T**	**P**	**THEORY**	**INTERNAL**	**PRACTICAL**	**TOTAL MARKS**
	0	**4**	**4**	**0**	**50**	**50**	**100**

Course Outcomes:

After this course, the student will be able to

1. Identify the different components in a Communication System and their respective roles.

2. Describe the technical issues related to the local Area Networks

3. Identify the common technologies available in establishing LAN infrastructure.

UNIT- I:

Introduction to Network:- Definition, Applications, line configuration, Network topologies, Transmission mode, Types of Networks (LAN, WAN, MAN), Protocols, Network models: The OSI model, TCP/IP Protocol Suite.

Physical Layer: Signals –Analog signals, Digital signals, Transmission media - Guided & Un- Guided.

UNIT - II:

Network LAN Technologies: Ethernet, Fast Ethernet, Gigabit Ethernet, and Wireless LAN's. Data Link Layer: Error Detection and correction - Types of Errors, Error Detection, Error correction. Data link Protocols – Stop-and-wait ARQ, Go-back-n ARQ, Automatic Repeat Request (ARQ).

UNIT - III:

Network Devices: Modem, Hub, Switch, Router, Repeaters, bridges, Gateway.

Network Layer: Internetwork Protocol (IP), Addressing (Classes, Dotted-decimal notation, Sample Internet), Subnet mask, Network layer Protocols – ARP, IPv4, and IPv6.

UNIT -IV:

Transport Layer: TCP protocol, UDP protocol, Process-to-Process delivery, Congestion: Congestion control, congestion avoidance, congestion discarding, Quality of Service (QOS).

UNIT -V:

Application Layer: Domain Name System (DNS) - domain name space, distribution of name space, DNS in the Internet, SMTP, SNMP, FTP, POP3, HTTP, WWW.

Text Books:

1. Data Communication and Computer Networks by Behrouz A. Forozoun, Published by Thomas casson, MC GRAW HILL 2nd edition.

References Books:

1. Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, 2003

2. An introduction to computer networks by PETER L DORODAL.

3. Communication networks by JEAN WAIRAND –WCB/MCGRAW HILL -1998, 2nd Edition.

4. Computer Networks by Bhushan Trivedi, Oxford University Press

5. Nader F. Mir, "Computer and Communication Networks", Pearson Education, 2007

SUGGESTED PRACTICALS:

1. Write a program for print the IP Address of a WWW.YAHOO.COM

2. Write a program to print the IP Address of the local machine and hostname.

3. Write HTML program to implement get( ) and post( ) methods

4. Write a program to identify the well known ports on a Remote system.

5. Write a program to print the parts of the URL.

6. Write a program to send & receive data from a datagram packet.

7. Write a program for a chat application.

8. Write a program for the simple file transfer between two systems by opening socket connection to our server on one system and sending a file from one system to another.

9. Write a program for the HTTP server.

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
I				**Communicative English**	3	45	3
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	3	0	0	100	0	100

Course Objectives:

° Learn Basics of Communication.

° Learn and develop the skills of writing, speaking, reading and listening.

° Know telephonic conversation skills, Interview skills and Group Discussion basics.

° Gain the knowledge and develop personality , soft skills ,presentation skills.

° To develop reading skills.

Course Outcomes:

° Inculcate Process of Communication and identify barriers in communication.

° Demonstrate the competency in English language through understandability and practice in four skills of language such as writing, speaking, reading and listening.

° Develop skills for working in a team and individually.

° Inculcate soft skills and develop personality through participation in group discussion, mock interview, group and individual presentation

° Practice reading skills in English language specific to eminent Indian Authors.

UNIT-I

The Process of Communication: Communication, the Process of Communication, Barriers of Communication, Different Types of Communication, Characteristics and Conventions of Conversation, Conversational Problems of Second/Foreign Language Users, Difference Between Conversation and Other Speech Events

UNIT- II

Telephone Techniques: Speaking and Listening, Conference Calls, Vocabulary Building, Writing, Grammar and Usage, Pronunciation, Job Applications and Interviews: Reading, Curriculum Vitae, Preparing for an Interview, Listening and Speaking in the Interviews Group Discussions: Group-Discussion, Study Skills, Language Focus, Speaking.

UNIT- III

Soft Skills Practice, Personality Development, Participating in Group Discussion and Job Interviews, Time Management Presentation Skills, Leadership Skills, Assertiveness, Lateral Thinking, Teamwork and Interpersonal Skills, Emotional Intelligence, Self-Confidence and Courage, Attitude.

UNIT- IV

Speaking Skills and Presentation: Presentation Design and Delivery. Monologue Dialogue, Group Discussion. Effective Communication/ Mis-Communication. Interview, Public Speech. Effective Writing, Report Writing, Resume, Circular, Notice and letter Writing.

UNIT- V

Importance of English as a vehicle of Spoken and written Communication. Close Reading Comprehension Summary Paraphrasing Analysis and Interpretation. Translation (from Indian language to English and vice-versa). Introduction to Articles of eminent Indian authors. Short Stories of eminent Indian authors.

References:

° Darer. Shankar-Communication Skills in English Language
° Dr. Uremia Rai and S.M.Rai- Business Communication
° B. K. Das- an Introduction to Professional English and Soft Skills
° Barun K. Mitra- Personality Development and Soft Skills
° Shashikumar and Dhameja-Spoken English
° Raymond Williams- English Grammar
° Wren and Martin -English Grammar and Composition
° Justin Seeley -Designing Presentation
° Laura Bergelles- Public Speaking Foundations
° M.a.K. Halliday- Spoken and Written Language
° B Balasubramanian-Phonetics for Indian Students
° R C Sharma- Business Correspondence
° Dowel Jones- the Handbook of English Phonetics
° Merriam Webster - Guide to Business Correspondence.
° Ashish Singh - How to Communicate Effectively

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
1,2,3,4				**SOFT SKILLS-TECHNICAL READING, WRITING & PEER TEACHING**	3	45	3
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	2	1	0	50	50		100

AIM

The aim of the course on Soft Skill-Technical Reading, Writing, and Peer Teaching is to equip learners with the essential skills and knowledge needed to communicate effectively in technical settings. The course focuses on developing technical reading, writing, and peer teaching skills, as well as enhancing collaborative and team communication abilities.

OBJECTIVES

1. To understand the importance of effective technical communication in various settings, including the workplace and academic environments.
2. To develop critical technical reading skills that enable learners to identify key information, evaluate sources, and summarize and take notes effectively.
3. To enhance technical writing skills by developing an understanding of audience, purpose, document design, and clear and concise writing techniques.
4. To foster peer teaching skills by developing presentation and facilitation skills, providing effective feedback, and engaging in collaborative learning.
5. To develop an appreciation for visual communication techniques and accessible document design principles.
6. To enhance team communication and collaboration skills, including conflict resolution and collaborative writing and editing techniques.
7. To apply technical reading, writing, and peer teaching skills in a real-world project, presenting and evaluating final projects.
8. To encourage self-reflection and goal-setting for continued growth and development in technical communication skills.

By the end of the course, learners should be able to communicate technical information effectively, both in writing and in person, and engage in collaborative learning and teamwork effectively. They should also have a deeper understanding of document design, visual communication techniques, and accessibility principles.

OUTLINE

UNIT 1 - INTRODUCTION TO TECHNICAL COMMUNICATION
What is technical communication?, Importance of effective communication in the workplace, Overview of the course.

UNIT 2- TECHNICAL READING SKILLS
Active reading strategies, Identifying key information, Summarizing and note-taking techniques, Evaluating sources.

UNIT 3- TECHNICAL WRITING SKILLS
Understanding audience and purpose, Organizing and structuring information, Writing clear and concise instructions, Editing and proofreading.

UNIT 4 - PEER TEACHING SKILLS
Understanding the benefits of peer teaching, Preparing and delivering effective presentations, Facilitating group discussions and activities, Providing feedback and evaluation.

UNIT 5- DOCUMENT DESIGN AND VISUAL COMMUNICATION
Basic principles of document design, Using visuals effectively (graphs, charts, images), Creating accessible and inclusive documents.

UNIT 6 - COLLABORATION AND TEAM COMMUNICATION
Communication in team environments, Handling conflicts and disagreements, Collaborative writing and editing.

UNIT 7 - FINAL PROJECT
Applying technical reading, writing, and peer teaching skills to a real-world project, Presenting and evaluating final projects.

UNIT 8 - WRAP-UP AND REFLECTION
Reviewing key concepts and skills learned, Reflecting on personal growth and development, Setting goals for continued improvement in technical communication.

OUTCOME
The course should help learners to communicate technical information more effectively and work collaboratively in team environments. They should also be able to apply the skills they have learned to future projects and continue to improve their technical communication abilities.

QUESTIONS
1. Why is effective technical communication important in the workplace?
2. What are some strategies for active technical reading and note-taking?
3. How can you tailor technical writing to your audience and purpose?
4. What are some techniques for organizing and structuring technical information effectively?
5. How can you provide constructive feedback to your peers during presentations or group discussions?
6. What are some basic principles of document design that can improve the effectiveness of technical documents?
7. How can you use visuals effectively to enhance understanding in technical documents?
8. What are some accessibility principles to consider when creating technical documents?
9. How can you collaborate effectively in team environments?
10. What are some techniques for resolving conflicts and disagreements within a team?
11. How can you apply technical reading, writing, and peer teaching skills to a real-world project?
12. How can you continue to develop your technical communication skills after the course is over?

REFERENCES

1. "Technical Communication" by Mike Markel
2. "The Elements of Technical Writing" by Thomas E. Pearsall
3. "Technical Writing: Principles, Strategies, and Readings" by Diana C. Reep and Laura J. Gurak
4. "The Essentials of Technical Communication" by Elizabeth Tebeaux and Sam Dragga
5. "Designing Visual Language: Strategies for Professional Communicators" by Charles Kostelnick and David D. Roberts
6. "Writing Science: How to Write Papers That Get Cited and Proposals That Get Funded" by Joshua Schimel
7. "Peer Power: Transforming Workplace Relationships" by Cynthia Clay and Ray Olitt
8. "Collaborative Writing in Industry: Investigations in Theory and Practice" by Rachel Spilka.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
1,2,3,4				**LIFE SKILL AND PUBLIC SERVICE**	3	45	2
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	1	2	0	50	50	100

AIM

Life skills directly influence student's careers and lives. Both UNESCO and WHO have listed major life skills. For being cognizant of their own as well as others' emotions, students must be in a position to empathize, communicate, and overcome challenges. Adjusting emotions as per the changing situations is the key to win-win outcomes.

OBJECTIVES

UNIT 1
Interpersonal skills:- By engaging themselves in design experiences, students may present their interpersonal skills. Listening closely to their faculty and friends and connecting with them and building a positive friendship will go a long way to ensuring the success of people and teams.

UNIT 2
Resilience:- It is unavoidable to suffer from mistakes. Nevertheless, perceiving mistakes as stepping stones and learning from them will undoubtedly assist in the improvement and growth of the student, this is done by design crits with eminent industry faculty practicing, who can critique the works of the student and establish the tolerant mindset. Feedback reception to enhance: This is an important part of the learning and development experience of the student. Students should be open to constructive criticism as this keeps them from being complacent and allows one to look sideways to address the problem.

UNIT 3
Cross-cultural sensitization:- It is compulsory for any student to engage in social services such as NSS, NCC, Bharat scouts and guides, NYKS, Air Force, Army and Navy, as this helps to foster harmony and a sense of belonging in the work world by returning to society.

UNIT 4
Time management:- As any task is time-bound in a fast-paced business environment, our progress depends to a great degree on our ability to effectively handle time. Our time management ability will be reflected in striking a study-life balance, grappling with managing schedules, coping with shifting interests, etc., and splitting the time between professional, social and physical activity will be a priority. Decision- making capability: To make a confident decision, it requires an analytical mind, information processing capacity and a rational judgment. This characteristic becomes increasingly more important for their position as one scales up the corporate ladder.

UNIT 5

Technical savviness:- It is imperative that students step up their understanding of technology as technology becomes an integral part of our life. Since our entire syllabus is focused on digitizing the education system, it is often helpful to be familiar with certain theoretical methods as well, aside from being well-versed with the technologies associated with their scope of work.

OUTCOME

- At the end of the such public service initiatives students are trained to lead a program and make quick decisions,
- Trained to equip volunteers with minimum required skills to carry out programmes.
- Equip themselves to work with others comfortably.
- Students would have learnt several other values such as selflessness, honesty, discipline, hard work and ways to build self-confidence and gain leadership qualities.

REFERENCES

1)   Life Skills Education Dr. K Ravikanth Rao,Dr. P Dinakar 2)Life Skills" Dr. Ali Khwaja.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
1,2,3,4,5,6				**YOGA, SPORTS AND CULTURE**	1	15	1
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	1		0	100	0	100

AIM

The positive impact of sports stretches far beyond the physical. Exercise and sporting activity can have significant knock-on effects on other areas of a student's academic performance. Our aim is to encourage students to engage themselves in a mainstream sports activity or cultural activity like dance to keep the students physically fit and give themselves an adrenaline rush to improve their divergent thinking and enhance them to think out of the box.

OBJECTIVES

Engage in any one or more sports activity or cultural activity, it can be any form of dance or martial art for a prescribed period of time on a daily basis.

To maintain a healthy BMI, that will be monitored on a timely basis and credits will be provided for the same.

OUTCOME

1) To achieve the following through the chosen sport-
2) Stay fit and healthy
3) Boost self-esteem
4) Reduce stress
5) Improve sleep
6) Develop leadership skills
7) Instill patience, discipline and perseverance
8) Credits will be given for well-maintained Body Mass Index achieved through sporting and cultural activities
9) Students will have to participate in any 2-district level, state level or national level competitions
10) This will lead to improved physical health, mental health, enhance team spirit and be a great stress buster.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
II				**STATISTICAL FOUNDATIONS**	**6**	**90**	**6**
	L	T	P	**THEORY**	INTERNAL	PRACTICAL	TOTAL MARKS
	4	2	0	50	50		100

Course Outcomes

1. Knowledge of Statistics and its scope and importance in various areas

2. Knowledge of various types of data in diagrammatic representation.

3. Brief analysis of different types of data and tabulated.

4. Knowledge of various types of data, their organization and evaluation of summary measures such as measures of central tendency and dispersion etc.

5. Insights into preliminary exploration of different types of data.

UNIT - I

Introduction to Statistics : Introduction of Statistics-Sources of data-techniques of data collection-primary data and secondary data-methods of collecting primary data and secondary data-classification of data-frequency distribution.Diagrammatic and graphical representation : Bar diagrams-Pie charts-histogram-frequency polygon-ogive curves.

UNIT – II

Measures of Central Tendency: Introduction-features of good average-Arithmetic mean, merits and demerits-Arithmetic mean individual observation ,discrete series ,continuous series- Median, merits and demerits-Median individual observation ,discrete series ,continuous series-

UNIT - III

Measures of Dispersion I : Introduction-properties of a good measures of dispersion-methods of studying dispersion-Range, Quartile deviation, Mean deviation(MD), its merits and demerits, calculation for Individual observation, calculation on discrete and continuous Series.

UNIT - IV

Variance - Standard Deviation : Variance, its merits and demerits, calculation for Individual observation, calculation on discrete and continuous Series. Standard Deviation, its merits and demerits, calculation for Individual observation, calculation on discrete and continuous Series. Coefficient of Variation.

UNIT - V

Moments: Central and Non - Central moments, Sheppard's correction for moments for grouped data. Concept of Skewness, Karl Pearson's coefficient of skewness, Bowley's Coefficient of skewness, kurtosis and their measures.

Note:

1. Concentration on numerical problems only.

2. Proofs of theorems and Derivations of expressions are omitted.

Text Books:

1. Statistical methods - S.P. Gupta.

2. Fundamentals of Mathematical Statistics - SC Gupta and V.K. Kapoor

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
II				**Python Programming**	**8**	**120**	**6**
	L	**T**	**P**	**THEORY**	**INTERNAL**	**PRACTICAL**	**TOTAL MARKS**
	0	**4**	**4**	**0**	**50**	**50**	**100**

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
4. Interpret the concepts of Object-Oriented Programming as used in Python.

UNIT – I

Introduction to Python: Features of Python Language, installing Python, Environment Setup, python syntax, running a python script,

Python Programming basics: Literals, Data Types: Numeric data types: int, float, complex, string data type, python variables, Expressions, comment statements.

Operators-Arithmetic operators, Assignment operators, Comparison operators, Logical operators, Identity operators, Membership operators, Bitwise operators

UNIT-II

Standard I/O Operations, python casting

Control statements- Conditional branching: if, if-else, nested if, if-elif-else statements, Iterative statements: while loop, for loop, nested loops, pass statement, continue statement, break statement, and else statement used with loops, Programming using Python conditional and loops block

UNIT – III

Functions: Introduction, function definition, creating a function, Function Calling, declaration and defining functions, variable scope and lifetime, built-in functions

Sequences: Lists : Creating lists, accessing values in lists, list operations, Tuples : Creating Tuples, accessing values in Tuples, Tuple operations, Sets : Creating a set, accessing values in Set, Set operations, and Dictionaries: Creating a dictionary, Accessing values in Dictionary, Dictionary operations

UNIT – IV

Strings and Regular expressions: Introduction to strings, String operations, Built-in string methods and functions, comparing strings, Functions in regular expression.

Object Oriented Programming: Classes and Objects, Class method and self argument, The Init Method, Class Variables and Object Variables, The Del Method, Public and Private Data Members Private Methods, Built-In Functions to Check, Get, Set and Delete Class Attributes, Garbage Collection (Destroying Objects)

UNIT - V

Inheritance and polymorphism: Inheriting Classes in Python, Polymorphism and Method Overriding, Types of Inheritance, Composition/ Containership, Abstract Classes and Interfaces, Exception Handling: Introduction, Types of errors, Handling exceptions, multiple except blocks and multiple exceptions, finally block.

SUGGESTED PRACTICALS :

Write a program to perform different Arithmetic Operations on numbers in Python
1 . Write a program to calculate mean of numbers
2. Write a Python program to find variance of the given values
3. Write a program to find length of the given string
4. Write a program to create, append, and remove lists in python.
5. Write a program to demonstrate working with tuples in python.
6. Write a program to demonstrate working with dictionaries in python.
7. Write a python program to find the largest of three numbers.
8. Write a Python script that prints prime numbers
9. Write a python program to find the factorial of a number using Recursion.
10. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
11. Write a python program to define a module and import a specific function in that module to another program.
12. Write a Python class to implement pow(x, n)
13. Write a Python class to reverse a string word by word.

Text Books:
1. ”Reema Thareja”, Python Programming using problem solving approach, First Edition, Oxford higher Education.
Reference Books:
1. Kenneth A. Lambert, Fundamentals of Python
2. James Payne, Beginning Python using Python 2.6 and Python 3
3. Charles Dierach, Introduction to Computer Science using Python

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
II				DATABASE MANAGEMENT SYSTEMS	4	60	4
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	2	2	0	50	50		100

UNIT - 1

Databases and Database Users: Introduction, An example, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using DBMS Approach, A Brief History of Database Applications, When Not to Use a DBMS. Database System Concepts and Architecture: Data Models, Schemas, and Instances, Three-schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client-Server Architectures, Classification of Database Management Systems.

UNIT – 2

Data Modeling Using Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design Company Database Diagrams, Naming Conventions and Design. Issues, File organization and storage, secondary storage devices, type of single level ordered index, multi-level indexes, indexes on multiple keys, other types of indexes.

UNIT – 3

Relational Model and Relational Algebra: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from SET Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra. Relational Database Design: Anomalies in a database, functional dependency, normal forms, lossless join and dependency, BCNF, normalization through synthesis, higher order normal forms. SQL- SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Specifying Constraints as Assertion and Trigger, Views(Virtual Tables) in SQL, Embedded SQL, Dynamic SQL,

UNIT – 4

Introduction to transaction processing, transaction and system concepts, desirable properties of transactions, transaction support in SQL. Concurrency control techniques: two-phase locking techniques, concurrency control based on timestamp ordering. Recovery techniques: recovery concepts, recovery in multidatabase systems, database backup and recovery from catastrophic failures.

Text Books:
1. Elmasri and Navathe: Fundamentals of Database Systems, 7th Edition, Addison -Wesley, 2016.
2. Silberschatz, Korth and Sudharshan Database System Concepts, 7th Edition, Tata McGraw Hill, 2019.

References:
1. C.J. Date, A. Kannan, S. Swamynatham: An Introduction to Database Systems, 8th Edition, Pearson education, 2009
2. Database Management Systems :Raghu Ramakrishnan and Johannes Gehrke: , 3rd Edition, McGraw-Hill, 2003

EXAMPLE QUESTIONS :

<div align="center">

PART A

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1. Draw E-R diagrams and convert entities and relationships to relation tables for a given scenario. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college)

   Consider the Company database with following Schema

   EMPLOYEE (FNAME, MINIT, LNAME, SSN, BDATE,ADDRESS,SEX,SALARY, SUPERSSN, DNO)

   DEPARTMENT (DNAME, DNUMBER,MGRSSN,MSRSTARTDATE)

   DEPT_LOCATIONS (DNUMBER, DLOCATION)

   PROJECT (PNAME, PNUMBER, PLOCATION, DNUM)

   WORKS_ON (ESSN, PNO<HOURS)

   DEPENDENT (ESSN, DEPENDENT_NAME, SEX, BDATE, RELATIONSHIP)

2. Perform the following:
   a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)

3. Perform the following:
   a. Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database.

4. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause).

5. Execute the following queries
   a. How the resulting salaries if every employee working on the 'Research' Departments is given a 10% raise.
   b. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department

6. Execute the following queries
   a. Retrieve the name of each employee Controlled by Department number 5 (use EXISTS operator).
   b. Retrieve the name of each dept and number of employees working in each Department which has at least 2 employees

7. Execute the following queries
   a. For each project, retrieve the project number, the project name, and the number of employees who work on that project.(use GROUP BY)
   b. Retrieve the name of employees who born in the year 1990's

8. For each Department that has more than five employees, retrieve the department number and number of employees who are making a salary more than 40000.

9. For each project on which more than two employees work, retrieve the project number, project name and the number of employees who work on that project.

10. For a given set of relation tables perform the following: Creating Views (with and without check option), Dropping views, Selecting from a view

PART B

Create the following tables with properly specifying Primary keys, Foreign keys and solve the following queries.

BRANCH (Branchid, Branchname, HOD) STUDENT
(USN, Name, Address, Branchid, sem)
BOOK (Bookid, Bookname, Authorid, Publisher, Branchid)
AUTHOR (Authorid, Authorname, Country, age) BORROW
(USN, Bookid, Borrowed_Date)

1. Perform the following:
    a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)
    Execute the following Queries:

2. a. List the details of Students who are all studying in 2nd sem BCA.
    b. List the students who have not borrowed any books.

3. a. Display the USN, Student name, Branch_name, Book_name, Author_name, Books_Borrowed_ Date of 2nd sem BCA Students who borrowed books.
    b. Display the number of books written by each Author.

4. a. Display the student details who borrowed more than two books.
    b.Display the student details who borrowed books of more than one Author.

5. a. Display the Book names in descending order of their names.
    b. List the details of students who borrowed the books which are all published by the same publisher.

    Consider the following schema:
    STUDENT (USN, name, date_of_birth, branch, mark1, mark2, mark3, total, GPA)

6. Perform the following:
    a. Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)

7. Execute the following queries:
    a. Find the GPA score of all the students.
    b. Find the students who were born on a particular year of birth from the date_of_birth column.

8. a. List the students who are studying in a particular branch of study.
    b. Find the maximum GPA score of the student branch-wise.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
II				**Introduction to Data Structures & Algorithms**	**8**	**120**	**6**
	L	**T**	**P**	**THEORY**	**INTERNAL**	**PRACTICAL**	**TOTAL MARKS**
	0	**4**	**4**	**0**	**50**	**50**	**100**

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.

2. Learn the benefits of dynamic and static data structures implementations

3. Design and develop various programs using data structures

4. Demonstrate different methods for traversing trees

5. Develop ability to implement different Sorting and Search methods

6. Understand the concept of recursion and how it can be implemented using a stack .

UNIT – I

INTRODUCTION TO DATA STRUCTURE: Definition, Data Types, Abstract Data Types (ADT), classification of data structure - primitive & non-primitive data structures, Linear and Non-linear data structures

ARRAYS: Definition, one dimensional array, two dimensional arrays, Applications, pointers. LINKED LIST: Definition, linked list ADT, single linked list, double linked list, circular linked list, comparison of linked list with Arrays.

UNIT – II

STACKS: Definition, Stack as an ADT & Operations on stack, Applications of stack, Representation of stack.

QUEUES: Definition, Queue as an ADT & Operations on Queue, Application of Queues, Representation of Queues, Various Queue Structures: circular Queue, DEQueue.

UNIT – III

TREES: Definition, Basic Tree Terminology. Binary Tree – Definition, Properties of Binary Trees, Types of Binary Trees, Representation of Binary Tree, Binary Tree Traversals.

Binary Search Tree (BST) – Definition, Operations on a Binary Search Tree, Examples of BST.

UNIT - IV

GRAPHS: Definition, Basic Graph Terminology, Representation of Graphs, Graph Traversal – DFS and BFS. Topological sort, Shortest Path problem, Minimum Spanning Tree.

UNIT – V

SORTING: Definition, Sorting methods - Bubble Sort, Selection Sort, Quick Sort, Insertion Sort, Merge Sort.

SEARCHING: Definition, searching methods - Linear or Sequential Search, Binary Search.

Text Books:

1. "Classic Data Structures ", by DEBASIS SAMANTHA 2nd EDITION, PHI publications , 2009

2. "Data Structures and Algorithms", by NARASIMHA KARUMANCHI , CAREERMONK Publications , 2017

Reference Books:

1. Data structures by Lipschutz, McGraw Hill Education

2. Fundamentals of Data Structures in C by Sahni Horowitz, University Press

3. Data Structures And Algorithms by Alfred V Aho and John E Hopcroft and Jeffrey D Ullman, Pearson Education

4. "Data Structures through C", Yashavant Kanetkar, BPB Publications

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
II				**Environmental Science**	3	45	3
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	3	0	0	100	0	100

Course Objectives:
° Build an understanding of the fundamental concepts of Environmental studies.
° Capability to identify relevant environmental issues, analyzes the various underlying
causes.

UNIT-I
The Multidisciplinary nature of environmental studies and Natural resources.
Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining,
dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, dams benefits
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources
Food resources: World food problems, changes caused by agriculture
and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity
Energy resources: Growing energy needs, renewable and non-renewable energy sources
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion.
UNIT-II
Ecosystems, Biodiversity and its Conservation.
Concept, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the
ecosystem, ecological succession, food chains, food webs and ecological pyramids.
Introduction, types, characteristic features, structure and function of the following ecosystem: - Forest
ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans,
estuaries). Biodiversity introduction-Definition: genetic, species and ecosystem diversity. Biogeographical
classification of India. Value of biodiversity: consumptive use, productive use,
social, ethical, aesthetic and option values, biodiversity at global, national and local levels,
UNIT-III
Environmental Pollution. Definitions. Causes, effects and control measures of:
(a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution
(e) Noise pollution (f) Thermal pollution (g) Nuclear hazards.
Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
UNIT-IV
Social Issues and the Environment. From Unsustainable to Sustainable development. Urban
problems related to energy. Water conservation, rain water harvesting, watershed management.
Resettlement and rehabilitation of people; its problems and concerns. Case studies.
Environmental ethics: Issues and possible solutions. Climate change, global warming, acid
rain, ozone layer depletion, nuclear accidents and holocaust.
UNIT-V
Human Population and the Environment.Population growth, variation among
nations.Population explosion- Family welfare Programme.Environment and human health,
Human Rights, Value Education, HIV/AIDS, Women and Child Welfare.Role of information
Technology in Environment and human health, Case Studies.
References:
Environmental Studies For Undergraduate Courses - UGC e-Text book by
Erach Bharucha available at http://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf

SEMESTER III

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
III				**PROBABILITY AND STATISTICS**	6	90	6
	L	**T**	**P**	**THEORY**	**INTERNAL**	**PRACTICAL**	**TOTAL MARKS**
	4	2	0	50	50	0	100

Course Outcomes

After successful completion of this course, the student will be able to;

1. Able to know the concepts of set theory and operations in sets.

2. Knowledge to conceptualize the probabilities of events including frequent and axiomatic approach. Simultaneously, they will learn the notion of conditional probability.

3. Knowledge related to concept of discrete and continuous random variables and their probability distributions including expectation and moments,

4. Knowledge related to the concept of random variable, Probability mass function and probability density function.

5. Knowledge related to the concept of Mathematical expectation.

UNIT - I

Set theory for Probability: Definition of Set- Types of Sets-Union of Sets-Intersection of Sets- Venn diagrams- Operations on Sets-Complement of Set-Distributive Laws-De Morgan's Laws

UNIT - II

Introduction to Probability: Basic concepts of Probability, random experiment, trial, outcome, sample space, event, mutually exclusive event, equally likely events, favorable events, classical, statistical and axiomatic definitions of probability.

UNIT - III

Probability theorems: Conditional probability, Independent events Addition and multiplication theorems of probability for 2 events (Statement and proof), Addition and multiplication theorems of probability for n events statements only, Bayees theorem Statement and its applications.

UNIT - IV

Random variable: Definition of Random variable, discrete and continuous random variables, functions of random variable, probability mass function, probability density function, distribution function and its properties, For a given probability mass function calculation of mean and variance, For a given probability density function calculation of mean and variance.

UNIT-V

Mathematical expectation : Mathematical Expectation of random variable and function of random variable, Moments and covariance using mathematical expectation, with examples. Addition and multiplication theorem on expectation. Definitions of M.G.F, P.G.F,C.F and their properties, and applications

Note:

1. Concentration on numerical problems only.

2. Proofs of theorems and Derivations of expressions are omitted.

Text Book:

1. Statistical Methods by S.P.Gupta.

2. Fundamentals of Mathematical Statistics - S.C. Gupta & V.K.Kapoor.

Reference Books:

1. Sambavyatha - Telugu Academy.

2. Fundamentals of statistics - Goon, Gupta and Das Gupta.

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
III				**DATA MINING**	8	120	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	4	4	0	50	50	100

Course Objectives:

It presents methods for mining frequent patterns, associations, and correlations.
It then describes methods for data classification and prediction, and data–clustering approaches.
It covers mining various types of data stores such as spatial, textual, multimedia, streams.

Course Outcomes:

Ability to understand the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system.
Apply preprocessing methods for any given raw data.
Extract interesting patterns from large amounts of data.
Discover the role played by data mining in various fields.
Choose and employ suitable data mining algorithms to build analytical applications
Evaluate the accuracy of supervised and unsupervised models and algorithms.

UNIT - I

Data Mining: Data–Types of Data–, Data Mining Functionalities– Interestingness PatternsClassification of Data Mining systems– Data mining Task primitives –Integration of Data mining system with a Data warehouse–Major issues in Data Mining–Data Preprocessing.

UNIT - II

Association Rule   Mining: Mining Frequent Patterns–Associations and correlations – Mining Methods– Mining Various kinds of Association Rules– Correlation Analysis– Constraint based Association mining.
Graph Pattern Mining, SPM.

UNIT - III

Classification: Classification and Prediction – Basic concepts–Decision tree induction–Bayesian classification, Rule–based classification, Lazy learner.

UNIT - IV

Clustering   and   Applications: Cluster analysis–Types of Data in Cluster Analysis–Categorization of Major Clustering Methods– Partitioning Methods, Hierarchical Methods– Density–Based Methods, Grid–Based Methods, Outlier Analysis.

UNIT - V

Advanced Concepts: Basic concepts in Mining data streams–Mining Time–series data––Mining sequence patterns in Transactional databases– Mining Object– Spatial– Multimedia–Text and Web data – Spatial Data mining– Multimedia Data mining–Text Mining– Mining the World Wide Web.

TEXT BOOKS:
1. Data Mining – Concepts and Techniques – Jiawei Han & Micheline Kamber, 3rd Edition Elsevier.
2. Data Mining Introductory and Advanced topics – Margaret H Dunham, PEA.

 REFERENCE BOOK:
1. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
III				**INTRODUCTION TO DATA SCIENCE & DATA ANALYTICS**	4	60	4
	L	**T**	**P**	**THEORY**	**INTERNAL**	**PRACTICAL**	**TOTAL MARKS**
	2	**2**		**50**	**50**		**100**

Course Objectives

1. Provide you with the knowledge and expertise to become a proficient data scientist.
2. Demonstrate an understanding of statistics and machine learning concepts that are vital for data science;
3. Produce R code to statistically analyze a dataset.
4. Critically evaluate data visualizations based on their design and use for communicating stories from data

Course Outcomes

After completing this course, the student will be able to:

1. Explain how data is collected, managed and stored for data science.
2. Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists.
3. Implement data collection and management scripts using databases.

UNIT -I

Introduction to Data Science: Definition, benefits and uses of data science and big data. Facets of Data: Structured data, unstructured data, natural language, machine generated data, network data, audio, images and video streaming data.

Data science process: overview of data science process, defining the goal, Retrieving data, data preparation, data exploration, building the models, cleaning and transforming data, presentation and automation.

UNIT -II

DATA: Definition, characteristics of data, classification of digital data.

The Data Science Fundamentals: Distributed file system, data integration framework, machine learning framework, system deployment, security.

Data Mining: definition, languages for data science, collection data –hunting, logging, scraping, cleaning data –error vs. artifacts, data compatibility, dealing with missing values, outlier detection.

UNIT –III

BIG DATA: Definition, Evolution of big data and its importance, four V's in big data, Drivers for Big data, Big data analytics, Big data applications, designing data architecture, Big data Vs Little data

UNIT - IV

Machine Learning: Definition, Applications of machine learning in data science, Types of Machine Learning (Degree) - supervised learning, semi supervised learning, un-supervised learning, Linear regression, Decision Tree classifier – constructing decision Tree, Bayes - Naive Bayes

UNIT -V

Data Visualization: Definition, importance of data visualization in data science, Exploratory Data analysis -confronting new data set, visualization tools, developing a visualization aesthetic – maximizing data link ratio, proper scaling and labeling, effective use of color and shading, and the power of repetition.

Chart Types: Tabular data, dot and line plots, scatter plots, bar plots and pie charts.

Text Books:

1. Introducing Data Science by Davy Cielen , Arno D.B.Meysman and Mohamed Ali, Published by Manning

2. Steven S.Skiena, The Data Science Design Manual, Published by Springer.Nature.

Reference Books:

3. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk from The Frontline.O'Reilly.

4. Jure Leskovek, AnandRajaraman and Jeffrey D.Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press.

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
III				**'R' Language for Data Science & Data Analytics**	**8**	**120**	**6**
	L	**T**	**P**	**THEORY**	**INTERNAL**	**PRACTICAL**	**TOTAL MARKS**
	0	**4**	**4**	**0**	**50**	**50**	**100**

Course Objectives:

This course covers practical issues in statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, and organizing and commenting R code. Topics in statistical data analysis and optimization will provide working examples.

Course Learning Outcomes:

1. be able to use and program in the programming language R

2. be able to use R to solve statistical problems

3. be able to implement and describe Monte Carlo the technology

4. be able to minimize and maximize functions using R

UNIT – I

Introduction to R: R overview and history, Basic features of R, Benefits of R, data types in R, Installing R, Getting started with the RStudio IDE, Running R, Packages in R, variable names and assignment ,operators, Input/output functions , reading and writing data.

UNIT-II

Preview of Some Important R Data Structures: Vectors, Character Strings, Matrices, Lists, Data Frames, and Classes.

Control structures: Conditional statements, Loops, dates and times functions, String manipulations.

UNIT- III

VECTORS: Scalars, Vectors, Arrays and Matrices: Adding and Deleting Vector Elements, Obtaining the Length of a Vector- Common vector operations: Arithmetic & logical operations, Vector Indexing, Generating vector sequences with seq (), Repeating vector constants with rep (), using all () and any () functions, Vectorized operations, NA and NULL values.

UNIT-IV

MATRICES AND ARRAYS: Creating Matrices, General Matrix operations- linear algebra operations, matrix indexing, filtering on matrices, using apply() function , Add and Delete matrix rows and columns.

LISTS: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List ,Accessing List Components and Values, Using lapply() and sapply() functions.

UNIT-V

DATA FRAMES: Creating Data Frames, Accessing Data Frames - Other Matrix-Like Operations: Extracting sub data frames, using rbind () and cbind () functions.

FACTORS AND TABLES : Factors and Levels - Common Functions Used with Factors : tapply() , split() and by() Working with Tables, Matrix/Array-Like Operations on Tables, Extracting a Sub table - Math Functions: aggregate() and cut() functions.

Text Books:

1. The Art of R Programming by Norman Matlof, No starch press, SAN FRANSISCO, 2011.

2. An Introduction to R for Beginners by SASHA HAFNER, on AUG-2019

Reference Books:

1. R Programming for Dummies, Andrie de Vries and Joris Meys, Wiley

2. R for Data Science, Hadley Wickham, Garrett Grolemund, O'Reilly Media

3. R Programming : A Step-By-Step Guide for Absolute Beginners-2nd Edition, Daniel Daniel Bell

4. Learn R programming in 1 Day, Krishna Rungta, Published by Guru99

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
III, IV, V, VI				**ELECTIVE - [MULTI DISCIPLINARY]**	3	45	3
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	3	0	0	100	0	100

SWAYAM

Is India's national Massive Online Open Courses (MOOC) platform. It offers over 2,150 courses taught by close to 1,300 instructors from over 135 Indian universities and ITs. It allows students in India to earn academic credit online. Since the platform was launched in 2017, over 10 million learners have taken courses on SWAYAM.

SWAYAM is a program initiated by Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. SWAYAM seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy. This is done through an indigenous developed IT platform that facilitates hosting of all the courses, taught in classrooms from 9th class till post-graduation to be accessed by anyone, anywhere at any time.

SWAYAM offers

Best in class Instructors drawn from high-ranked Universities and IITs. Weekly Assignments to ensure students' progress in a timely manner. Easy Credit Transfer by complementing students' program Systematic Approach enabling students towards learning goals
Qualifying Certificates may, in turn, be used by students enrolled in India's higher education to earn academic credit for completing SWAYAM courses earmarked as credit-eligible by their universities. SWAYAM is supported by various industries such and as such the students undertaking the courses will have added advantage of ranking for placements. Laboratory facility will be allotted by the Course Coordinator depending on the available time-slots. For further information about how India is leveraging SWAYAM at the university level, please contact the Course Coordinator in the College and taking his guidance, register for the same.

Some of the suggested courses under SWAYAM for students to choose from are listed below:
1. Design and Analysis of Algorithms
2. Python for Data Science
3. Cloud Computing
4. Deep Learning for Visual Computing
5. Deep Learning for Computer Vision
6. Artificial Intelligence: Search Methods for Problem Solving
7. Robotics
8. Mobile Development
9. Java Programming

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
IV				**FUNDAMENTALS OF CYBER SECURITY**	6	90	6
	L	T	P	**THEORY**	INTERNAL	PRACTICAL	**TOTAL MARKS**
	4	2	0	50	50	0	100

Course Objectives

1. To learn today's increasing network security threats and explain the need to implement a comprehensive security policy to mitigate the threats.
2. To provide extended security using authentication, Substitution Techniques, Transposition Techniques, Encryption and Decryption
3. To introduce security services for email and email protocols, Digital Certificates,Private Key Management, E-mail Security and Wireless Application Protocol (WAP) Security
4. To be aware about Prohibited actions on Cyber, Cyber Squatting Banking/Credit card related crime E-commerce.
5. To gain the knowledge about Cyber Crime and Prohibited actions on Cyber Syllabus

Unit I

Introduction to the Concepts of Security: The need for security, Security Approaches, Principles of Security, Types of Attacks. Cryptographic Techniques: Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption,Symmetric and Asymmetric Key Cryptography, Key Range and Key Size, Possible Types of Attacks.

Unit II

Computer-based Symmetric Key Cryptographic Algorithms: Algorithm Types and Modes, An overview of Symmetric Key Cryptography, DES, International Data Encryption,Algorithm (IDEA), RC5, Blowfish, AES, Differential and Linear Cryptanalysis.

Unit III

Computer-based Asymmetric Key Cryptography: Brief History of Asymmetric Key Cryptography, An overview of Asymmetric Key Cryptography, The RSA Algorithm,Symmetric and Asymmetric Key Cryptography Together, Digital Signatures, Knapsack Algorithm, Some other Algorithms.

Unit IV

Public Key Infrastructure: Digital Certificates, Private Key Management, The PKIX Model, Public Key Cryptography Standards, XML, PKI and Security. Internet Security Protocols: Basic Concepts, Secure Socket Layer, SHTTP, Time Stamping Protocol, Secure Electronic Transaction, SSL versus SET, 3-D Secure Protocol, Electronic Money, E-mail Security, Wireless Application Protocol (WAP) Security, Security in GSM.

Unit V

Prohibited Actions on Cyber: Pornography, IPR violations: software piracy, copyright infringement, trademarks violations, theft of computer source code, patent violations, Cyber Squatting Banking/Credit card Related crime E-commerce/ Investment Frauds, Defamation (Cyber smearing),Cyber Stacking

Course Outcomes (Cos):

Upon successful completion of this subject students should be able to:

CO1: Demonstrate the threats in networks and security concepts, Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption.

CO2: Apply authentication applications in different networks.

CO3: Understand security services for email, the RSA Algorithm, Symmetric and Asymmetric Key Cryptography Together and Digital Signatures.

CO4: Know of Digital Certificates, Private Key Management, E-mail Security and Wireless Application Protocol (WAP) Security

CO5: Awareness of Prohibited actions on Cyber, Cyber Squatting Banking/Credit card related crime E-commerce.

Text Books

1. William Stallings, ―Cryptography and Network Security, Prentice Hall, New Delhi, 2006.

2. Atul Kahate, Cryptography and Network Security, Mc Graw Hill Education, 3rd Edition.

Reference Books

1. Neal Krawetz, ―Introduction to Network Security‖, Thomson Learning, Boston, 2007.

2. Bruce Schneier, ―Applied Cryptography‖, John Wiley & Sons, New York, 2004.

3. Frontiers of of Electronic Commerce Kalakota and Whinstn Addition Wesley

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
IV				Linux and Shell Programming	8	120	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	4	4	0	50	50	100

Course Objectives:
° Understanding the basic set of commands and utilities in Linux/UNIX systems.
° To learn command structure of LINUX, various types of shells and types of commands and familiarize students with some general commands, directory and file related commands,
° To learn editors available in LINUX and the detailed working on the most Vi editor
Course Outcomes:
° Understand Shell variables and shell keywords.
° Write the shell program for a simple problem.
° Understand type of process and pipes in Linux.
° Understand background and foreground Process
° Understand Linux System Administration
Unit-wise Syllabus
UNIT – I
Linux introduction and file system - basic features, different flavors of linux. advantages, installing requirements, basic architecture of Unix/Linux system, kernel, shell, linux standard directories. Commands for files and directories cd, ls, cp, md, rm, mkdir, rmdir, pwd, file, more, less.

UNIT–II
Creating and viewing files using cat, file comparisons – cmp&comm, view files, disk related commands, checking disk free spaces. Essential Linux commands understanding shells, processes in linux - process fundamentals, connecting processes with pipes, redirecting input output, manual help, background processing.

UNIT–III
Managing multiple processes, changing process priority with nice, scheduling of processes at command, cron commands, kill, ps, who, sleep, Printing commands, touch, file related commands -wc, cut, dd, etc. Mathematical commands- bc, expr.

UNIT - IV
Creating and editing files with vi& vim editor. Shell programming- Basic of shell programming, Various types of shell available in Linux, comparisons between various shells,shell programming in bash, read command, conditional and looping statements, case statements, parameter passing and arguments, Shell variables, system shell variables, shell keywords,Creating Shell programs for automate system tasks.

UNIT - V
Simple filter commands – pr, head, tail, cut, paste, sort, uniq, tr. Filter using regular expressions – grep, awk, egrep, and sed.

References:

° Sumitabha Das "Unix - Concepts & Applications" (Third Ed.) Tata Mcgraw Hill Publications.
° Graham Glass & King Ables, "Unix for Programmers and Users" (Third Ed.) - Pearson Education India.(Low Prices Edition)
° Cristopher Negus "Red Hat Linux 9 Bible" IDG Books India Ltd.
° Jack T Ackett, David Gunter " Using Linux" PHI, EEE Edition
° Nicholas Wells "Linux Installation and Administration" Vikas Publishing, New Delhi
° YashwantKanetkar "Unix Shell Programming" BPB Publications,
° Red Hat Linux Unleashed Techmedia (Bpb Publications)
° Wells "Linux Networking and Security" Vikas Publishing, New Deihi

LIST OF PRACTICAL's:

1. Usage of following commands: ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.
2. Usage of following commands: cal, cat(append), cat(concatenate), mv, cp, man, date.
3. Usage of following commands: chmod, grep, tput (clear, highlight), bc.
4. Write a shell script to check if the number entered at the command line is prime or not.
5. Write a shell script to modify "cal" command to display calendars of the specified months.
6. Write a shell script to modify "cal" command to display calendars of the specified range of months.
7. Write a shell script to accept a login name. If not a valid login name display message – "Entered login name is invalid".
8. Write a shell script to display date in the mm/dd/yy format.
9. Write a shell script to display on the screen sorted output of "who" command along with the total number of users .
10. Write a shell script to display the multiplication table any number,
11. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.
12. Write a shell script to find the sum of digits of a given number.
13. Write a shell script to merge the contents of three files, sort the contents and then display page by page.
14. Write a shell script to find the LCD(least common divisor) of two numbers.
15. Write a shell script to perform the tasks of a basic calculator.
16. Write a shell script to find the power of a given number.
17. Write a shell script to find the factorial of a given number.
18. Write a shell script to check whether the number is Armstrong or not.
19. Write a shell script to check whether the file has all the permissions or not.
20. Program to show the pyramid of special character "*"

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
IV				CLOUD COMPUTING	8	120	6
	L	T	P	THEORY	INTERNAL	PRACTICA L	TOTAL MARKS
	0	4	4	0	50	50	100

Course Outcomes:
° Define Cloud Computing and memorize the different Cloud service and deployment models
° Describe the importance of virtualization along with their technologies.
° Use and Examine different cloud computing services
° Analyze the components of Google Cloud platform
° Describe the key components of Amazon web Service
° Design & develop backup strategies for cloud data based on features.
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Unit-wise Syllabus

Unit - I
Introduction to Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Biocomputing,Mobile Computing, Quantum Computing, Optical Computing, Nano-computing,Network Computing. Cloud Computing Fundamentals: Motivation, Need, Definition of Cloud Computing. Principles of Cloud computing: Five Essential Characteristics, Four Cloud Deployment Models, Three Service Offering Models, Cloud Ecosystem, Requirements for Cloud Services. Cloud Computing Architecture: cloud Architecture, User/Client Layer,
Network Layer, Cloud Management Layer, Hardware Resource Layer, , Network Connectivity in Cloud Computing, Public Cloud Access Networking, Private Cloud Access
Networking.

UNIT – II
Cloud Computing Management: Cloud Application, Benefits and Drawbacks Applications on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure, Managing the Cloud Application, Migrating Application to Cloud, Cloud Deployment Models: Private Cloud, Outsourced Private Cloud, Community Cloud, On-Premise Community Cloud, Hybrid Cloud. Cloud Service Models: Infrastructure as a Service, : Platform as a Service, Software as a Service, Introduction to Open Source Tools for IaaS, Paas & SaaS : Apache.

UNIT - III
Technological Drivers for Cloud Computing: SOA and Cloud, SOA and SOC, Benefits of SOA, Multi-core Technology: Multi-core Processors and VM Scalability, Memory and Storage Technologies, Cloud Storage Requirements, Networking Technologies, Web 2.0 : Characteristics, Difference from Web 1.0, Applications, Social Media, Marketing, Education.Web 3.0:Components , Semantic Web, Web Services, Characteristics, Convergence of Cloud and Web 4.0, Connecting Information: Facebook. Agile Software Models: Agile SDLC for Cloud Computing, Features of Cloud SDLC, Agile Software Development Process,
Advantages of Agile. Cloud Application Development Platforms: Windows Azure, Google App Engine, Forcecom. IBM Cloud Computing API

UNIT - IV
Virtualization : Full Virtualization, Para virtualization, Hardware-Assisted Virtualization, Hypervisor, OS Virtualization, Server Virtualization, Memory Virtualization, Storage Virtualization, Network Virtualization, Application Virtualization, Processor Virtualization, Memory Virtualization, Storage Virtualization, Network Virtualization, Data Virtualization, Application Virtualization, Hypervisors, Types of Hypervisors, Security Issues and Recommendations, From Virtualization to Cloud Computing VMware. Microsoft Hyper-V.

UNIT - V
Cloud Service Providers ; EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue Service, Microsoft Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM SmartCloud. Security in Cloud Computing, Cloud General Challenges,

Text Books:
° Essentials of Cloud Computing, K Chandrasekaran, CRC Press [ISBN: 3: 978--4822-0544-2]
° Raj Kumar Buyya, James Broberg and rezeiM.Goscinski, -Cloud Computing: Principles and Paradigms,-Wiley 2011.
° Srinivasan, J.Suresh,-Cloud Computing – a Practical Approach for Learning and Implementation, Pearson India, [ISBN 978131776513]
° Toby Velte, Anthony Velte, Robert Elsenpeter,-Cloud Computing, a Practical Approach -McGraw Hill, 2010 [ISBN: 0071626948]

References:
° Greg Schulz -Cloud and Virtual Data Storage Networking, Auerbach Publications [ISBN: 978-1439851739].
° Marty Poniatowski-Foundations of Green It- [ISBN: 978-0137043750].
° Learning Spring Application Development, Ravi Kant Soni, Packt Publishing.
° Michael Miller, Cloud Computing, 2008.
° Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, Cloud Computing for Dummies, 2009.
° BorkoFurht, Armando Escalante (Editors), Handbook of Cloud Computing, Springer, 2010.

Suggested Practical for development of applications for following tasks/tools:
1. Any one Tool for IaaS
2. Any one Tool for PaaS
3. Any one Tool for SaaS
4. Any one Tool for Virtualization (VMware or Microsoft Hyper-V.)
5. Any one Tool for Cloud Service (Amazon Web Services or Microsoft Azure)

SEME STER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
IV				**Cyber Law and Information Security**	**4**	**60**	**4**
	L	**T**	**P**	**THEORY**	**INTERNAL**	**PRACTICAL**	**TOTAL MARKS**
	2	**2**	**0**	**50**	**50**	**0**	**100**

Course Objectives:
° Understand the fundamental concepts of Cyber and Information Security
° Gain the knowledge of different types and working of malware and security hazards real-world incidents.
° Understand cryptography techniques and apply them for secure data communication and authentications
° Understand the working and implementation of Firewall.
° Understand the concept of cyberspace and cyber crime and digital signature

Course Outcomes:
1. Explain various security concepts and apply them in daily cyber use.
2. Configure firewall and other security setting in computer
3. Perform the malware and spam email identification, analysis, virus scanning and cleaning and other services using security tools
4. Explain and practice the Cyber Law, Ethics, and Intellectual Property Rights, Patent and Trademark and Design Law

Unit-wise Syllabus
UNIT-I
Information security: overview, information security importance, information security components. Threats to information system- external and internal thread, security threat and vulnerability- overview, malware, type of malware: virus, worms, trojans, rootkits, robots, adware's, spywares, ransom wares, zombies etc., desktop security

UNIT-II
Application security- database security, e- mail security, internet security, principles of security- confidentiality, integrity, availability, introduction to cryptography- symmetric key cryptography, asymmetric key cryptography, message authentication, applications of cryptography. Security technology- firewall, type of firewall, firewall benefits, VPN, antivirus software

UNIT-III
Cyberspace- cloud computing & security, social network sites security, attack prevention passwords, protection against attacks in social media, securing wireless networks, security threats.

UNIT-IV
Cybercrime-concept of cybercrime, type of cybercrime, phishing, cyber crime prevention, case study, security threats to e- commerce- electronic payment system, Digital Signature– digital signature process.

UNIT-V
ISO- international organization for standardization, world intellectual property organization, cyber law- cyber law in India, IT act 2000, intellectual property rights- definition, intellectual property, categories of intellectual property, rights protected under intellectual property, copyright, patent and trademark, design- design law in India

References:
° Allan Friedman and P. W. Singer, Cyber Security and Cyber war: What Everyone Needs to Know by Published Oxford University
° Don Franke, Cyber Security Basics: Protect Your Organization by Applying the Fundamentals by Publisher CreateSpace Independent Publishing Platform, 2016
° Mayank Bhushan, Fundamental of Cyber Security

SEMESTER V

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
V				**Text, Web and Social Media Analytics**	**4**	**60**	**4**
	L	**T**	**P**	**THEORY**	**INTERNAL**	**PRACTICAL**	**TOTAL MARKS**
	2	**2**	**0**	**0**	**50**	**50**	**100**

1. To provide an overview of common text mining and social media data analytic activities.
2. To understand the complexities of processing text and network data from different data sources.
3. To enable students to solve complex real-world problems for sentiment analysis and Recommendation systems.

Expected Course Outcome :
Interpret the terminologies, metaphors and perspectives of social media analytics.
1. Apply a wide range of classification, clustering, estimation and prediction algorithms on Textual data.
2. Perform social network analysis to identify important social actors, subgroups and network properties in social media sites.
3. Apply state of the art web mining tools and libraries on realistic data sets as a basis for business decisions and applications.
4. Provide solutions to the emerging problems with social media such as behaviour analytics and Recommendation systems.
5. Design new solutions to opinion extraction, sentiment classification and data summarization problems.

Introduction to Text Mining:
Text Representation- tokenization, stemming, stop words, TF-IDF, Feature Vector Representation, NER,N-gram modeling.

Mining Textual data :
Text Clustering, Text Classification, Topic Modeling-LDA,HDP

Introduction to Web Mining :
Inverted indices and Boolean queries. PLSI,Query optimization, page ranking.

Web content Mining:
Essentials of Social graphs,Social Networks,Models, Information Diffusion in SocialMedia.

Social Media Network ;
Behavioral Analytics, Influence and Homophily, Recommendation in SocialMedia

Sentimental Mining:
Sentiment Classification ,feature based opinion mining, comparative sentence and relational mining, Opinion spam.

References:

1.BingLiu,"WebDataMining-ExploringHyperlinks,Contents,andUsageData",Springer,Second Edition, 2011.
2.RezaZafarani,MohammadAliAbbasiandHuanLiu,"SocialMediaMining-AnIntroduction", Cambridge University Press, 2014.
3.Bing Liu, "Sentiment Analysis and Opinion Mining", Morgan & Claypool Publishers, 2012.
4.NitinIndurkhya,FredJDamerau,"HandbookofNaturalLanguageProcess",2ndEdition,CRC Press, 2010.

5.Matthew A. Russell, "Mining the social web", 2nd editionO'Reilly Media, 2013.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
V				**Data Analytics Methods and Probability Distributions**	6	90	6
	L	**T**	**P**	**THEORY**	**INTERNAL**	**PRACTICAL**	**TOTAL MARKS**
	4	2	0	50	50		100

Course Objectives

1. The main objective of this course is to provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science like disease modeling, climate prediction and computer networks etc.

Course Outcomes

After successful completion of this course, the student will be able to;

1. Ability to distinguish between discrete and continuous distributions.

2. Knowledge related to the concept of curve fitting.

3. Knowledge of important discrete and continuous distributions such as Binomial, Poisson, rectangular , normal, distributions.

4. Acumen to apply standard discrete and continuous probability distributions to different situations.

5. Knowledge related to the concept of correlations.

6. Knowledge related to the concept of regressions.

7. Knowledge of correlation, regression analysis, regression diagnostics.

UNIT – I

Correlation: Introduction, Meaning of Correlation, Types of correlation ,probable error, Karl- pearson's coefficient of correlation for individual series only, Spearman's Rank correlation for individual series only.

UNIT –II

Regression: Introduction, definition, difference between correlation and regression, Simple linear regression, properties of regression coefficients, Regression equation x on y, Regression equation y on x , Simple Problems.

UNIT – III

Finite Differences and Interpolation: Forward Differences - Backward differences. Newton's forward interpolation formula - Newton's backward interpolation formula

UNIT – IV

Curve Fitting : method of least squares, fitting of a straight line only. Linear trend and find trend values by the method of straight line trend.

UNIT –V

Probability Distributions: Binomial, Poisson and Normal Distributions – Definitions, means, variances and applications of these distributions. Simple problems.

Note:

1. Concentration on numerical problems only.

2. Proofs of theorems and Derivations of expressions are omitted.

Text Books:

1. Mathematical Methods by Dr. T.K.V.Iyengar. - S.Chand Publications.

2. Statistical methods - S.P Gupta.

Reference Books:

Fundamentals of Mathematical Statistics - S.C. Gupta & V.K.Kapoor.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
V				**Data Analytics Using Python**	**8**	**120**	**6**
	L	**T**	**P**	**THEORY**	**INTERNAL**	**PRACTICAL**	**TOTAL MARKS**
	0	**4**	**4**	**0**	**50**	**50**	**100**

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.

UNIT – I

Introduction to Python: Features of Python Language, installing Python, Environment Setup, python syntax, running a python script, Python Programming basics: Literals, Data Types: Numeric data types: int, float, complex, string data type, python variables, Expressions, comment statements.

Operators-Arithmetic operators, Assignment operators, Comparison operators, Logical operators, Identity operators, Membership operators, Bitwise operators

UNIT-II

Standard I/O Operations, python casting

Control statements- Conditional branching: if, if-else, nested if, if-elif-else statements, Iterative statements: while loop, for loop, nested loops, pass statement, continue statement, break statement, and else statement used with loops, Programming using Python conditional and loops block

UNIT – III

Functions: Introduction, function definition, creating a function, Function Calling, declaration and defining functions, variable scope and lifetime, built-in functions

Sequences: Lists : Creating lists, accessing values in lists, list operations, Tuples : Creating Tuples, accessing values in Tuples, Tuple operations, Sets : Creating a set, accessing values in Set, Set operations, and Dictionaries: Creating a dictionary, Accessing values in Dictionary, Dictionary operations

UNIT – IV

Strings and Regular expressions: Introduction to strings, String operations, Built-in string methods and functions, comparing strings, Functions in regular expression. Object Oriented Programming: Classes and Objects, Class method and self argument, The Init Method, Class Variables and Object Variables, The Del Method, Public and Private Data Members Private Methods, Built-In Functions to Check, Get, Set and Delete Class Attributes, Garbage Collection (Destroying Objects)

UNIT - V

Inheritance and polymorphism: Inheriting Classes in Python, Polymorphism and Method Overriding, Types of Inheritance, Composition/ Containership, Abstract Classes and Interfaces, Exception Handling: Introduction, Types of errors, Handling exceptions, multiple except blocks and multiple exceptions, finally block.

Text Books:

1. "Reema Thareja", Python Programming using problem solving approach, First Edition, Oxford higher Education.

Reference Books:

1. Kenneth A. Lambert, Fundamentals of Python
2. James Payne, Beginning Python using Python 2.6 and Python 3
3. Charles Dierach, Introduction to Computer Science using Python

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
V,VI				**Capstone Project**	10	90	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	2	8	0	50	50	100

Objective :
A capstone project or capstone experience involves the identification of an existing problem in a real-world setting and the application of learned skills and methods to develop a solution that addresses the problem directly. In some cases, a capstone project will be geared toward research, while others are more oriented toward problem-solving. Solutions are usually interactive, meaning they can be implemented and used.

Typically there are several goals for a capstone and they often include:

1. Defining an information problem or opportunity
2. Decide what techniques are required in order to master this information problem or opportunity
3. Include all aspects of the information problem – using people, technology and information
4. Make a positive difference for the community whether it is a business, school, library, hospital, or other organization
5. Choose a topic or focus area the students are enthusiastic about

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
VI				Cyber Security – Network Defense	6	90	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	4	2	0	50	50		100

Unit – I

1. Computer Network and Defense Fundamentals
• Understanding computer network
• Describing OSI and TCP/IP network Models
• Comparing OSI and TCP/IP network Models
• Understanding different types of networks
• Describing various network topologies
• Understanding various network components
• Explaining various protocols in TCP/IP protocol stack
• Explaining IP addressing concept
• Understanding Computer Network Defense (CND)
• Describing fundamental CND attributes
• Describing CND elements
• Describing CND process and approaches Network Security Threats, Vulnerabilities, and Attacks
• Understanding threat, attack, and vulnerability
• Discussing network security concerns
• Reasons behind network security concerns
• Effect of network security breach on business continuity
• Understanding different types of network threats
• Understanding different types of network security vulnerabilities
• Understanding different types of network attacks
• Describing various network attacks Network Security Controls, Protocols, and Devices
• Understanding fundamental elements of network security
• Explaining network access control mechanism
• Understanding different types of access controls
• Explaining network Authentication, Authorization and

Unit – II

Network Security Policy Design and Implementation
• Understanding security policy
• Need of security policies
• Describing the hierarchy of security policy
• Describing the characteristics of a good security policy
• Describing typical content of security policy
• Understanding policy statement
• Describing steps for creating and implementing security policy
• Designing of security policy
• Implementation of security policy
• Describing various types of security policy
• Designing of various security policies
• Discussing various information security related standards, laws and acts
• Understanding and describing security requirements for different types of servers
• Understanding security requirements for hardening of routers
• Understanding data security concerns when data is at rest, in use, and in motion

Unit – III

Secure Firewall Configuration and Management
• Understanding firewalls
• Understanding firewall security concerns
• Describing various firewall technologies
• Describing firewall topologies
• Appropriate selection of firewall topologies
• Designing and configuring firewall ruleset
• Implementation of firewall policies
• Explaining the deployment and implementation of firewall
• Factors to considers before purchasing any firewall solution
• Describing the configuring, testing and deploying of firewalls
• Describing the management, maintenance and administration of firewall implementation
• Understanding firewall logging
• Measures for avoiding firewall evasion
• Understanding firewall security best practices

Secure VPN Configuration and Management
• Understanding Virtual Private Network (VPN) and its working
• Importance of establishing VPN
• Describing various VPN components
• Describing implementation of VPN concentrators and its functions
• Explaining different types of VPN technologies
• Discussing components for selecting appropriate VPN technology
• Explaining core functions of VPN
• Explaining various topologies for implementation of VPN
• Discussing various VPN security concerns
• Discussing various security implications to ensure VPN security and performance

Unit – IV

Wireless Network Defense
• Understanding wireless network
• Discussing various wireless standards
• Describing various wireless network topologies
• Explaining various wireless network components
• Explaining wireless encryption (WEP, WPA,WPA2) technologies
• Describing various authentication methods for wireless networks
• Discussing various types of threats on wireless networks
• Creation of inventory for wireless network components
• Appropriate placement of wireless Access Point (AP)
• Appropriate placement of wireless antenna
• Monitoring of wireless network traffic
• Prevention of wireless network from RF interference
• Describing various security implications for wireless network
• Discussing best practices and precautions for deploying vulnerability assessment tool
• Describing vulnerability reporting, mitigation, remediation and verification

Unit – V

Data Backup and Recovery
• Understanding data backup
• Describing the data backup plan
• Describing the identification of data to backup
• Determining the appropriate backup medium for data backup
• Understanding RAID backup technology and its advantages

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
VI				**Ethical Hacking**	4	60	4
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	2	2	0	50	50		100

Unit – I

Background Network and Communication Technologies
• Networking technologies (e.g., hardware, infrastructure)
• Web technologies (e.g., web 2.0, skype)
• Systems technologies
• Communication protocols
• Telecommunication technologies
• Mobile technologies (e.g., smartphones)
• Wireless terminologies
• Cloud computing
• Cloud deployment models Information Security Threats and Attack Vectors
• Malware (e.g., Trojan, virus, backdoor, worms)
• Malware operations
• Information security threats and attack vectors
• Attacks on a system (e.g., DoS, DDoS, session hijacking, web server and web application attacks, SQL injection, wireless threats)
• Botnet
• Cloud computing threats and attacks
• Mobile platform attack vectors
• Cryptography attacks Information Security Technologies
• Information security elements
• Information security management (e.g. IA, Defense-in-Depth, incident management)
  L (Hr.) T/P (Hr.) Pr (Hr.) Credits 3 0 0 3
• Security trends
• Hacking and ethical hacking
• Vulnerability assessment and penetration testing
• Cryptography
• Encryption algorithms
• Wireless encryption
• Bring Your Own Device (BYOD)
• Backups and archiving (e.g., local, network)
• IDS, firewalls, and honeypots

Unit – II

Analysis / Assessment Information Security Assessment and Analysis
• Data analysis
• Systems analysis
• Risk assessments
• Vulnerability assessment and penetration testing
• Technical assessment methods
• Network sniffing
• Malware analysis

Unit – III

Security Information Security Controls
• Systems security controls
• Application/file server

• Firewalls
• Cryptography
• Disk Encryption
• Network security
• Physical security
• Threat modeling
• Biometrics
• Wireless access technology (e.g., networking, RFID, Bluetooth)
• Trusted networks
• Privacy/confidentiality (with regard to engagement)
Information Security Attack Detection
• Security policy implications
• Vulnerability detection
• IP Spoofing detection
• Verification procedures (e.g., false positive/negative validation)
• Social engineering (human factors manipulation)
• Vulnerability scanning
• Malware detection
• Sniffer detection
• DoS and DDoS detection
• Detect and block rogue AP
• Evading IDS (e.g., evasion, fragmentation)
• Evading Firewall (e.g., firewalking, tunneling)
• Honeypot detection
• Steganalysis
Information Security Attack Prevention
• Defend against web server attacks
• Patch management
• Encoding schemes for web application
• Defend against web application attacks
• Defend against SQL injection attacks
• Defend against wireless and Bluetooth attacks
• Mobile platforms security
• Mobile Device Management (MDM)
• BYOD Security
• Cloud computing security

Unit – IV
Tools / Systems / Programs Information Security Systems
• Network/host based intrusion
• Boundary protection appliances
• Access control mechanisms (e.g., smart cards)
• Cryptography techniques (e.g., IPSec, SSL, PGP)
• Domain name system (DNS)
• Network topologies
• Subnetting
• Routers / modems / switches
• Security models
• Database structures Information Security Programs
• Operating environments (e.g., Linux, Windows, Mac)
• Anti-malware systems and programs (e.g., anti-keylogger, anti-spyware, anti-rootkit, antitrojan, anti-virus)
• Wireless IPS deployment
• Programming languages (e.g. C++, Java, C#, C)

- Scripting languages (e.g., PHP, Javascript) Information Security Tools
- Network/wireless sniffers (e.g., Wireshark, Airsnort)
- Port scanning tools (e.g., Nmap, Hping)
- Vulnerability scanner (e.g., Nessus, Qualys, Retina)
- Vulnerability management and protection systems (e.g., Founds tone, Ecora)
- Log analysis tools
- Exploitation tools
- Footprinting tools (e.g., Maltego, FOCA, Recon-ng)
- Network discovery tools (e.g., Network Topology Mapper)
- Enumeration tools (e.g., SuperScan, Hyena, NetScanTools Pro)
- Steganography detection tools
- Malware detection tools
- DoS/DDoS protection tools
- Patch management tool (e.g., MBSA)
- Web Server security tools
- Web application security tools (e.g., Acunetix WVS)
- Web application firewall (e.g., dotDefender)
- SQL injection detection tools (e.g., IBM Security AppScan)
- Wireless and Bluetooth security tools
- Android, iOS, Windows Phone OS, and BlackBerry device security tools
- MDM Solutions
- Mobile Protection Tools
- Intrusion Detection Tools (e.g., Snort)
- Hardware and software firewalls (e.g., Comodo Firewall)
- Honeypot tools (e.g., KFSenser)
- IDS/Firewall evasion tools (e.g., Traffic IQ Professional)
- Packet fragment generators
- Honeypot Detection Tools
- Cloud security tools (e.g., Core CloudInspect)
- Cryptography tools (e.g., Advanced Encryption Package)
- Cryptography toolkit (e.g., OpenSSL)
- Disk encryption tools
- Cryptanalysis tool (e.g., CrypTool)

Unit – V
Information Security Assessment Methodologies
- Web server attack methodology
- Web application hacking methodology
- SQL injection methodology and evasion techniques
- SQL injection evasion techniques
- Wireless and Bluetooth hacking methodology
- Mobile platform (Android, iOS, Windows Phone OS, and BlackBerry) hacking methodology
- Mobile Rooting and Jailbreaking

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
VI				Domain Specific Predictive Analytics	8	120	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	4	4	0	50	50	100

Course Objective
It introduces theoretical foundations, algorithms, methodologies for analyzing data in various domains such Retail, Finance, Risk and Healthcare.

Course Outcome:
1. Recognize challenges in dealing with data sets in domains such as finance, risk and healthcare.
2. Identify real-world applications of machine learning in domains such as finance, risk and healthcare.
3. Identify and apply appropriate algorithms for analyzing the data for a variety of problems in finance, risk and healthcare.
4. Make choices for a model for new machine learning tasks based on reasoned argument

Retail analytics:
Understanding Customer: Profiling and Segmentation, Modelling Churn. Modelling Lifetime Value, Modelling Risk, Market Basket Analysis.

Risk Analytics:
Risk Management and Operational Hedging: An Overview, Supply Chain Risk Management, A Bayesian Framework for Supply Chain Risk Management, Credit Scoring and Bankruptcy Prediction

Financial Data analytics:
Financial News analytics: Framework, techniques, and metrics, News events impact market sentiment, Relating news analytics to stock returns

Financial Time Series Analytics:
Financial Time Series and Their Characteristics, Common Financial Time Series models, Autoregressive models, Markov chain models, Time series models with leading indicators, Long term forecasting

HealthCare analytics:
An Introduction to Healthcare Data Analytics, Electronic Health Records, Privacy-Preserving Data Publishing Methods in Healthcare, Clinical Decision Support Systems

Genome Data analytics:
Microarray Data, Microarray Data Analysis, Genomic Data Analysis for Personalized Medicine, Patient Survival Prediction from Gene Expression Data, Genome Sequence Analysis

Reference Books:
1. Chris Chapman, Elea McDonnell Feit "R for Marketing Research and Analytics", Springer, 2015.
2. Olivia Parr Rud "Data Mining Cookbook: Modeling Data for Marketing, Risk, and Customer Relationship Management", Wiley, 2001.
3. Chandan K. Reddy, Charu C. Aggarwal "Healthcare Data Analytics", CRC Press, 2015.
4. Rene Carmona "Statistical Analysis of Financial Data in R", Springer, 2014.
5. James B. Ayers "Handbook Of Supply Chain Management" Auerbach Publications, 2006.
6. PanosKouvelis, Lingxiu Dong, OnurBoyabatli, Rong Li "The Handbook of Integrated Risk Management in Global Supply Chains", Wiley, 2012.

SEMESTER VII

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
VII				**INTERNSHIP**	0	15 weeks	15
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	0	0	0		100	100

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
VII				**INTERNSHIP REPORT**	0	45	3
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	0	6	0		100	100

OBJECTIVE

To provide exposure to the various aspects of software development.

OUTLINE

The student is expected to be exposed to all aspects of software development including and not limited to software development cycles, product familiarity, workflow management, software development methodology followed and all other relevant details as needed to fulfill their duties as a software intern.

Monitoring of Training:

A. Submission of Joining report : To be submitted within one week from the date of joining. Students must report for the training from the day of commencement of 9th semester as notified by the university.
B. Submission of periodical reports: Students shall maintain a record of their engagement for the period of training. This will be recorded in an authorized diary to be counter signed by the manager at the end of each week and the same diary shall be sent to the training coordinator once in a month.
C. Completion certificate: At the end of the training period, a student shall produce a certificate of satisfactory completion of training in duplicate.

Submission of Report

Students shall present a report containing the following works before the examiners for Viva-Voce Examination:
Training Report:
It shall also contain a brief description of works handled during the training along with code, product output etc.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
VIII				**THESIS**	27	180	15
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	3	24	0	50	50	100

Course Description:
Thesis course serves as a concluding achievement for graduating students, allowing them to apply knowledge that they have gained from the Computer Science curriculum toward a year-long project.
Moreover, the aim of the course is to introduce the basic ideas, concepts and principles of writing a thesis / research study; the problem, the review of related literature and studies, and the procedure of investigation. This would allow students to integrate their academic work in the design and development of a significant product that showcases the student's skills

Course Outcomes :

1. Analyze complex problems, and identify and define the computing requirements needed to design an appropriate solution;

2. Apply computing and other knowledge domains to address real-world problems;

3. Design and develop computing solutions using a system-level perspective;

4. Utilize modern computing tools;

5. Gather related literature on an identified topic and identify the research gap.

6. Formulate the research objective, and scope and limitations for a chosen topic

7. Propose software solution to the identified research problem that employs new design, tools, as well as unique and useful enhancement.

 UNIT 1:
Outline the research gap from the gathered literature
   ● Explain the importance of research.
   ● Use a particular research method.
   ● Identify the research gap from the gather related literature
UNIT 2:
Formulate the research objective, and scope and limitations for a chosen topic

   ● Examine how a problem is known to be a research problem.
   ● Discuss the elements of a research problem.
   ● Recognize how a research problem is selected.
   ● Frame research title, objectives, assumptions, and hypothesis.
UNIT 3:
Propose software solution to the identified research problem that employs new design, tools, as well as unique and useful enhancement.
   ● Explain the meaning of descriptive research, and design and development research.
   ● Determine what techniques /design shall be used in creating a proposal.

Develop Project design/Research Methodology

UNIVERSITY OF MYSORE

Estd.1916

**Vishwavidyanilaya Karyasoudha
Crawford Hall, Mysuru- 570 005**

(Re-accredited by NAAC with 3.01 CGPA of 4.0 Scale)
(NIRF-2021 Ranked 19 in University Category & 34 in Overall Category)

No.: PMEB/AC10/759(6)/2019-20   **Date: 10-01-2022**

NOTIFICATION

Sub.: Change of Nomenclature from the academic year 2021-22-reg.

Ref.: 1. Decision of the BOS Meeting held on 25-11-2021.
      2. Decision of the Faculty of Science & Technology meeting held on 20-12-2021.
      3. Decision of the Academic Council meeting held on 23-12-2021.

******

The Board of Studies in **B.Voc. (Digital Architecture) (UG)** at its meeting held on 25-11-2021 has resolved and recommended to change the nomenclature of the course from **B.Voc. (Digital Architecture) to B.Des.-Hons.(Digital Architecture)** and duration of the course from 3 years to 4 years from the academic year 2021-22.

The Faculty of Science & Technology and the Academic Council at their meetings held on 20-12-2021 and 23-12-2021 respectively, are also approved the above said proposals and the same is hereby notified.

The change of Regulations, Syllabus and Scheme of Examination of **B.Des.-Hons.(Digital Architecture)** course is uploaded in University website. The contents may be downloaded from the University website **https://uni-mysore.ac.in/PMEB/.**

REGISTRAR
REGISTRAR
University of Mysore
MYSURU- 570 005

To;
1. The Registrar (Evaluation), University of Mysore, Mysuru.
2. The Dean, Faculty of Science & Technology, DOS in Earth Science, Manasagangothri, Mysuru.
3. Prof. Suresha, DOS in Computer Science, Manasagangotri, Mysuru.
4. The Director, Acharya Institute for Innovation and Transformation, Belawadi, Srirangapatna Tq., Mandya Dist.
5. The Deputy Registrar/ Asst. Registrar/ Superintendent, Examination Branch, UOM, Mysuru.
6. The Special Officer to Hon'ble Vice-Chancellor, University of Mysore, Mysuru.
7. The PA to Vice-Chancellor/Registrar/Registrar (Evaluation), University of Mysore, Mysuru.
8. Office Copy.

ACHARYA INSTITUTE FOR INNOVATION AND TRANSFORMATION

Regulations Governing the (B. Des.- Hons.(Digital Architecture /Vedic Architecture)

under
CREDIT AND SEMESTER SYSTEM AND GRADING
Scheme for the Distribution of Credits, Period
of Instruction and Syllabus

PREAMBLE:

This programme is designed to develop logical, parametric design thinking, and critical thinking skills in the field of Digital Architectural Technology. We empower the students to apply their skills in Building Design, Project Management and develop their leadership skills thus equipping them for the construction industry. We also make them future ready with a strong foundation and first-hand experience. We follow a pattern of project based learning, where students are exposed to case studies, and learn from real life examples and incorporate it in their design. What is hence learnt remains fresh in the young minds for a longer period of time.

The curriculum is designed with industry collaboration, ensuring students are learning relevant material to what is dominating in the current and future construction market.

AIM

The University Grants Commission (UGC) has launched a scheme on skills development based higher education as part of college/university education, leading to Bachelor of Vocation (B.Voc.) Degree with multiple exits such as Diploma/Advanced Diploma under the NSQF. The B.Voc. the programme is focused on universities and colleges providing undergraduate studies which would also incorporate specific job roles and their NOSs along with broad based general education. This would enable the graduates completing B.Voc. to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

The main objectives of the scheme are:

A. To provide a judicious mix of skills relating to a profession and appropriate content of General Education.

B. To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the programme.

C. To provide flexibility to the students by means of pre-defined entry and multiple exit points.

D. To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.

E. To provide vertical mobility to students coming out of 10+2 with vocational subjects.

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OBJECTIVES OF THE (B. Des.- Hons.(Digital Architecture /Vedic Architecture))

To empower the students with the professional competence and expertise of Digital architecture/ Vedic architecture.

A. To emphasize the importance of Digital-aided drawing, building methods and project management using the latest computer programs such as Revit (Building Information Modelling), Rhino/Dynamo and sketch-up in the design and construction industry.

B. To familiarize the students about the Construction technologies for materials such as load bearing structures, steel, masonry and precast concrete, and Alternative building technologies.

C. Hands-on skills including lessons on prevailing building codes, building specifications, estimating, and structural and environmental systems knowledge

D. To enable the students to understand Digital architecture, machine learning (Robotics), fabrication technologies, artificial intelligence , Big Data and so on— are soon becoming more and more ubiquitous and pervasive. Increased interest in the impact these technologies are having, and will have, in our daily lives has rapidly expanded the use of these tools in architecture schools, small scale industries, independent firms and international, corporate practices. From augmented reality for construction to 3D printing architectural models to using artificial intelligence within the design process, it is seldom that an architectural project does not use some kind of digital tool either for design or fabrication. This is also the case throughout how we experience the built environment. The digital lifestyle is everywhere; from the infrastructure we use to navigate the world to the objects we use to communicate.

DEFINITIONS OF KEYWORDS

The following are the definitions/descriptions that have been followed for the different terms used in the Regulations Governing the (B. Des.- Hons.(Digital Architecture/ Vedic Architecture)), Bachelor of Design Honors - (DIGITAL ARCHITECTURE /VEDIC ARCHITECTURE)

1) **Programme:** Is an educational programme in a particular stream/ branch of Digital Architecture/Vedic Architecture Branch of specialization leading to award of Bachelor of Design Hons. - (DIGITAL ARCHITECTURE/ VEDIC ARCHITECTURE) It involves events/activities, comprising of lectures/tutorials/ laboratory work/studio/field work, outreach activities/project work/ vocational training/ viva/seminars/Internship/ assignments/ presentations/ self-study etc., or a combination of some of these.

2) **Branch:** Means Specialization or discipline of B. DArch. Hons., (B. Des.- Hons.(Digital Architecture/Vedic Architecture)), Bachelor of Design Honors - (DIGITAL ARCHITECTURE/VEDIC ARCHITECTURE) Programme.

3) **Semester:** Refers to one of the two sessions of an academic year(vide:serial number4), each session being of sixteen weeks duration (with working days greater than or equal to ninety).The odd semester may be scheduled from July and even semester from January of the year.

4) **Academic Year:** Refers to the sessions of two consecutive semesters (odd followed by an even) including periods of vacation.

5) **Course:** Refers to usually referred to as 'papers' and is a component of a programme. All Courses need not carry the same weight. The Courses should define learning objectives and learning outcomes. A Course may be designed to comprise lectures/ tutorials/ laboratory work/ studio/case studies/field work/thesis/ outreach activities/project work/ professional training/ viva/ seminars/ term

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papers/assignments/ presentations/ self-study etc., or a combination of some of these.

6) **Credit:** Refers to a unit by which the Course work is measured. It indicates the relative importance of a given course.

7) **Audit Courses:** Means Knowledge/ Skill enhancing Courses without the benefit of a grade or credit for a Course.

8) **Choice Based Credit System (CBCS):** Refers to customizing the Course work, through Core, Elective and soft skill Courses, to provide necessary support for the students to achieve their goals.

9) **Course Registration:** Refers to formal registration for the Courses of a semester (Credits) by every student under the supervision of a Faculty Advisor (also called Mentor, Counselor etc.,) in each Semester for the Faculty to maintain proper record.

10) **Course Evaluation:** Means Progressive Evaluation[Continuous Internal Evaluation(CIE)] and Semester End Examinations (SEE) to constitute the major evaluations prescribed for each Course.

11) **Progressive Evaluation:** Refers to evaluation of students' achievement in the learning process. Progressive Evaluation shall be by the Course Instructor and includes tests, homework, problem solving, reviews/juries, periodical submissions, desk – crits (criticism), quiz, mini-project and seminar throughout the Semester, with weightage for the different components being fixed at the University level.

12) **Semester end examinations (SEE):** Refers to examinations conducted at the University level in each Course covering the entire Course Syllabus. SEE shall be conducted for Term work / Theory/Viva voce.

13) **First Attempt:** Refers to a student who has completed all formalities and has become eligible to attend the SEE and has attended at least one head of passing, such attempt shall be considered as first attempt.

14) **Credit Based System (CBS):** Refers to quantification of Course work, after a student completes Project based learning process, followed by passing in both Progressive Evaluation and SEE. Under CBS, the requirement for awarding a degree is prescribed in terms of total number of credits to be earned by the students.

15) **Credit Courses**: All Courses registered by a student in a semester to earn credits. In a widely accepted definition, students must earn credits by registering and passing the courses.

16) **Letter Grade:** It is an index of the performance of students in a said Course. Grades are denoted by letters S, A, B, C, D, E and F.

17) **Grading:** Grade refers to a qualitative measure of achievement of a student in each Course, based on the percentage of marks secured in (Progressive Evaluation and SEE). Grading is done by Absolute Grading [Refer: 23SBDS5.0]. The rubric attached to letter grades are as follows: S – Outstanding, A – Excellent, B – Very Good, C – Good, D – Above Average, E – Average and F – Fail.

18) **Grade Point (GP):** Refers to a numerical weightage allotted to each letter grade on a 10- point scale as under. Letter Grade and corresponding Grade Points on a typical 10 – Point scale LetterGrade S A B C D E F Grade Point 10 09 08 07 06 04 00

19) **Passing Standards:** Refers to passing a Course only when getting GP greater than or equal to 04 (as per serial number 17).

20) **Credit Point:** Is the product of grade point (GP) and number of credits for a Course i.e., Credtpoints CrP =GP×Credits for the Course.

21) **Semester Grade Point Average (SGPA):** Refers to a measure of academic performance of student/s in a semester. It is the ratio of total credit points secured by a student in various Courses of a semester and the total Course credits taken during that semester. [Refer: 23SBDS5.0]

22) **Cumulative Grade Point Average (CGPA):** Is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points earned by a student in various Courses in all semesters and the sum of the total credits of all Courses in all the semesters. It is expressed up to two decimal places. [Refer: 23SBDS5.0]

23) **Transcript or Grade Card or Certificate:** Refers to a certificate showing the grades earned by a student. A grade certificate shall be issued to all the registered students after every semester end examination. The grade certificate will display the programme details (Course code, title, number of credits, grades secured) along with SGPA of that semester and CGPA earned till that semester.

24) **University:** University of Mysore (UoM), Mysuru.

	Regulations Governing the (B. Des.- Hons.(Digital Architecture/Vedic Architecture)) **Bachelor of Design Honors - (DIGITAL ARCHITECTURE/ VEDIC ARCHITECTURE)**
23SBDS1.0	**Title, Duration and Credits of the Programme of Study**
23SBDS1.1	The programme of study shall be called the Bachelor of Design Hons. – (DIGITAL ARCHITECTURE / VEDIC ARCHITECTURE) abbreviated as B.Des Hons D.Arch/ V.Arch
23SBDS1.2	The B.Des Hons D.Arch/ V.Arch programme shall be of Four academic year duration divided into eight semesters and each semester is of 16 weeks duration. The actual teaching and learning days shall be for at least 90 working days in a semester.
23SBDS1.3	The calendar of events of the programme of study shall be notified by theUniversity.
23SBDS1.4	The University examination shall be conducted at the end of each semester for all the Eight semesters.
23SBDS1.5	**Maximum Duration for Programme Completion:** (a) Students admitted to I year B.Des Hons D.Arch/ V.Arch shall complete the programme. No time limit is considered. (b) As per the UGC guidelines, there are multiple exit points for a candidate admitted in this course. (c) If he/she is completing all the eight semester successfully, he/she will get **B. Des.- Hons. (Digital Architecture/ Vedic Architecture).** (d) If he/she is completing all the six semester successfully, he/she will get **B.Des.(Digital Architecture/ Vedic Architecture).** (e) If he/she is completing the first four semesters successfully, he/she will get an **UnderGraduate Diploma** (Digital Architecture/ **/** Vedic Architecture). (f) If he/she is completing the first two semesters he/she will get a **UnderGraduate Certificate (Digital Architecture / Vedic Architecture).**
23SBDS1.6	**Prescribed Number of Credits for the Programme:** The number of credits to be completed by students admitted for **(a)** B.Des Hons D.Arch/ V.Arch programme shall be **240 + 6** **(b)** B.Des D.Arch/ V.Arch programme shall be **180 + 6** **(c) UnderGraduate** Diploma in B.Des Hons D.Arch/ V.Arch programme shall be **120 + 4** **(d) UnderGraduate Certificate** in B.Des Hons D.Arch/ V.Arch Programme shall be **60** + **2**
23SBDS2.0	**Eligibility for Admission (As per the Government orders issued from time to time)**

23SBDS2.1	**Admission to 1st Semesters (1st year) :**
	for Level 5 and/or Undergraduate Certificate :
	   (a) who have passed the two year Pre-University examination conducted by the Karnataka State Pre-University Board with any discipline; or
	   (b) who have passed 10+2 of the Central Board of Secondary Education (CBSE)or equivalent with any discipline; or
	   (c) Who have passed any other examination recognized by the University as equivalent thereto.
	
	Admission to 3rd Semesters (2nd year) :
	for Level 6 and/or Undergraduate Diploma :
	   (d) A candidate who has passed Level 5 and/or have an undergraduate Certificate examination or first year Bachelor's degree examination in Architecture / Digital Architecture/ Vedic Architecture of University of Mysore or any other University considered as equivalent thereto is eligible for admission to this programme as lateral entry with passing marks in aptitude test conducted by the institute.
	   (e) who possess Three-Year Diploma in Architecture recognized by Government of Karnataka, or any other State Government or Central Government considered as equivalent thereto is eligible for admission to this programme as lateral entry with passing marks in aptitude test conducted by the institute.
	   (f) who possess Three-Year Diploma in any stream of engineering recognized by Government of Karnataka, or any other State Government or Central Government considered as equivalent thereto is eligible for admission to this programme as lateral entry with passing marks in aptitude test conducted by the institute.
	
	Admission to 5th Semesters (3rd year) :
	for Level 7 and/or B.Design:
	   (g) A candidate who has passed Undergraduate Diploma - (Digital Architecture/ Vedic Architecture) examination or second year Bachelor's degree examination in Architecture / Digital Architecture/ Vedic Architecture of University of Mysore or any other University considered as equivalent thereto is eligible for admission to this programme with passing marks in aptitude test conducted by the institute.
	
	Admission to 7th Semesters (4th year) :
	for Level 8 and/or B.Design (Hons):
	   (h) A candidate who has passed B.Design – (Digital Architecture/ Vedic Architecture) examination of University of Mysore or any other University considered as equivalent thereto is eligible for admission to this programme with passing marks in aptitude test conducted by the institute.
	
	   (i) A candidate who enters Level 5 in particular specialization shall select the same specialization in Level 6 and 7.
	
	   (j) A Candidate who enters B.Des Hons D.Arch/ V.Arch programme programme from a conventional bachelors degree programme has to clear attainment of competencies required for earlier 4 Levels through on-line or off-line mode, as a part of eligibility for admission to a chosen B.Des Hons D.Arch/ V.Arch programme.

23SBDS2.2	The candidates shall have secured a minimum of 50 % of marks in aggregate in the qualifying examination. Provided that candidates belonging to Scheduled Castes,Scheduled Tribes and/or any other groups classified by the Government of Karnataka for such purpose from time to time shall be considered eligible for admission, if they have passed the qualifying examination giving eligibility for the admission with 45% of marks in aggregate.
23SBDS2.3	All the candidates seeking admission to B.DArch/ V.Arch. Hons. shall pass/qualify the **Design Aptitude Test in Digital Architecture/ Vedic Architecture (DATDA)** conducted by the institution or any specially designed aptitude test in Architecture conducted by the Competent Authority of the Central / State Government or JEE Paper-II examination conducted by CBSE . This condition shall be fulfilled by all candidates including those belonging to Scheduled Castes, scheduled tribes and other classified groups.
23SBDS2.4	Any 3 year diploma holder can take lateral entry to B.Des Hons D.Arch/ V.Arch 3rd Semester (2nd year) and has to clear attainment of competencies required for earlier 2 Levels through on-line or off-line mode, as a part of eligibility for admission to a chosen B.Des Hons D.Arch/ V.Arch programme.
23SBDS3.0	**Courses**

23SBDS3.1	Course includes instructions on visual representation, building science, site planning and technical communications. Electives include bath and kitchen, interior detailing, National building code (legal), augmented reality, Morphology design thinking, The Proto-Parametricists, A Cybernetic Revolution, Computing design, Parametric Explosion, Augmenting Reality, Digital Fabrication, Robotics, Radical Rethinking, AI within the design process, Data science, fabrication, high-rise building's design and more.
	BDA= Digital Architectural Subjects; DRT= Digital Art Subjects; DRT= Digital Art Subjects; DAE = Engineering Subjects; HAP = Humanities and Psychology Subjects. Subject Categories:- GE = General Education; CEA = Cultural & Extracurricular Activities; SDC = Skill Development Components; OE = Optional Elective. Details will be as per the scheme.
23SBDS3.2	The minimum number of students registered to any Elective Course offered by theDepartment/College shall be not less than ten. However, the above condition shall not be applicable if the class strength is less than 10.
23SBDS3.3	A student shall exercise his option in respect of Elective Courses and register for the same at the beginning of the concerned semester. The student may be permitted to opt for a change of Elective Course within 15 days from the date of commencement of the semester as per the calendar of the University.
23SBDS3.4	**Course Registration:** Every student shall register for the Courses of a semester (Credits) under the supervision of a Faculty Advisor (also called Mentor, Counselor etc.,) in each Semester for the Institution to maintain proper record.
23SBDS4.0	**Study Tour, Professional Training and Professional Training**

23SBDS4.1	**Study Tour** A minimum of One study tours each of 4 to 10 days duration shall be completed, one before the end of each semester. The students have to submit a study tour report as group work (4 to 6 students per group) within 15 days after the end of the study tour. The reports shall be evaluated by the departments/ colleges for awarding the progressive mark of the Soft skills. The average marks obtained by a student in the two study tour reports shall be the progressive marks for the course Soft skills. The department/ college shall use its discretion about the choice of places and buildings to be visited for study tour. The study tour may include places of architectural interest in India or abroad. Students who cannot attend the study tour due to ill-health or any other compelling reasons shall undertake a study assignment in lieu of study tour.
23SBDS4.2	**Professional Training** At the end of sixth semester students shall undergo Professional Training for a period of 16+16 weeks under the supervision of a practicing architect. The students are permitted to carry out the professional training anywhere in India or abroad. Students opting to undergo training abroad shall work only under the Principal architect of firms registered with the local affiliating body of architects. The University/college will not provide any kind of financial assistance to any student for carrying out the professional training.

23SBDS4.3	The commencement of professional training shall be the date as notified by the University. The duration of professional training shall be counted from the date of commencement of the training.
23SBDS4.4	The students shall undergo professional training in a single organization only. The change of office /firm shall be permitted only under extraordinary circumstances with due approval of the Principal/HoD.
23SBDS4.5	All the students shall submit the logbook, training report along with the training completion certificate duly signed by the Principal Architect of the firm to the Head of the Department of Architecture / Principal. The report shall comprise of certified print out of drawings, site notes and any other relevant work carried out during the training period.
23SBDS4.6	The college / department shall maintain the record of the students undergoing training in the form of joining reports, periodical log reports, etc.
23SBDS4.7	The candidates who have completed the Professional Training shall attend the viva-voce examination conducted by two University appointed examiners, one internal examiner and one external examiner. Each candidate shall produce the logbook, training report and training completion certificate duly signed by the Principal Architect of the firm to the examiners.
23SBDS4.8	Failing to undergo Professional Training: Professional Training is one of the heads of passing. Completion of 16+16 weeks training is mandatory. If a student fails to undergo/ complete the 16 week training, he/she shall be considered as fail in B.Des.-Hons. (Digital Architecture/ Vedic Architecture) course and shall not be awarded the B.Des.-Hons. – (Digital Architecture/ Vedic Architecture) The student shall appear for the subsequent SEE in Professional Training after repeating and satisfying the conditions prescribed Training. The reappearance shall be considered as an attempt.

23SBDS4.9	**Digital Architectural / Vedic Architectural Design Project (Thesis)** The thesis project is the culmination of the learning under B.DArch/ VArch. Hons. programme. The thesis provides an opportunity to the students to experiment with an architectural idea with comprehensive application of understanding of various aspects of buildings / built environment. The Digital architectural / Vedic Architectural design project chosen by a student can be of any scale which can be adequately handled in all semesters. The genre of the project shallend with a design solution.
23SBDS5.0	**Computation of SGPA and CGPA**
23SBDS5.1	(i) The University adopts an absolute grading system wherein the marks are converted to grades, and every semester results will be declared with semester grade point average (SGPA) and Cumulative Grade Point Average (CGPA). The CGPA will be calculated for every semester, except for the first semester. (ii) The grading system with the letter grades and the assigned range of marks under absolute grading system are as given Annexure - 1
23SBDS5.2	Grade Card: Based on the secured letter grades, grade points, SGPA and CGPA, the transcript for each semester and a consolidated transcript indicating the performance in all semesters shall be issued.
23SBDS6.0	**Conversion of CGPA into Percentage of Marks and Class Equivalence**

23SBDS6.1	Formula for the conversion of CGPA into percentage is as per Mysore University framework.
23SBDS7.0	**Progressive Evaluation and Semester End Examination**
23SBDS7.1	Progressive Evaluation marks and SEE marks (Theory / Term work /Viva voce marks), shall be as prescribed in the Scheme of Teaching and Examination.

23SBDS7.2	**Progressive Evaluation**
	The minimum Progressive marks to be secured by the students in all the courses shall be 50 % of the maximum marks prescribed for the Progressive Evaluation.
	(a) In case of theory courses which are mainly lecture based as per the scheme of teaching and examinations, the Progressive Evaluation marks shall be based on the average of three tests conducted covering the entire syllabus. In addition, the teacher may give assignments instead of tests which may include sketching, book reviews, write-ups etc.
	(b) In case of courses which are mainly studio based as per the scheme of teaching and examinations, the Progressive marks shall be the sum total of marks given to the various drawings (plates) submitted from time to time by a student on tracing sheets / drawing sheets or Computer printouts/sketches/ models on the basis of internal reviews / juries / desk crits (criticisms). However, if the course teacher so desires, he/she shall give some weightage for time bound exercises/ problems / tests in these courses for the award of progressive marks. In a semester, two to three such time problems / tests may be conducted.
	(c) In case of courses which are mainly practical based as per the scheme of teaching and examinations, the Progressive marks shall be based on the assignments submitted by the students. A minimum of three assignments per semester shall be given.
	(d) In all the above three cases, viz. lectured based, studio based, and term work based courses the concerned teacher shall give a reasonable opportunity to the student to improve his / her Progressive marks for example by re-doing the assignments or attending an additional test etc., within the time frame of the given semester.
	(e) The Progressive marks in the case of Digital Architectural / Vedic Architectural Design Project (Thesis) at the end of semester shall be based on the evaluation of the project work (Thesis) through internal reviews/juries and desk crits etc., in accordance with the scheme of teaching and examination.

23SBDS7.3	All the relevant records and submissions of students pertaining to Progressive Evaluation shall be preserved by the Principal/ Head of the Department for at least six months after the announcement of University results and shall be made available for verification at the direction of the University authorities.

23SBDS7.4	(a) Students failing to secure a minimum of 50 % of the Progressive marks and students who remain absent for all the Progressive Evaluation shall not be eligible for the examination conducted by the University and they shall be considered as fail in that/those Course/s. However, they can appear for University examinations conducted in other Courses of the same semester and backlog Course/s if any.
	(b) Improvement in progressive marks shall only be allowed during the subsequent semester when the course is offered as per the scheme of teaching. (The students can register for improvement of marks of odd semester subjects during odd semester only, similarly the registration for improvement of marks of even semester subjects shall be permitted during even semester only)
	(c) Students who have satisfied the attendance requirement but not the minimum progressive marks requirements shall be permitted to register afresh and appear for SEE after satisfying the progressive evaluation requirements in the same Course/s when the course is offered during subsequent semester/s.
	(d) Each appearance to SEE to complete a course shall be treated as an attempt.
	(e) Candidates shall register their names in their college for satisfying progressive marks requirements within 15 days from the commencement of the subsequent semesters during which the course is offered as per the scheme of teaching. The college shall get the permission from UoM for such cases.
23SBDS7.5	The list of such candidates, who have not secured the minimum progressive marks, shall be sent to the University along with the submission of progressive marks of the successful candidates.
23SBDS7.6	Improvement of Progressive Evaluation marks shall not be allowed in case the student has already secured the minimum required marks.
23SBDS7.7	The final list, incorporating corrections (if any) of Progressive Evaluation marks awarded to the students in all the courses, shall be displayed on the notice board of the college at least seven days before the closure of the semester. The institution shall enter the progressive marks of each semester in the format of the UoM online/Offline CIE marks portal and submit a certified copy of the same to the University Examination Section within the stipulated date notified by University. Every page of the Progressive Evaluation marks sheet (hardcopy) shall bear the signatures of the concerned Teacher/Teachers, Head of the Department and Principal.
23SBDS7.8	Any corrections or overwriting of Progressive Evaluation marks shall bear the signature(s) of concerned Teacher(s) and in such cases the Head of the Department shall indicate the number of corrections on every sheet and attest it with his/her signature.

23SBDS7.9	Progressive Evaluation marks shall reach the University before the commencement of examination as per the notification from the office of the Registrar (Evaluation) from time to time. After the submission of Progressive Evaluation marks to the University, any request under any circumstances for change of Progressive Evaluation marks shall not be considered.
23SBDS7.10	**Semester End Examination and Passing standards** For a pass in a course (theory/viva voce/term work), a candidate shall secure a minimum 40 % in the University examination. (a) The University examination in Term work refers to the evaluation of complete course portfolios produced by students during a semester. (b) The Term work examination shall be conducted, in the absence of candidates, by internal and external examiners appointed by the University. (c) The viva voce examination, as per scheme of teaching and examination, shall be conducted by internal examiner (Course teacher /senior faculty/ visiting teacher working as full time or part-time teacher in an institution) and external examiners (a teacher or a professional not working in the same institution) appointed by the University. A consolidated mark shall be awarded by the examiners after a joint evaluation. (d) The viva voce examination, in the Digital Architectural/ Vedic Architectural Design Project (Thesis) shall be conducted by one internal and two external examiners, all appointed by the university. The maximum number of candidates assigned shall not exceeded 10 per batch and 3 batches per day to a panel of examiners in a day. (e) Candidates shall be present in person for Digital Architectural / Vedic Architectural Design Project (Thesis) examinations and submit the portfolio of works done (detailed set of drawings, sketches and models) during the semester and answer the queries of the examiners in respect of the portfolio.
23SBDS7.11	(a) Students who obtain any grade from S to E in courses prescribed for only progressive marks and for both progressive and SEE marks shall be considered as passed the course. (b) If a student secures F grade in any of the head of passing, he/she has to reappear in that head for the SEE. The Progressive Evaluation marks awarded to the student/s at first attempt in the failed Course/s shall be carried forward.
23SBDS7.12	Students who pass a Course of a semester shall not be allowed to appear for any individual Course again, unless they opt for rejection of results of the entire semester.
23SBDS7.13	A student may, at his/her desire, reject the total performance of a semester (including Progressive Evaluation marks) or reject the result of his/her performance in University examination of a semester only without rejecting the progressive marks. The rejection is permitted only once during the entire programme of study.

23SBDS7.14	The student who desires to reject the results of a semester shall reject performance in all the Courses of the semester, irrespective of whether the student has passed or failed in any Course. However, the rejection of performance of each semester Professional Training shall not be permitted.

23SBDS7.15	(a) Students, who desire to reject the total performance of a semester including Progressive Evaluation marks, have to repeat that odd or even semester of the prevailing scheme by taking readmission during the subsequent academic year/s. They shall also be governed by 23SBDS11.1 and 11.2.
	(b) If the rejection of SEE results excluding the progressive marks is of an odd semester, students shall be allowed to take admission to the immediate next semester. If the rejection of SEE results excluding the progressive marksis of even semester, then students shall not be allowed to take admission to the next odd semester as per 23SBDS9.2. In such cases, students shall take admission to the next odd semester of the prevailing scheme during the subsequent academic year/s, after obtaining the eligibility to move to higher semester. They shall also be governed by 23SBDS11.1 and 11.2.
	(c) Readmission to odd/even semester as per 23SBDS7.15 (i) and (iii) shall not be considered as fresh admission and therefore students shall continue to have the same University Seat Number, which was allotted earlier. The Course duration (as per 20SBDS1.5) will be counted with reference to old USN.
	(d) Applications for rejection and approval to reappear for University examinations shall be sent to the Registrar (Evaluation) through the Principal of the College within 30 days from the date of announcement of the results. Late submission of applications shall not be accepted for any reasons.
	(e) Application for approval of readmission shall be sent to the Registrar through the Principal of College within 30 days from the date of the announcement of the results. Late submission of application shall not be accepted for any reasons.
23SBDS7.16	Students who opt for rejection of results of University examinations are eligible for the award of degree, but are not eligible for the award of ranks.
23SBDS8.0	**Attendance Requirement**
23SBDS8.1	Courses of each semester shall be treated as a separate unit for calculation of the attendance. The candidate has to put in a minimum attendance of 85% in each Course with a provision to condone 10% of the attendance by the Vice-Chancellor on the specific recommendations of the Principal of the college where the candidate is studying, based on medical grounds, participation in University/State/ National/ International level sports and cultural activities, seminars, workshops, paper presentation etc., of significant value.
23SBDA 8 . 1 (continued)	The supporting documents for condoning the shortage of attendance are to be submitted along with the recommendations. The basis for the calculation of the attendance shall be the period prescribed by the University by its calendar of events.

23SBDS8.2	The Course Instructor/ Mentor/College shall inform the students as well as their parents about the attendance status periodically. Students who are facing the shortage of attendance are mentored to make up the shortage. Principals shall also notify every month, the list of candidates who are under short of attendance.

23SBDS8.3	A candidate, who does not satisfy the attendance requirement (in one or more Courses) as mentioned in 23SBDS8.1 shall not be eligible to appear for the SEE of that semester and shall not be permitted to take admission to next higher semester. The candidate shall be required to repeat that semester during the subsequent year.
23SBDS8.4	The list of the candidates falling short of attendance shall be sent to the Registrar (Evaluation) at least once in a month and final list shall be sent one week prior to the commencement of the examination. The detained students should obtain permission from Registrar, UoM for readmission to the semester concerned as a repeater.
23SBDS9.0	**Vertical Progression (Promotion/ Eligibility to higher semesters)**

23SBDS9.1	(a) There shall be no restriction for promotion from an odd semester to the next even semester, provided the student has fulfilled the attendance requirement, except in the case of promotion from VI semester to VII semester.
	
	 (b) A student shall be eligible for promotion from VII semester to VIII semester provided, he/she has passed the course Professional Training of VII semester. If the candidate has not undergone the training/ discontinued after registration to training/not undergone the prescribed training period of 16 weeks/ failed in viva voce examination, he/ she shall repeat the Professional Training during again to appear for the SEE.
	
	 (c) A student shall be declared fail if the candidate
	   (i) Fails to satisfy the minimum progressive marks conditions.
	   (ii) Absents himself / herself to the University examination.
	   (iii) Is held guilty of examination malpractice and for any other reasons, and declared the performance of any Course/s null and void by a competent authority.
	   (iv) If a student secures F grade in any of the Course/s, he/she shall reappear in that Course/s during the subsequent SEE. The progressive marks awarded to the student at first attempt in the concerned Course/s shall be carried forward. Newly earned progressive marks is considered only incases of 23SBDS7.4.

23SBDS9.2	**Vertical Progression:** (a) Each credit Course shall be treated as a head of passing. (b) Students having not more than four F grades in the two semesters of first year of the Programme shall be eligible to move to II Year. (c) Students having not more than four F grades in the four semesters of I and IIyear shall be eligible to move to III year. (d) Students having not more than four F grades in the six semesters of I, II and III year shall be eligible to move to IV year.

23SBDS10.0	Award of Degree

23SBDS10.1	(a) Students shall be declared to have completed the B.Des.-Hons.-(Digital Architecture/ Vedic Architecture) programme and shall be eligible for the award of B.Des.- Hons.-(Digital Architecture/ Vedic Architecture), provided the students have undergone the stipulated Course work of all the semesters under the same Scheme of Teaching and Examination and has earned the prescribed number of credits as per the provision 23SBDS1.6. [To be read along with 23SBDS11.1 and 11.2.]
	(b) If the students exit in 3rd year Students shall be declared to have completed the B.Des. .-(Digital Architecture/ Vedic Architecture) programme and shall be eligible for the award of B.Des. .-(Digital Architecture/ Vedic Architecture), provided the students have undergone the stipulated Course work of all the semesters under the same Scheme of Teaching and Examination and has earned the prescribed number of credits as per the provision 23SBDS1.6. [To be read along with 23SBDS11.1 and 11.2.]
	(c) For the award of Hons., a CGPA ≥5.00 at the end of Programme shall be mandatory. [to be read with 23SBDS10.0 and 11.0]
23SBDS10.2	**Noncompliance of CGPA ≥ 5. 00 at the end of the programme**
	(a) Students who have completed all the courses of the programme but not having a CGPA ≥ 5.00 at the end of the programme, shall not be eligible for the award of the degree. In such cases, students shall be permitted to appear again for SEE in course/s [other than Professional training and Digital Architectural / Vedic Architectural Design Project (Thesis)] of any Semester/s without the rejection of progressive evaluation marks for any number of times, subject to the provision of maximum duration of the programme to make up the CGPA equal to or greater than 5.00 for the award of the Degree.
	(b) In case, the students earn improved grade/s in all the reappeared course/s, the CGPA shall be calculated considering the improved grade/s. If it is ≥ 5.00, the students shall become eligible for the award of the degree. If CGPA <5.00, the students shall follow the procedure laid in 23SBDS10.2 (a).
	(c) In case, the students earn improved grade/s in some course/s and the same previously earned pass grade/s in the other reappeared course/s, the CGPA shall be calculated considering the improved grade/s. If it is ≥ 5.00, the students shall become eligible for the award of the degree. If CGPA <5.00, the students shall follow the procedure laid in 23SBDS10.2 (a).
	(d) (d)In case, the students earn improved grade/s in some courses and fail in the other reappeared course/s, the CGPA shall be calculated by considering the improved grade/s and the previously earned pass grade/s of the reappeared course/s in which the students have failed. If it is ≥ 5.00, the students shall become eligible for the award of the degree. If CGPA <5.00, the students shall follow the procedure laid in 18OBA10.2 (a).

23SBDS10.2 (Continued)	(e) In case, the students fail (i.e., earns F grade) in all the reappeared course/s, pass grade/s of the course/s earned by the students before reappearance shall be retained. In such cases, the students shall follow the procedure laid in 23SBDS10.2 (a). (f) Students shall obtain written permission from the Registrar (Evaluation) to reappear in SEE to make up the CGPA equal to or greater than 5.00.

23SBDS11.0	**Temporary Discontinuation/Break in the Program**
23SBDS11.1	(a) If a candidate, for any reason, temporarily discontinues the Programme or takes a break from the Programme during any semester intentionally, he/ she shall be permitted to continue the Programme by registering to the same semester of the prevailing scheme. The candidate shall complete all the remaining Course work subject to the provision 23SBDS1.5. Also the Candidates may have to complete additional Course/s, if any, as per the decision of Board of Studies in B.DArch/ VArch and approval of Dean, Faculty of Digital Architecture/ Vedic Architecture, on establishing the equivalence between two schemes. (b) A Grade card shall be issued to that effect. Additional Course/s shall not be considered for the eligibility criteria prescribed for promotion. However, based on the individual cases, they shall be considered to decide the SGPA and CGPA to admit the student for the award of degree. Such candidates shall not be eligible for the award of rank. (c) Candidates who take admission to any semester of the existing scheme from another scheme, as a repeater/fresher because of various reasons, including the case of 23SBDS11.1(a),
23SBDS11.1 (Continued)	shall attend and complete all the remaining semester/s of the Programme adhering to the regulations of the prevailing scheme, and shall complete additional Course/s, if any, as per the decision of Board of Studies in B.DArch./VArch Hons. and approval of Dean, Faculty of Digital Architecture/ Vedic Architecture , on establishing the equivalence between two schemes. (a) A Grade card shall be issued to that effect. Additional Courses shall not be considered for the eligibility criteria prescribed for promotion. However, based on the individual cases, they shall be considered to decide the SGPA and CGPA to admit the student for the award of degree. Such candidates shall not be eligible for the award of rank. (b) The credits to be earned by the candidates under 23SBDS11.1 (a and b) and BDA13.1 (b) and (c) shall be decided by the University along with the additional Course/s to be completed.

23SBDS11.2	(a) The candidates who have temporarily discontinued the Programme of study or changed the scheme of study from one to another because of various reasons, or transferred from autonomous/other University to non- autonomous UoM affiliated college, shall be eligible for the award of degree provided the credits earned is equal to or greater than the credits decided by the University in the individual cases.
	(b) In case, the credits earned is less than the credits decided by the University in the individual cases, after the completion of all the semesters of the Programme under the prevailing scheme, the candidate shall register for a Course or courses not studied earlier and make up the credits earned equal to or greater than the required for the award of degree.
23SBDS12.0	**Award of Prizes, Medals and Ranks**
23SBDS12.1	For the award of Prizes and Medals, the conditions stipulated by the Donor shall be considered subject to the provisions of the statutes framed by the University for such awards.

23SBDS12.2	(a) For award of rank in B. DArch/ VArch Hons. the CGPA secured by the students from I to VIII semester shall be considered.
	(b) A student shall be eligible for a rank at the time of award of Bachelor of Design Hons. - (Digital Architecture/ Vedic Architecture) , provided the student (i) Has passed I to VIII semester in all the Courses in first attempt only. Is not a repeater in any semester because of rejection of results of a semester/ shortage of attendance etc. (ii) Has completed all the semesters without any break/discontinuity. (iii) Has completed all the semesters (I to VIII) in UoM constituent college or in any UoM affiliated non-autonomous college. (iv) Has not been transferred from any autonomous institution affiliated to UoMor from any other University. (c) The total number of ranks awarded shall be 10% of the total number of students appearing in VIII semester subject to a maximum of 10 ranks. (d) For award of ranks in B.DArch/ VArch, Hons. a minimum of 10 students should have appeared in the VIII semester examination. (e) Illustration: (i)　　If 1333 students appeared for the VIII semester B. DArch/VArch Hons. programme, the number of ranks to be awarded shall be 10. (ii)　　If 90 students appeared for the VIII semester B. DArch/ VArch Hons programme, the number of ranks to be awarded shall be 09. (f) In case of fractional number of ranks, it is rounded to a higher integer only when the first decimal place value is greater than or equal to 5.
23SBDS12.3	Ranks are awarded based on the merit of the students as determined by CGPA. If two or more students get the same CGPA, the tie shall be resolved by considering the number of times a student has obtained higher SGPA. If it is not resolved even at this stage, the number of times a student has obtained higher grades like S, A,B etc., shall be taken into account to decide the order of the rank.
23SBDS13.0	**Transfers of Students**

23SBDS13.1	Transfer of students from one college to another college within the Karnataka state shall be permitted only at the beginning of third, and fifth, semesters, subject to availability of seats within the permitted intake in respective Colleges and subject to the prior approval of the University.
	Transfer of students from one non - autonomous to another non – autonomous college affiliated to UoM is permitted with the approval of the Registrar, UoM subject to the provision 23SBDS9.2.
	The students seeking transfer shall have to
	i) Obtain No Objection certificate for admission from the University and from both the colleges before the commencement of term as notified by UoM.
	ii) Complete the Programme subject to the provision 23SBDS1.5.
	Transfer of students from an autonomous to non – autonomous college, affiliated to UoM is permitted with the approval of the Registrar, UoM provided the candidates have passed in all the Courses of the previous semesters.
23SBDS13.1	**The students seeking transfer shall have to**
	(i) Obtain No Objection certificate for admission from the University and from both the colleges before commencement of term as notified by UoM.
	ii) Complete additional Course/s, if any, as per the decision of concerned Board of Studies and approval of Dean, Faculty of Digital Architecture , on establishing the equivalence between two schemes. A Grade card shall be issued to that effect. Additional Course/s shall not be considered for the Eligibility criteria prescribed for promotion, Class, calculation of SGPA and CGPA. However, a pass in the additional Courses, if any, is mandatory before the completion of a Degree.
	iii) Earn the credits decided by the University as per 23SBDS11.2.
	iv) Complete the Programme subject to the provision 23SBDS1.5.

23SBDS13.1 (Continued)	**The students seeking admission from other Universities to UoM shall have to**
	i) Apply for establishment of equivalence with prescribed fees as notified by the UoM and obtain No Objection certificate for admission from the University before the commencement of term as notified by UoM.
	ii) Produce No Objection certificate for admission from both the colleges before the commencement of term as notified by UoM.
	iii) Complete additional Course/s, if any, as per the decision of concerned Board Of Studies and approval of Dean, Faculty of Digital Architecture / Vedic Architecture, on establishing equivalence between two schemes. A Grade card shall be issued to that effect. Additional Course/s shall not be considered for the eligibility criterion prescribed for promotion, Class, calculation of SGPA and CGPA. However, a pass in the additional Courses, if any, is mandatory before the completion of Degree.
	iv) Earn the credits decided by the University as per 23SBDS 11.2.
	v) Complete the Programme subject to the provision 23SBDS1.5.
23SBDS13.2	The University may prescribe a fee for administrative purposes, which shall be notified from time to time, for transfer from one college to another (Change of College).
23SBDS14.0	**Applicability and Power to Modify**
23SBDS14.1	The regulations governing the B. Des. -Hons.(Digital Architecture/ Vedic Architecture) of University Of Mysore shall be binding on all concerned.
23SBDS14.2	i) Notwithstanding anything contained in the foregoing, the University shall have the power to issue directions/ orders to address any difficulty. ii) Nothing in the foregoing may be construed as limiting the power of the University to amend, modify or repeal any or all of the above.

ANNEXURE 1

Letter Grade	Grade Point
O (Outstanding)	100
A+ (Excellent)	90-99
A (Very Good)	80-89
B+ (Good)	70-79
B(Above Average)	60-69
C (Average)	50-59
P(Pass)	40-49
F(Fail)	Below 40
Ab(Absent)	0

Note

- A student obtaining Grade I shall be considered failed and will be require to reappear in the examination

- For non-credit courses Satisfactory or "Unsatisfactory shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA

- The formula for conversion of Grade Point Average (GPA) into the Final Grade

Sl. No.	Mark From	Mark To	Grade	Grade Value	Advantage	Fail
1	0	42	F	0	No	Yes
2	43	50	E	5	No	No
3	5	60	D	6	No	No
4	61	70	C	7	No	No
5	71	80	B	8	No	No
6	81	90	A	9	No	No
7	91	100	S	10	No	No

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

B.Des.-Hons Vedic Architecture

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Vedic Architecture and its principles	0	7	4	11	0	0	50	50	100	9
2		SDC	STHAPATHYA VEDA	3	4	0	7	2	50	50	0	100	7
3		SDC	Scared Geometry in Vedic Architecture-1	3	1	0	4	2	50	50	0	100	4
4		SDC	Vedic Measurements , Surveying & Documenting	0	2	2	4	0	0	50	50	100	3
5		SDC/OE	ASTROLOGY AND ASTRONOMY IN VEDIC ARCHITECTURE	1	1	0	2	2	50	50	0	100	2
6		GE	SOFT SKILL-TECHNICAL READING, WRITING AND PEER TEACHING-I	2	1	0	3	2	50	50	0	100	3
7		GE	LIFE SKILL AND PUBLIC SERVICES-I	0	1	2	3	0	0	50	50	100	2
8		CEA	Yoga, Sports & Culture	0	1	0	1	0	0	100	0	100	1
			Total	**9**	**18**	**8**	**35**		**200**	**450**	**150**	**800**	**31**
		No. of subjects/Heads		8	No. of Theory Examinations =		4						

BDA = Digital Architectural Subjects; **DRT** = Digital Art Studio; **DRT** = Digital Art Subject; **DAE**= Engineering Subjects; **HAP** = Humanities And Psychology Subjects.

Subject Categories : **GE** = General Education   **CEA** = Cultural & Extracurricular Activities   **SDC** = Skill Development components   **OE** = Optional Elective

Minimum Marks for passing: Progressive Marks **50%**, Theory marks, Term work marks and Viva marks **40 % in each**

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

B.Des.-Hons Vedic Architecture

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Vedic Architecture and its principles & Apllications (Design)	0	7	4	11	0	0	50	50	100	9
2		SDC	SUSTAINABLE VEDIC ARCHITECTURE	0	4	4	8	0	0	50	50	100	6
3		SDC	Vedic Building Materials & Methods of Construction	3	1	0	4	2	50	50	0	100	4
4		SDC	The Vastu Purusha Mandala And its Application	0	2	4	6	0	0	50	50	100	4
5		SDC/OE	Elective (Drafting Software)	0	2	0	2	0	0	100	0	100	2
6		GE	SOFT SKILL-TECHNICAL READING, WRITING AND PEER TEACHING-I	2	1	0	3	2	50	50	0	100	3
7		GE	LIFE SKILL AND PUBLIC SERVICES-I	0	1	2	3	0	0	50	50	100	2
8		CEA	Yoga, Sports & Culture	0	1	0	1	0	0	100	0	100	1
			Total	**5**	**19**	**14**	**38**		**100**	**500**	**200**	**800**	**31**
		No. of subjects/Heads		8	No. of Theory Examinations =		2						

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Subject Categories : **GE** = General Education   **CEA** = Cultural & Extracurricular Activities   **SDC** = Skill Development components   **OE** = Optional Elective

Minimum Marks for passing: Progressive Marks **50%**, Theory marks, Term work marks and Viva marks **40 % in each**

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

B.Des.-Hons Vedic Architecture

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Vedic Temple Design Principles & Apllications	0	10	8	18	0	0	50	50	100	14
2		SDC	Building Services	0	2	6	8	0	0	50	50	100	5
3		SDC	Alternate Building Materials & Methods of Construction-II	3	1	0	4	2	50	50	0	100	4
4		SDC/OE	Elective (3D Drafting Software)	0	2	0	2	0	0	100	0	100	2
5		GE	SOFT SKILL-TECHNICAL READING, WRITING AND PEER TEACHING-I	2	1	0	3	2	50	50	0	100	3
6		GE	LIFE SKILL AND PUBLIC SERVICES-I	0	1	2	3	0	0	50	50	100	2
7		CEA	Yoga, Sports & Culture	0	1	0	1	0	0	100	0	100	1
			Total	5	18	16	39		100	450	150	700	31
		No. of subjects/Heads		7	No. of Theory Examinations =		2						

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Subject Categories :   **GE** = General Education   **CEA** = Cultural & Extracurricular Activities   **SDC** = Skill Development components   **OE** = Optional Elective

Minimum Marks for passing: Progressive Marks **50%**, Theory marks, Term work marks and Viva marks **40 % in each**

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

B.Des.-Hons Vedic Architecture

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Vedic Design Apllications (Urban Design)	0	12	6	18	0	0	50	50	100	15
2		SDC	Analysis of Design Structure	0	6	4	10	0	0	50	50	100	8
3		SDC/OE	Elective (Multidisciplinary)	0	1	2	3	0	0	100	0	100	2
4		GE	SOFT SKILL-TECHNICAL READING, WRITING AND PEER TEACHING-I	2	1	0	3	2	50	50	0	100	3
5		GE	LIFE SKILL AND PUBLIC SERVICES-I	0	1	2	3	0	0	50	50	100	2
6		CEA	Yoga, Sports & Culture	0	1	0	1	0	0	100	0	100	1
			Total	2	22	14	38		50	400	150	600	31
	No. of subjects/Heads			6	No. of Theory Examinations =		1						

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Subject Categories :   **GE** = General Education   **CEA** = Cultural & Extracurricular Activities   **SDC** = Skill Development components   **OE** = Optional Elective

Minimum Marks for passing: Progressive Marks **50%**, Theory marks, Term work marks and Viva marks **40 % in each**

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

B.Des.-Hons Vedic Architecture

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Working Drawing & Tender Drawings	0	9	6	15	0	0	50	50	100	12
2		SDC	Professionals Practice & Office Management	3	3	0	6	2	50	50	0	100	6
3		SDC	Entrepreneurship & Marketing	2	3	0	5	2	50	50	0	100	5
4		SDC/OE	Elective (Multidisciplinary)	0	1	2	3	0	0	100	0	100	2
5		SDC/OE	Project Managemet	2	1	0	3	2	50	50	0	100	3
6		GE	LIFE SKILL AND PUBLIC SERVICES-I	0	1	2	3	0	0	50	50	100	2
7		CEA	Yoga, Sports & Culture	0	1	0	1	0	0	100	0	100	1
			Total	**7**	**19**	**10**	**36**		**150**	**450**	**100**	**700**	**31**
	No. of subjects/Heads			7	No. of Theory Examinations =		3						

BDA = Digital Architectural Subjects; **DRT** = Digital Art Studio; **DRT** = Digital Art Subject; **DAE**= Engineering Subjects; **HAP** = Humanities And Psychology Subjects.

Subject Categories :   **GE** = General Education   **CEA** = Cultural & Extracurricular Activities   **SDC** = Skill Development components   **OE** = Optional Elective

Minimum Marks for passing: Progressive Marks **50%**, Theory marks, Term work marks and Viva marks **40 % in each**

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

B.Des.-Hons Vedic Architecture

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Vedic Architecture Thesis	0	12	6	18	0	0	50	50	100	15
2		SDC	Estimation & Costing	2	4	0	6	2	50	50	0	100	6
3		SDC	Specification Writing	2	2	0	4	2	50	50	0	100	4
4		SDC/OE	Elective (Multidisciplinary)	0	1	2	3	0	0	100	0	100	2
5		SDC	Value Engineering Design	2	1	0	3	2	50	50	0	100	3
6		CEA	Yoga, Sports & Culture	0	1	0	1	0	0	100	0	100	1
			Total	**6**	**21**	**8**	**35**		**150**	**400**	**50**	**600**	**31**
		No. of subjects/Heads		6	No. of Theory Examinations =		3						

BDA = Digital Architectural Subjects; **DRT** = Digital Art Studio; **DRT** = Digital Art Subject; **DAE**= Engineering Subjects; **HAP** = Humanities And Psychology Subjects.

Subject Categories :   **GE** = General Education   **CEA** = Cultural & Extracurricular Activities   **SDC** = Skill Development components   **OE** = Optional Elective

Minimum Marks for passing: Progressive Marks **50%**, Theory marks, Term work marks and Viva marks **40 % in each**

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

B.Des.-Hons Vedic Architecture

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Internship	0	0	30	30	0	0	0	0	100	30
2		SDC	Research	0	0	2	2	0	0	0	0	100	1
			Total	**0**	**0**	**32**	**32**	0	**0**	**0**	**0**	**200**	**31**
		No. of subjects/Heads		2	No. of Theory Examinations =		0						

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Subject Categories :   **GE** = General Education   **CEA** = Cultural & Extracurricular Activities   **SDC** = Skill Development components   **OE** = Optional Elective

Minimum Marks for passing: Progressive Marks **50%**, Theory marks, Term work marks and Viva marks **40 % in each**

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

B.Des.-Hons Vedic Architecture

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorial (T)	Practical (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Internship	0	0	30	30	0	0	0	0	100	30
2		SDC	Research	0	0	2	2	0	0	0	0	100	1
			Total	**0**	**0**	**32**	**32**	0	**0**	**0**	**0**	**200**	**31**
	No. of subjects/Heads			2	No. of Theory Examinations =		0						

BDA = Digital Architectural Subjects; **DRT** = Digital Art Studio; **DRT** = Digital Art Subject; **DAE**= Engineering Subjects; **HAP** = Humanities And Psychology Subjects.

Subject Categories :   **GE** = General Education   **CEA** = Cultural & Extracurricular Activities   **SDC** = Skill Development components
  OE = Optional Elective

Minimum Marks for passing: Progressive Marks **50%**, Theory marks, Term work marks and Viva marks **40 % in each**

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

S. No	Stream Code	Semester	QP Code	Subject Title	Course Type	L	T	P	Total Credits
1st Sem.									
1	RBVA23	1	-NA-	Vedic architecture and its principles	SDC	0	7	4	9
2	RBVA23	1	90210	Sthapatya Veda	SDC	3	4	0	7
3	RBVA23	1	90211	sacred geometry in Vedic architecture - I	SDC	3	1	0	4
4	RBVA23	1	-NA-	Vedic Measurements, SURVEYING & DOCUMENTING	SDC	0	2	2	3
5	RBVA23	1	90212	astrology and astronomy in Vedic architecture	SDC/OE	1	1	0	2
6	RBVA23	1	90213	SOFT Skills-TECHNICAL READING, WRITING AND PEER TEACHING	GE	2	1	0	3
7	RBVA23	1	-NA-	LIFE Skills AND PUBLIC SERVICES	GE	0	1	2	2
8	RBVA23	1	-NA-	Yoga, SPORTS AND CULTURE	CEA	0	1	0	1
					Total Credits				**31**
2nd Sem.									
1	RBVA23	2	-NA-	Vedic architecture and its principles and applications (Design)	SDC	0	7	4	9
2	RBVA23	2	-NA-	Sustainable Vedic Architecture	SDC	0	4	4	6
3	RBVA23	2	90214	Vedic Building Materials AND METHODS OF CONSTRUCTION-I	SDC	3	1	0	4
4	RBVA23	2	-NA-	the Vastu Purusha Mandala and its application	SDC	0	2	4	4
5	RBVA23	2	-NA-	ELECTIVE (Drafting Software)	SDC/OE	0	1	2	2
6	RBVA23	2	90215	SOFT Skills-TECHNICAL READING, WRITING AND PEEr TEACHING	GE	2	1	0	3
7	RBVA23	2	-NA-	LIFE Skills AND PUBLIC SERVICES	GE	0	1	2	2
8	RBVA23	2	-NA-	Yoga, SPORTS AND CULTURE	CEA	0	1	0	1
					Total Credits				**31**
				Certificate Course - (Vedic Architecture) - (Exit at 1st Year) Total Credits					**62**
3rd Sem.									
1	RBVA23	3	-NA-	Vedic temple design principles & Applications	SDC	0	10	8	14
2	RBVA23	3	-NA-	BUILDING SERVICES	SDC	0	2	6	5
3	RBVA23	3	90216	Alternate building MATERIAL AND METHODS OF CONSTRUCTION-II	SDC	3	1	0	4
4	RBVA23	3	-NA-	ELECTIVE(3D Drafting Software)	SDC/OE	0	1	2	2
5	RBVA23	3	90217	SOFT Skills-TECHNICAL READING, WRITING AND PEER TEACHING	GE	2	1	0	3
6	RBVA23	3	-NA-	LIFE Skills AND PUBLIC SERVICES	GE	0	1	2	2
7	RBVA23	3	-NA-	Yoga, SPORTS AND CULTURE	CEA	0	1	0	1
					Total Credits				**31**
4th Sem.									

1	RBVA23	4	-NA-	Vedic DESIGN APPLICATIONS (Urban Design)	SDC	0	12	6	15
2	RBVA23	4	-NA-	analysis of design structures	SDC	0	6	4	8
3	RBVA23	4	-NA-	ELECTIVE (multidisciplinary)	SDC/OE	0	1	2	2
4	RBVA23	4	90218	SOFT Skills-TECHNICAL READING, WRITING AND PEER TEACHING	GE	2	1	0	3
5	RBVA23	4	-NA-	LIFE Skills AND PUBLIC SERVICES	GE	0	1	2	2
6	RBVA23	4	-NA-	Yoga, SPORTS AND CULTURE	CEA	0	1	0	1
								Total Credits	**31**
				Diploma - (Vedic Architecture) - (Exit at 2nd Year) Total Credits					**124**
5th Sem.									
1	RBVA23	5	-NA-	WORKING DRAWINGS AND TENDER DRAWINGS	SDC	0	9	6	12
2	RBVA23	5	90219	PROFESSIONAL PRACTICE And OFFICE MANAGEMENT	SDC	3	3	0	6
3	RBVA23	5	90220	ENTREPRENEURSHIP AND MARKETING	SDC	2	3	0	5
4	RBVA23	5	-NA-	ELECTIVE (multidisciplinary)	SDC/OE	0	1	2	2
5	RBVA23	5	90221	PROJECT MANAGEMENT	SDC/OE	2	1	0	3
6	RBVA23	5	-NA-	LIFE Skills AND PUBLIC SERVICES	GE	0	1	2	2
7	RBVA23	5	-NA-	Yoga, SPORTS AND CULTURE	CEA	0	1	0	1
								Total Credits	**31**
6th Sem.									
1	RBVA23	6	-NA-	Vedic Architecture Thesis.	SDC	0	12	6	15
2	RBVA23	6	90222	ESTIMATION AND COSTING	SDC	2	4	0	6
3	RBVA23	6	90223	SPECIFICATION WRITING	SDC	2	2	0	4
4	RBVA23	6	-NA-	ELECTIVE (multidisciplinary)	SDC/OE	0	1	2	2
5	RBVA23	6	90224	VALUE ENGINEERING DESIGN	SDC	2	1	0	3
6	RBVA23	6	-NA-	Yoga, SPORTS AND CULTURE	CEA	0	1	0	1
								Total Credits	**31**
				B.Des.- (Vedic Architecture) - (Exit at 3rd Year) Total Credits					**186**
7th Sem.									
1	RBVA23	7	-NA-	INTERNSHIP	SDC	0	0	30	30
2	RBVA23	7	-NA-	Research Paper	SDC	0	0	2	1
								Total Credits	**31**
8th Sem.									
1	RBVA23	8	-NA-	INTERNSHIP	SDC	0	0	30	30
2	RBVA23	8	-NA-	Research Paper	SDC	0	0	2	1
								Total Credits	**31**

	B.Des.-Hon. - (Vedic Architecture) - (Exit at 4th Year) Grand Total Credits	248
Note:	**Subject Categories:-** **GE =** General Education; **CEA =** Cultural & Extracurricular Activities; **SDC =** Skills Development Components; **OE =** Optional Elective	
	Minimum Marks for passing: Progressive Marks **50%,** Theory marks, Term work marks and Viva marks **40% in each**	
	Progressive Marks to be awarded by the subject teacher. Term work & Viva Voce examination shall be conducted jointly by one internal & one external examiner appointed bythe University.	

	YEAR:1	SEMESTER:1	SDC	VEDIC ARCHITECTURE AND ITS PRINCIPLES - I	CREDITS 0:7:2

CONTACT PERIOD: 11 (0 LECTURE+7 TUTORIAL+ 4 PRACTICAL/ SEMINAR) per week	PROGRESSIVE MARKS:50	VIVA MARKS:50

AIM

The aim of the topic Introduction to Vedic architecture and its principles is to provide an overview of the traditional Indian architectural principles and concepts that underlie Vedic architecture. This topic aims to introduce learners to the fundamental principles of Vedic architecture, including the use of natural materials, the importance of orientation, the role of symmetry and proportion, and the use of sacred geometry.

This topic aims to explain the significance of Vedic architecture in Indian culture and its relevance to modern architecture. It aims to provide an understanding of the spiritual and religious beliefs that inform Vedic architecture and how these beliefs are reflected in the design and construction of buildings.

The main aim of the topic is to promote a greater appreciation of the cultural and artistic traditions of India, while also providing practical design skills that can be applied to modern architecture. By studying Vedic architecture, learners can gain a deeper understanding of sustainable building practices, develop personal growth, and promote harmony with nature.

OBJECTIVES

1. The course begins with an **overview of Vedic architecture**, including its history, philosophy, and principles.
2. Students will learn about the key **design principles of Vedic architecture,** such as the use of natural materials, the importance of orientation, and the role of sacred geometry.
3. Students will explore the ancient Indian science of **Vastu Shastra,** which provides guidelines for the design and construction of buildings in harmony with nature.
4. The course will cover the **sustainable building practices** of Vedic architecture, including the use of natural and renewable materials and the integration of buildings with their natural surroundings.
5. Students will learn how the principles of Vedic architecture can be **applied to modern architecture**, including the design of homes, offices, and public buildings.
6. The course will provide a **cultural and spiritual context for Vedic architecture**, including an exploration of the religious and spiritual beliefs that underlie traditional Indian architecture.

Throughout the course, students will engage in a range of activities, including readings, lectures, discussions, and design exercises. By the end of the course, students will have a foundational understanding of the principles and practices of Vedic architecture and will be able to apply these principles to their own design work.

OUTLINE

UNIT 1 - Introduction

A. **Definition of Vedic architecture:** Vedic architecture seeks to create buildings and spaces that support physical, mental, and spiritual well-being, and that foster a sense of connection to the natural world and the cosmos.

B. **Historical context:**Origins and Evolution, Vedic Literature, Sacred Geometry and its history, City Planning during Vedic period, Influence on Indian Architecture, Contemporary Relevance of Vedic Architecture.

C. **Importance of Vedic architecture:** It should be covered with examples of Creating a harmonious living environment, Enhancing energy flow, Improving health and well-being, Connecting with the cosmic order, Preserving cultural heritage.

UNIT 2 - Principles of Vedic architecture
A. **Five elements:** The five elements of nature, namely earth, water, fire, air, and space, how these elements are incorporated into the design of buildings and structures, and how they affect the energy flow and ambiance of a space.

B. **Orientation and alignment:** The placement and alignment of a building is based on the position of the sun and other celestial bodies. The flow of natural light and air, and create a positive energy flow in space.

C. **Materials and colors:** The selection of building materials and colors, their natural properties and their ability to create a positive energy flow in the space.

D. **Proportions and measurements:** A system of proportion and measurement, measurements based on the human body, with the size and proportions of the modules reflecting the dimensions of various body parts, grid-based system, Mandalas.

E. **Functionality and sustainability:** The functionality of the space and its ability to serve the needs of the occupants. It also focuses on the use of sustainable materials and technologies that minimize the impact on the environment.

F. **Rituals and ceremonies:** The incorporation of rituals and ceremonies into the design process. Infuse the space with positive energy and create a sacred environment.

UNIT 3 - Applications of Vedic architecture
A. **Temple architecture:** To study a unique design and symbolism that reflects the spiritual beliefs and practices of the culture. This topic covers the principles of temple architecture, including the layout, orientation, and symbolism of various elements such as the sanctum, mandapa, and garbhagriha.

B. **Residential architecture:** The Optimal orientation of the site and building, Use of Natural materials, Balancing elements, Designing for function, and Mindful layout.

C. **Commercial architecture:** Creating a space for a welcoming and productive work environment, Designing for success and prosperity, Creating spaces for customer engagement, Incorporating sustainability and environmental consciousness, Promoting well-being and health.

D. **Sacred architecture:** The role of geometry, symbolism, and proportion in the design of sacred spaces.How sacred architecture impacts religious and spiritual experiences of the people who use them.The relationship between natural elements and sacred architecture, such as the use of light, water, and plants.Case studies of iconic sacred buildings, such as churches, temples, and mosques, and the architectural features that make them unique.

UNIT 4 - Benefits of Vedic architecture
A. **Benefits of health:** Mental health, Physical health, Spiritual well-being, Financial success, Social harmony and Explaining the topics of Improve air quality, Better sleep, Reduced stress, Enhanced physical activity, Improved digestion, Reduced exposure to electromagnetic fields, and Better circulation by adopting Vedic architectural principles.

UNIT 5 - Conclusion
A. Summary of key points and future potential of Vedic architecture.

OUTCOME
At the end of this course, students will be aware ofUnderstanding of Vedic architecture, know the Design skills and how it can be implemented in modern architecture and how that are aesthetically pleasing.Cultural appreciation,, understanding of sustainable building practices and apply them to modern architecture. Personal benefits, such as developing a greater sense of connection to nature, promoting mindfulness and meditation, and fostering a sense of spirituality and inner peace.

2

QUESTIONS

A.   What is Vedic architecture?
B.   What are the key principles of Vedic architecture?
C.   How is Vedic architecture different from other architectural styles?
D.   What is the significance of Vastu Shastra in Vedic architecture?
E.   How can Vedic architecture principles be applied in modern construction practices?
F.   What are some of the key benefits of incorporating Vedic architecture principles in building design?
G.   What are the different types of spaces and their ideal Vedic architecture design?
H.   What are some of the common mistakes made while applying Vedic architecture principles and how to avoid them?
I.   How can Vedic architecture help in creating a more harmonious and balanced living or work environment?
J.   How to achieve sustainability and efficiency in building design using Vedic architecture principles?

REFERENCES

1.   "Vastu Architecture: Design Theory and Application for Everyday Life" by Michael Borden
2.   "The Vastu Vidya Handbook: The Indian Feng Shui" by Pallavi Chhelavda
3.   "Vastu: Breathing Life into Space" by Robert Svoboda
4.   "Vedic Architecture: Towards a Sustainable Future" by B.G. Dharmananda
5.   "Introduction to Vastu: The Hindu System of Architecture" by Michael Mastro
6.   "Vastu: Transcendental Home Design in Harmony with Nature" by Sherri Silverman

	YEAR:1	SEMESTER:1	SDC	STHAPATYA VEDA	CREDITS 3:4:0

CONTACT PERIOD: 7 (3 LECTURE + 4 TUTORIAL+0 PRACTICAL /SEMINAR) per week	PROGRESSIVE MARKS:50	THEORY MARKS:50

AIM

A course on the concept of Sthapatya Veda and its relevance in modern architecture aims to provide students with a comprehensive understanding of this ancient Indian science of architecture and design and its potential applications in contemporary design And will examine the cultural and regional specificity of Sthapatya Veda and explore how its principles can be adapted to different cultural contexts and design needs.

OBJECTIVES

1. Students can learn about the **fundamental principles and concepts of Sthapatya Veda**, such as the use of natural materials, orientation of buildings, and the importance of Vastu Shastra.
2. Students can explore the **historical context of Sthapatya Veda** and how it has evolved over time. They can also examine the impact of colonization and globalization on this traditional Indian system of architecture.
3. Students can examine how the **principles of Sthapatya Veda have influenced modern architecture**, such as the use of sustainable materials and the integration of buildings with their natural surroundings.
4. Students can **evaluate case studies of buildings** that have been designed using the principles of Sthapatya Veda and analyze their effectiveness in terms of sustainability, energy efficiency, and overall aesthetic appeal.
5. Students can **develop their design skills** by applying the principles of Sthapatya Veda to create their own building designs that are sustainable, energy-efficient, and in harmony with the surrounding environment.

Overall, studying Sthapatya Veda and its relevance in modern architecture can help students develop a deeper understanding of the relationship between architecture and the natural environment, and how traditional systems of architecture can be adapted to meet the needs of modern society.

OUTLINE

UNIT 1 - INTRODUCTION
A. **Definition and explanation of Sthapatya Veda:**Historical background, its connection to Vedic traditions, and its development over time.Principles and concepts, such as the use of natural materials, the orientation of buildings. Criticisms and controversies, such as the use of ancient principles in modern architecture and the potential for cultural appropriation.

B. **Historical context and evolution of Sthapatya Veda:**Origins and early developments, include the historical origins of Sthapatya Veda, its connection to the Vedas, and its early development in ancient India.Evolution during the Vedic period, Influence of Buddhism and Jainism, Impact of colonization and globalization, Contemporary developments, Regional variations, Cultural significance including its role in shaping Indian culture and its connection to spiritual practices.

UNIT 2 - Principles of Sthapatya Veda
A. **Harmony with nature and the environment:**Elements of design, such as the use of symmetry, proportion, and harmony.concept of the five elements (earth, water, fire, air, and space) and how Sthapatya Veda principles seek to create harmony between these elements in architectural design.
B. **Integration of indoor and outdoor spaces:** Examples of a seamless transition between the built environment and the natural environment.
C. **Use of natural materials and sustainable design:** Benefits and significance, such as its ability to create healthy living environments and its emphasis on sustainability and energy efficiency.

UNIT 3 - Case Studies

A. **Analysis of buildings and structures that incorporate principles of Sthapatya Veda:** Examples and case studies, such as the Maharishi University in Iowa, USA or the Auroville community in Tamil Nadu, India.

B. **Assessment of the success of these buildings in achieving the goals of Sthapatya Veda:** The examples of buildings designed using Sthapatya Veda principles, assessing their success in achieving the goals of the tradition and identifying areas for improvement.

UNIT 4 - Applying principles of Sthapatya Veda in design projects

A. Developing design concepts that incorporate principles of Sthapatya Veda, Use of natural light and ventilation in design projects.

UNIT 5 - Criticisms and limitations of Sthapatya Veda

A. Cultural and regional specificity of Sthapatya Veda, Adapting principles of Sthapatya Veda to different cultural contexts and design needs.

UNIT 6 - Conclusion

A. Recap of the importance and relevance of Sthapatya Veda in modern architecture And future directions and possibilities for incorporating Sthapatya Veda in modern architecture.

OUTCOME

Studying the concept of Sthapatya Veda and its relevance in modern architecture can help students develop critical thinking skills, creative problem-solving skills, and a deeper understanding of the relationship between architecture and the natural environment. This knowledge can be applied in the design of sustainable and energy-efficient buildings that enhance the quality of life for people while minimizing their impact on the environment.

QUESTIONS:

1. What is Sthapatya Veda?
2. What are the key principles of Sthapatya Veda?
3. How does Sthapatya Veda differ from other architectural systems?
4. What is the role of astrology in Sthapatya Veda?
5. How can Sthapatya Veda principles be incorporated into modern architecture?
6. What are the benefits of using Sthapatya Veda in modern architecture?
7. What are some examples of modern buildings that incorporate Sthapatya Veda principles?
8. What are the challenges in incorporating Sthapatya Veda principles into modern architecture?
9. What is the overall significance of Sthapatya Veda in modern architecture?
10. What are the future prospects of Sthapatya Veda in modern architecture?
11. What are the potential benefits of a wider adoption of Sthapatya Veda principles in modern architecture? References (if any)

REFERENCES

1. "Sthapatya Veda: The Architecture of Life" by Michael Borden.
2. "Vastu Architecture: Design Theory and Application for Everyday Life" by Michael Borden.
3. "Architecture of Manasara: Illustrations of Architectural and Sculptural Objects" by Prasanna Kumar Acharya.
4. "Sustainable Architecture in Vorarlberg: Energy Concepts and Construction Systems" by Gerhard Hausladen.
5. "The Natural House: A Complete Guide to Healthy, Energy-Efficient, Environmental Homes" by Daniel D. Chiras.

	YEAR:1	SEMESTER:1	SDC	SACRED GEOMETRY IN VEDIC ARCHITECTURE-I	CREDITS 3:1:0

CONTACT PERIOD: 4 (3 LECTURE+1 TUTORIAL +0 PRACTICAL /SEMINAR) Per week	PROGRESSIVE MARKS:50	THEORY MARKS:50

AIM

The aim of the course on Sacred Geometry in Vedic Architecture is to provide students with a comprehensive understanding of the principles, theories, and practical applications of sacred geometry in Vedic architecture. The course aims to equip students with the knowledge and skills necessary to incorporate sacred geometry into their own design projects and to understand how it can enhance the functionality and beauty of a building.

OBJECTIVES
The objectives of the course include:

1. Understanding the basic **principles of sacred geometry** and how they are applied in Vedic architecture.
2. Exploring the **relationship between sacred geometry and Vastu Shastra**, and how these two principles complement each other in building design.
3. Understanding the **symbolism and significance of various geometric shapes and patterns** used in Vedic architecture, such as the mandala, yantra, and Sri Yantra.
4. Examining the **role of sacred geometry in different types of buildings**, including residential, commercial, and religious structures.
5. Understanding how **sacred geometry can enhance the functionality and aesthetic appeal of a building**, and how it can be used to create a sense of harmony and balance within a space.
6. Exploring the use of **sacred geometry in different cultures and traditions**, and how it is adapted to different contexts and building styles.
7. Understanding how **sacred geometry is calculated and applied in building design**, and developing the skills necessary to incorporate these principles into one's own design projects.

Overall, the course aims to provide students with a deep understanding of the principles of sacred geometry in Vedic architecture, and to equip them with the skills and knowledge necessary to create buildings that are both functional and beautiful, and that promote health, happiness, and prosperity.

OUTLINE

UNIT 1 - Introduction to Sacred Geometry and Vedic Architecture
Defining sacred geometry, Understanding the principles of Vedic architecture and its relationship to sacred geometry.

UNIT 2- The Geometry of Vedic Architecture
The importance of geometric shapes and patterns in Vedic architecture
Understanding the significance of different shapes and patterns, such as the mandala, yantra, and Sri Yantra, Examining the symbolism and meaning behind these shapes and patterns.

UNIT 3- Sacred Geometry and Vastu Shastra
Understanding the relationship between sacred geometry and Vastu Shastra. Examining how sacred geometry is used in Vastu Shastra to create harmonious living spaces. Understanding the principles of Vastu Shastra and how they relate to sacred geometry.

UNIT 4- Applications of Sacred Geometry in Vedic Architecture
Examining how sacred geometry is used in different types of buildings, including residential, commercial, and religious structures. Understanding how sacred geometry can enhance the functionality and aesthetic appeal of a building. Examining case studies of buildings that incorporate sacred geometry into their design.

6

UNIT 5- Calculation and Application of Sacred Geometry in Vedic Architecture

Understanding how sacred geometry is calculated and applied in building design. Developing the skills necessary to incorporate sacred geometry into one's own design projects. Examining different tools and techniques used in the calculation and application of sacred geometry in Vedic architecture.

UNIT 6- The Role of Sacred Geometry in Different Cultures and Traditions

Examining the use of sacred geometry in different cultures and traditions around the world. Understanding how sacred geometry is adapted to different contexts and building styles. Examining the similarities and differences between the use of sacred geometry in Vedic architecture and other architectural traditions.

UNIT 7- Future Directions in Sacred Geometry and Vedic Architecture

Understanding how sacred geometry is evolving in the field of Vedic architecture
Examining new techniques and technologies that are being developed for the calculation and application of sacred geometry. Examining potential areas of research and development in the field of sacred geometry and Vedic architecture

UNIT 8- Conclusion

Summarizing the key concepts and ideas covered in the course. Discussing the relevance of sacred geometry in Vedic architecture today. Encouraging students to incorporate sacred geometry into their own design projects and to continue exploring the principles of Vedic architecture and sacred geometry.

OUTCOME

The students who complete a course on Sacred Geometry in Vedic Architecture, students should have achieved the following outcomes:
1. A deep understanding of the principles and theories of sacred geometry and Vedic architecture, and how they relate to one another.
2. An ability to identify and analyze the significance of different geometric shapes and patterns used in Vedic architecture, and an understanding of how they contribute to the harmony and balance of a building.
3. Knowledge of the principles of Vastu Shastra and how they relate to the use of sacred geometry in building design.
4. An understanding of how sacred geometry is applied in different types of buildings, including residential, commercial, and religious structures, and how it can enhance functionality and aesthetic appeal.
5. The ability to calculate and apply sacred geometry principles in building design, using different tools and techniques.
6. An appreciation for the cultural and historical significance of sacred geometry in different traditions around the world, and how it is adapted to different contexts and building styles.
7. An ability to incorporate sacred geometry into one's own design projects, and to create buildings that promote health, happiness, and prosperity.

Students who complete a course on Sacred Geometry in Vedic Architecture should be equipped with the knowledge and skills necessary to create buildings that are not only functional, but also beautiful and harmonious. They should be able to apply sacred geometry principles in their own work, and to appreciate the significance of sacred geometry in different cultural and historical contexts.

REFERENCES
1. "Vastu Architecture: Design Theory and Application for Everyday Life" by Michael Borden
2. "Sri Yantra and Vastu" by Vastu Devta
3. "The Power of Sacred Geometry: Creating Space for Well-Being" by Charles Gilchrist
4. "Vastu: Transcendental Home Design in Harmony with Nature" by Sherri Silverman
5. "The Geometry of Vastu: An Introduction to Hindu Temple Architecture" by M.A. Dhaky
6. "Vastu: Breathing Life into Space" by Robert Svoboda
7. "Sacred Geometry Design Sourcebook: Universal Dimensional Patterns" by Bruce Rawles
8. "Vastu Vidya Handbook: Indian Feng Shui" by V. Ganapati Sthapati
9. "The Language of Post-Modern Architecture" by Charles Jencks
10. "The Hidden Geometry of Life: The Science and Spirituality of Nature" by Karen L. French

QUESTIONS:

1. What is the significance of sacred geometry in Vedic architecture?
2. How does sacred geometry contribute to the harmony and balance of a building?
3. What are the key geometric shapes and patterns used in Vedic architecture, and what do they symbolize?
4. How do Vastu Shastra principles relate to the use of sacred geometry in building design?
5. How is sacred geometry applied in different types of buildings, such as residential, commercial, and religious structures?
6. What are some tools and techniques used to calculate and apply sacred geometry principles in building design?
7. How does the use of sacred geometry in Vedic architecture compare to its use in other traditions around the world?
8. What is the cultural and historical significance of sacred geometry in Vedic architecture?
9. How can sacred geometry be used to promote health, happiness, and prosperity in building design?
10. How can one incorporate sacred geometry principles into their own design projects?

23BVA11	YEAR:1	SEMESTER:1	SDC	VEDIC MEASUREMENTS, SURVEYING & DOCUMENTING	CREDITS 0:2:1

CONTACT PERIOD: 4 (0 LECTURE+2 TUTORIAL +2 PRACTICAL/SEMINAR) Per week	PROGRESSIVE MARKS:50	VIVA MARKS:50

AIM

The aim of the course Vedic Measurements, Surveying & Documenting is to provide students with an understanding of the ancient Indian system of measurements and surveying techniques, as documented in Vedic texts. The course seeks to explore the various concepts and principles that underpin this system, including the use of astronomical observations, geometry, and trigonometry.

OBJECTIVES

1. To introduce students to the basic principles of Vedic measurement and surveying techniques, including the use of instruments such as the gnomon, the quadrants, and the astrolabe.
2. To provide students with an understanding of the role of astronomy in Vedic measurements and surveying, including the use of celestial observations to determine time and location.
3. To explore the principles of geometry and trigonometry used in Vedic measurements, including the use of right angles, circles, and triangles.
4. To examine the historical and cultural context of Vedic measurements and surveying, including their significance in ancient Indian society.
5. To enable students to document Vedic measurements and surveying techniques, including the use of modern technologies such as GIS and GPS.
6. To encourage students to critically evaluate the strengths and limitations of the Vedic system of measurements and surveying, and to consider its relevance and applicability in contemporary contexts.

The course aims to provide students with a deeper understanding of the Vedic system of measurements and surveying, its principles and applications, and its broader significance in the history of Indian science and technology.

OUTLINE

UNIT 1 - INTRODUCTION TO VEDIC MEASUREMENTS AND SURVEYING
Objectives, scope, and relevance of studying Vedic measurements and surveying. Introduce students to the historical and cultural context of Vedic science and technology, and the basic principles of Vedic mathematics.

UNIT 2 - ASTRONOMY IN VEDIC MEASUREMENTS
The role of astronomy in Vedic measurements, including the use of celestial observations to determine time, latitude, and longitude, solar and lunar eclipses, solstices, equinoxes, and the motions of the planets.

UNIT 3 - GEOMETRY AND TRIGONOMETRY IN VEDIC MEASUREMENTS
The principles of geometry and trigonometry used in Vedic measurements, including the use of right angles, circles, and triangles. It may cover topics such as the Pythagorean theorem, trigonometric ratios, and the use of shadow lengths.

UNIT 4 - INSTRUMENTS IN VEDIC MEASUREMENTS
The various instruments used in Vedic measurements, such as the gnomon, the quadrants, and the astrolabe. It may explore their principles of operation, their limitations, and their applications in practical surveying.

UNIT 5 - TECHNIQUES OF SURVEYING IN VEDIC MEASUREMENTS
various techniques of surveying used in Vedic measurements, including the use of triangulation, the measurement of angles and distances, and the calculation of areas and volumes. It may also cover the principles of mapmaking and map reading.

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UNIT 6 - DOCUMENTATION OF VEDIC MEASUREMENTS

The methods and tools of documenting Vedic measurements and surveying techniques, data collection, data processing, data analysis, and data presentation. It may also introduce students to modern technologies such as GIS and GPS.

UNIT 7 - EVALUATION AND CRITIQUE OF VEDIC MEASUREMENTS

Critically evaluate the strengths and limitations of the Vedic system of measurements and surveying. It may encourage them to consider the cultural, social, and political context of Vedic science, and to reflect on the relevance and applicability of Vedic measurements in contemporary contexts.

UNIT 8 - CONCLUSION AND SYNTHESIS

Provide an opportunity for students to synthesize their learning from the course, to reflect on their personal and professional growth, and to discuss their future plans for applying their knowledge and skills in Vedic measurements and surveying.

OUTCOME

The course on Vedic Measurements, Surveying & Documenting may provide students with a range of knowledge, skills, and perspectives that can enrich their personal and professional lives, and contribute to their understanding of the history and diversity of human knowledge and culture.

QUESTIONS

1. What are the key principles and concepts of Vedic mathematics, and how are they applied in measurements and surveying?
2. How did ancient Indian astronomers use celestial observations to determine time, latitude, and longitude, and what impact did this have on Vedic measurements?
3. What were the major instruments used in Vedic measurements and surveying, and how did they work? How do they compare to modern tools such as GPS and GIS?
4. What were the key techniques of surveying used in Vedic measurements, and how were they applied to practical problems such as land surveying or construction?
5. How did Vedic scholars document and present their measurements and surveying data, and what tools and methods did they use? How does this compare to modern approaches to data analysis and visualization?
6. What are some examples of Vedic measurements and surveying being applied to solve practical problems, such as designing buildings or planning cities?
7. How did Vedic measurements and surveying influence the development of mathematics, astronomy, and science more broadly, both in ancient India and beyond?
8. What are some critiques of Vedic measurements and surveying, and how valid are these criticisms? How might we evaluate the strengths and limitations of this system of knowledge in a contemporary context?
9. How might the principles and techniques of Vedic measurements and surveying be relevant or applicable to modern-day challenges such as climate change, urban planning, or disaster management?
10. How might the study of Vedic measurements and surveying contribute to a broader understanding of the history and diversity of human knowledge and culture, and what insights might we gain from this perspective?

REFERENCES

1. "The Surya Siddhanta: A Textbook of Hindu Astronomy" by Ebenezer Burgess
2. "Vedic Mathematics" by Bharati Krsna Tirthaji
3. "The Geometry of Vedic Altars" by Boris Kudryavtsev
4. "The Arthashastra" by Chanakya (Kautilya)
5. "Astronomy and Mathematical Geography in Bhāskarāchārya's Siddhānta Śiromani" by K. Ramasubramanian and M. S. Sriram
6. "Surveying and Mapping in Ancient India'' by D. C. Pandey.
7. "The Origin of Measurements and Its Units" by V. N. Misra
8. "A History of Ancient and Early Medieval India" by Upinder Singh
9. "A Cultural History of India" by A. L. Basham
10. "Geomatics and its Applications" by Hasanuddin Z. Abidin and Süleyman N. Kırlangıç

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23BVA11	YEAR:1	SEMESTER:1	SDC/ OE	ASTROLOGY AND ASTRONOMY IN VEDIC ARCHITECTURE	CREDITS 1:1:0

CONTACT PERIOD: 2 (1 LECTURE +1 TUTORIAL + 0 PRACTICAL/SEMINAR) per week	PROGRESSIVE MARKS:50	THEORY MARKS:50

AIM

The aim of the course on Astrology and Astronomy in Vedic Architecture is to provide students with an understanding of how the principles of astrology and astronomy are integrated into Vedic architecture.

OBJECTIVES

Introduce students to the history and philosophy of Vedic architecture, and the role of astrology and astronomy in this field.

1. Introduce students to the history and philosophy of **Vedic architecture, and its relationship with astrology and astronomy**.
2. Provide an overview of **Vedic astrology and astronomy, and its application** in the design and construction of Vedic buildings.
3. Teach students how to **calculate the position of stars, planets, and other celestial bodies**, and how to incorporate this knowledge into the design of buildings.
4. Explain the **impact of different celestial bodies on human behavior,** and how to use this knowledge to create buildings that promote health, wealth, and prosperity.
5. Examine the **role of astrology and astronomy in the selection of building sites and the orientation** of buildings.
6. Encourage critical thinking by presenting the criticisms and **debates surrounding the use of astrology and astronomy in architecture.**
7. Provide students with the knowledge and **skills to apply astrology and astronomy principles** to their own design projects.
8. Explore the future directions for astrology and astronomy in Vedic architecture, and its implications for the future of architecture and design.

The main course objective is to provide students with the knowledge and skills to design buildings that are not only aesthetically pleasing but also promote health, happiness, and prosperity by incorporating the principles of Vedic astrology and astronomy.

OUTLINE

UNIT 1 - Vedic Astrology and Astronomy
This topic will cover the basics of Vedic astrology and astronomy, including the movement of celestial bodies, calculation of planetary positions, and their impact on human behavior and well-being.

UNIT 2 - Application of Astrology and Astronomy in Vedic Architecture
This topic will focus on the practical application of astrology and astronomy principles in the design and construction of Vedic buildings, including the selection of building sites, orientation of buildings, and placement of rooms.

UNIT 3 - Role of Astrology and Astronomy in Building Construction
This topic will explore the role of astrology and astronomy in building construction, including the use of specific materials and construction methods that are in harmony with the celestial bodies.

UNIT 4 - Criticisms and Debates
This topic will examine the criticisms and debates surrounding the use of astrology and astronomy in architecture, and encourage critical thinking and analysis of different perspectives and opinions.

UNIT 5 - Application of Astrology and Astronomy in Design Projects
This topic will provide students with the knowledge and skills to apply astrology and astronomy principles to their own design projects, whether it be in residential, commercial, or religious structures.

UNIT 6 - Future Directions
This topic will explore the future directions for astrology and astronomy in Vedic architecture, and its implications for the future of architecture and design.

The course outline will provide students with a comprehensive understanding of the role of astrology and astronomy in Vedic architecture, and equip them with the knowledge and skills to design buildings that promote health, happiness, and prosperity.

OUTCOME
The course outcomes will provide students with a unique perspective on architecture and design, and equip them with the skills and knowledge to create buildings that promote health, happiness, and prosperity by incorporating the principles of Vedic astrology and astronomy.

REFERENCES
1. "Vastu Architecture: Design Theory and Application for Everyday Life" by Michael Borden.
2. "Astrology and Vastu Remedies: For Happiness and Successful Life" by Dr. Bhojraj Dwivedi.
3. "Vedic Architecture: Towards a Sustainable Future" by Ganapati Sthapati.
4. "Astrology for Beginners: An Introduction to the World of Astrology" by William W. Hewitt.
5. "The Science of Vaastu" by Dr. S. P. Sabharathnam.
6. "Ayurveda and Vastu: The Art and Science of Living" by Dr. Suhas Kshirsagar and Dr. Manisha Kshirsagar.
7. "The Astrology of Vastu: Planetary Influence on Vastu" by Joni Patry.
8. "Sthapatya Ved-Vastu Shastra: Ideal Homes, Colony and Town Planning" by Dr. B. V. Raman.
9. "Astro-Vastu: A New Way to Enhance Your Home and Life" by Kavita Jain.
10. "Principles of Vedic Architecture" by Prof. V. Ganapati Sthapati.

QUESTIONS:
1. What is the history and philosophy behind Vedic architecture, and how does it differ from other forms of architecture?
2. What is the role of astrology and astronomy in Vedic architecture, and how are these principles incorporated into the design and construction of buildings?
3. What are the different types of Vedic charts used in architecture, and how are they calculated and interpreted?
4. How does Vedic architecture promote health, happiness, and prosperity, and what are some examples of buildings that embody these principles?
5. How has Vedic architecture evolved over time, and what are some of the challenges and criticisms that it has faced?
6. How do cultural influences shape the design and construction of buildings in Vedic architecture, and how do architects navigate these cultural complexities?
7. What are some practical applications of Vedic architecture in residential, commercial, and religious structures, and how can these principles be integrated into modern building design?
8. What are some potential future directions for Vedic architecture, and how might the field continue to evolve in the coming years?
9. How do different schools of Vedic astrology and astronomy influence the principles and application of Vedic architecture, and what are some of the key differences between these schools?
10. How do architects and designers communicate the principles of Vedic architecture to clients, stakeholders, and other professionals, and what are some effective strategies for promoting the use of these principles in building design?

23BVA11	YEAR:1	SEMESTER:1,2,3,4	GE	SOFT SKILLS-TECHNICAL READING, WRITING & PEER TEACHING	CREDITS 2:1:0

CONTACT PERIOD: 3 (2 LECTURE +1 TUTORIAL + 0 PRACTICAL/SEMINAR) per week	PROGRESSIVE MARKS:50	THEORY MARKS:50

AIM

The aim of the course on Soft Skill-Technical Reading, Writing, and Peer Teaching is to equip learners with the essential skills and knowledge needed to communicate effectively in technical settings. The course focuses on developing technical reading, writing, and peer teaching skills, as well as enhancing collaborative and team communication abilities.

OBJECTIVES

1. To understand the importance of effective technical communication in various settings, including the workplace and academic environments.
2. To develop critical technical reading skills that enable learners to identify key information, evaluate sources, and summarize and take notes effectively.
3. To enhance technical writing skills by developing an understanding of audience, purpose, document design, and clear and concise writing techniques.
4. To foster peer teaching skills by developing presentation and facilitation skills, providing effective feedback, and engaging in collaborative learning.
5. To develop an appreciation for visual communication techniques and accessible document design principles.
6. To enhance team communication and collaboration skills, including conflict resolution and collaborative writing and editing techniques.
7. To apply technical reading, writing, and peer teaching skills in a real-world project, presenting and evaluating final projects.
8. To encourage self-reflection and goal-setting for continued growth and development in technical communication skills.

By the end of the course, learners should be able to communicate technical information effectively, both in writing and in person, and engage in collaborative learning and teamwork effectively. They should also have a deeper understanding of document design, visual communication techniques, and accessibility principles.

OUTLINE

UNIT 1 - INTRODUCTION TO TECHNICAL COMMUNICATION
What is technical communication?, Importance of effective communication in the workplace, Overview of the course.

UNIT 2- TECHNICAL READING SKILLS
Active reading strategies, Identifying key information, Summarizing and note-taking techniques, Evaluating sources.

UNIT 3- TECHNICAL WRITING SKILLS
Understanding audience and purpose, Organizing and structuring information, Writing clear and concise instructions, Editing and proofreading.

UNIT 4 - PEER TEACHING SKILLS
Understanding the benefits of peer teaching, Preparing and delivering effective presentations, Facilitating group discussions and activities, Providing feedback and evaluation.

UNIT 5- DOCUMENT DESIGN AND VISUAL COMMUNICATION
Basic principles of document design, Using visuals effectively (graphs, charts, images), Creating accessible and inclusive documents.

UNIT 6 - COLLABORATION AND TEAM COMMUNICATION
Communication in team environments, Handling conflicts and disagreements, Collaborative writing and editing.

UNIT 7 - FINAL PROJECT
Applying technical reading, writing, and peer teaching skills to a real-world project, Presenting and evaluating final projects.

UNIT 8 - WRAP-UP AND REFLECTION
Reviewing key concepts and skills learned, Reflecting on personal growth and development, Setting goals for continued improvement in technical communication.

OUTCOME
The course should help learners to communicate technical information more effectively and work collaboratively in team environments. They should also be able to apply the skills they have learned to future projects and continue to improve their technical communication abilities.

QUESTIONS
1. Why is effective technical communication important in the workplace?
2. What are some strategies for active technical reading and note-taking?
3. How can you tailor technical writing to your audience and purpose?
4. What are some techniques for organizing and structuring technical information effectively?
5. How can you provide constructive feedback to your peers during presentations or group discussions?
6. What are some basic principles of document design that can improve the effectiveness of technical documents?
7. How can you use visuals effectively to enhance understanding in technical documents?
8. What are some accessibility principles to consider when creating technical documents?
9. How can you collaborate effectively in team environments?
10. What are some techniques for resolving conflicts and disagreements within a team?
11. How can you apply technical reading, writing, and peer teaching skills to a real-world project?
12. How can you continue to develop your technical communication skills after the course is over?

REFERENCES
1. "Technical Communication" by Mike Markel
2. "The Elements of Technical Writing" by Thomas E. Pearsall
3. "Technical Writing: Principles, Strategies, and Readings" by Diana C. Reep and Laura J. Gurak
4. "The Essentials of Technical Communication" by Elizabeth Tebeaux and Sam Dragga
5. "Designing Visual Language: Strategies for Professional Communicators" by Charles Kostelnick and David D. Roberts
6. "Writing Science: How to Write Papers That Get Cited and Proposals That Get Funded" by Joshua Schimel
7. "Peer Power: Transforming Workplace Relationships" by Cynthia Clay and Ray Olitt
8. "Collaborative Writing in Industry: Investigations in Theory and Practice" by Rachel Spilka.

23BVA11	YEAR:1	SEMESTER:1, 2,3,4,5	GE	LIFE SKILL AND PUBLIC SERVICE	CREDITS 0:1:1

CONTACT PERIOD:03 (0 LECTURE 1 TUTORIAL+ 2 PRACTICAL / SEMINAR) per week	PROGRESSIVE MARKS:50	VIVA MARKS:50

AIM

Life skills directly influence student's careers and lives. Both UNESCO and WHO have listed major life skills. For being cognizant of their own as well as others' emotions, students must be in a position to empathize, communicate, and overcome challenges. Adjusting emotions as per the changing situations is the key to win-win outcomes.

OBJECTIVES

UNIT 1
Interpersonal skills:- By engaging themselves in design experiences, students may present their interpersonal skills. Listening closely to their faculty and friends and connecting with them and building a positive friendship will go a long way to ensuring the success of people and teams.

UNIT 2
Resilience:- It is unavoidable to suffer from mistakes. Nevertheless, perceiving mistakes as stepping stones and learning from them will undoubtedly assist in the improvement and growth of the student, this is done by design crits with eminent industry faculty practicing, who can critique the works of the student and establish the tolerant mindset. Feedback reception to enhance: This is an important part of the learning and development experience of the student. Students should be open to constructive criticism as this keeps them from being complacent and allows one to look sideways to address the problem.

UNIT 3
Cross-cultural sensitization:- It is compulsory for any student to engage in social services such as NSS, NCC, Bharat scouts and guides, NYKS, Air Force, Army and Navy, as this helps to foster harmony and a sense of belonging in the work world by returning to society.

UNIT 4
Time management:- As any task is time-bound in a fast-paced business environment, our progress depends to a great degree on our ability to effectively handle time. Our time management ability will be reflected in striking a study-life balance, grappling with managing schedules, coping with shifting interests, etc., and splitting the time between professional, social and physical activity will be a priority. Decision- making capability: To make a confident decision, it requires an analytical mind, information processing capacity and a rational judgment. This characteristic becomes increasingly more important for their position as one scales up the corporate ladder.

UNIT 5
Technical savviness:- It is imperative that students step up their understanding of technology as technology becomes an integral part of our life. Since our entire syllabus is focused on digitizing the education system, it is often helpful to be familiar with certain theoretical methods as well, aside from being well-versed with the technologies associated with their scope of work.

OUTCOME
- At the end of the such public service initiatives students are trained to lead a program and make quick decisions,
- Trained to equip volunteers with minimum required skills to carry out programmes.
- Equip themselves to work with others comfortably.
- Students would have learnt several other values such as selflessness, honesty, discipline, hard work and ways to build self-confidence and gain leadership qualities.

REFERENCES
1) Life Skills Education Dr. K Ravikanth Rao,Dr. P Dinakar 2)Life Skills" Dr. Ali Khwaja.

23BVA11	YEAR:1	SEMESTER:1, 2, 3, 4,5,6	CEA	YOGA, SPORTS AND CULTURE	CREDITS 0:1:0

CONTACT PERIOD: 1 (0 LECTURE 1 TUTORIAL+ 0 PRACTICAL / SEMINAR) per week	PROGRESSIVE MARKS:100	VIVA MARKS:00

AIM

The positive impact of sports stretches far beyond the physical. Exercise and sporting activity can have significant knock-on effects on other areas of a student's academic performance. Our aim is to encourage students to engage themselves in a mainstream sports activity or cultural activity like dance to keep the students physically fit and give themselves an adrenaline rush to improve their divergent thinking and enhance them to think out of the box.

OBJECTIVES

Engage in any one or more sports activity or cultural activity, it can be any form of dance or martial art for a prescribed period of time on a daily basis.

To maintain a healthy BMI, that will be monitored on a timely basis and credits will be provided for the same.

OUTCOME

1) To achieve the following through the chosen sport-
2) Stay fit and healthy
3) Boost self-esteem
4) Reduce stress
5) Improve sleep
6) Develop leadership skills
7) Instill patience, discipline and perseverance
8) Credits will be given for well-maintained Body Mass Index achieved through sporting and cultural activities
9) Students will have to participate in any 2-district level, state level or national level competitions
10) This will lead to improved physical health, mental health, enhance team spirit and be a great stress buster.

23BVA11	YEAR:1	SEMESTER:2	SDC	VEDIC ARCHITECTURE & ITS PRINCIPLES & APPLICATIONS - II	CREDITS 0:7:2

CONTACT PERIOD :11 (0 LECTURE+7 TUTORIAL + 4 PRACTICAL / SEMINAR) Per week	PROGRESSIVE MARKS:50	VIVA MARKS:50

AIM

The aim of the course on the application of Vedic architecture in residential and commercial buildings is to provide students with an understanding of the principles and practices of Vedic architecture. The course aims to explore the traditional Vedic principles of design and construction, and how they can be applied to create spaces that promote harmony, balance, and well-being.

OBJECTIVES

1. Understanding the basic principles of Vedic architecture, including the role of orientation, the use of natural materials, and the importance of spatial arrangement.
2. Learning how to apply Vedic architecture principles to residential and commercial building projects, including site analysis, building design, and construction.
3. Exploring the role of Vedic architecture in promoting health, well-being, and sustainability in the built environment.
4. Understanding the cultural and historical context of Vedic architecture, including its origins in ancient Indian texts and its evolution over time.
5. Learning about the contemporary applications of Vedic architecture in modern building design, and the potential for its integration with other design disciplines.

The course aims to equip students with the knowledge and skills necessary to design and build spaces that promote physical, mental, and emotional well-being, while also respecting the principles of Vedic architecture.

OUTLINE

UNIT 1 - Introduction to Vedic architecture
Definition and principles of Vedic architecture, Historical and cultural context of Vedic architecture.

UNIT 2 - Site analysis and selection
Site selection criteria based on Vedic principles, Analysis of landforms, soil, and water bodies.

UNIT 3 - Building orientation
Role of orientation in Vedic architecture, Orientation guidelines for residential and commercial buildings, Impact of orientation on energy efficiency and well-being.

UNIT 4 - Building design and construction
Vedic architectural elements and their significance, Guidelines for building design and construction, Use of natural materials in building construction.

UNIT 5 - Interior design and spatial arrangement
Vedic principles of interior design and spatial arrangement, Guidelines for furniture placement, lighting, and color schemes, Use of plants and natural elements in interior design.

UNIT 6 - Health and well-being in Vedic architecture
Vedic principles of health and well-being in the built environment, Use of Ayurvedic principles in building design and construction, Impact of Vedic architecture on mental, physical, and emotional health.

UNIT 7 - Case studies and contemporary applications
Case studies of Vedic architecture in residential and commercial buildings, Contemporary applications of Vedic architecture in modern building design, Integration of Vedic architecture with other design disciplines.

Note:
The course should also include site visits, guest lectures by practitioners in the field, and practical assignments where students apply Vedic principles to building design and construction.

OUTCOME
1. Understand the fundamental principles and concepts of Vedic architecture and their relevance to building design and construction.
2. Analyze sites for building projects based on Vedic principles, taking into account factors such as orientation, topography, and natural features.
3. Design buildings that incorporate Vedic architectural elements, such as placement of rooms, windows, and doors, selection of building materials, and use of natural elements.
4. Understand the role of Vedic architecture in promoting health, well-being, and sustainability in the built environment.
5. Apply Vedic principles to residential and commercial building projects and evaluate their effectiveness in creating spaces that promote harmony, balance, and well-being.
6. Understand the cultural and historical context of Vedic architecture, including its evolution over time and its contemporary applications in modern building design.
7. Collaborate with other design professionals to integrate Vedic architecture with other design disciplines.

The outcome of the course is to provide students with the knowledge and skills to design and build spaces that promote physical, mental, and emotional well-being, while respecting the principles of Vedic architecture.

REFERENCES
1. "Vastu Architecture: Design Theory and Application for Everyday Life" by Michael Borden.
2. "Vastu: Transcendental Home Design in Harmony with Nature" by Sherri Silverman.
3. "Vastu: The Origin of Feng Shui" by Khushdeep Bansal.
4. "Vedic Architecture: Towards a Sustainable Future" by Vinayak Bharne and Kruti Jain.
5. "Vastu Architecture: It's Inception, Development and Future" by Hiren Ganatra.

QUESTIONS:
1. What are the fundamental principles of Vedic architecture, and how do they differ from other design practices?
2. How do you select a site for a building project based on Vedic principles, and what factors do you need to consider?
3. What are some of the key design elements in Vedic architecture, and how do you incorporate them into the design of a residential or commercial building?
4. What is the role of orientation in Vedic architecture, and how does it impact the energy efficiency and well-being of a building?
5. How do you use natural materials and elements in the construction of buildings according to Vedic principles, and what are the benefits of doing so?
6. What is the relationship between Vedic architecture and health and well-being, and how do you incorporate Ayurvedic principles into building design?
7. How do you integrate Vedic architecture with other design disciplines, such as sustainability and environmental conservation?
8. What are some case studies of Vedic architecture in residential and commercial buildings, and what can we learn from them?
9. How can we apply Vedic architecture principles to modern building design and construction in a practical way?
10. What is the cultural and historical context of Vedic architecture, and how has it evolved over time?

23BVA11	YEAR:1	SEMESTER:2	SDC	SUSTAINABLE ARCHITECTURE IN VEDIC	CREDITS 0:4:2

CONTACT PERIOD:8 (0 LECTURE +4 TUTORIAL + 4 PRACTICAL / SEMINAR) Per week	PROGRESSIVE MARKS:50	VIVA MARKS:50

AIM

The aim of the course "The Principles of Eco-Friendly and Sustainable Architecture in Vedic Tradition" is to provide students with an understanding of the principles of sustainable architecture as they are understood in the Vedic tradition. The course will explore the relationship between architecture and the natural environment, as well as the importance of sustainable design in promoting a healthy and harmonious way of life.

OBJECTIVES
1. Understanding the principles of eco-friendly and sustainable architecture in the Vedic tradition, including the use of natural materials, energy-efficient design, and waste reduction strategies.
2. Understanding the role of architecture in promoting sustainability and environmental stewardship, and how sustainable design principles can be applied to different types of buildings.
3. Learning about traditional Vedic building practices and design principles, and how these can be adapted for contemporary use.
4. Exploring the relationship between architecture and the natural environment, and how sustainable design can promote a healthy and harmonious way of life.
5. Understanding the importance of social and cultural factors in promoting sustainable architecture, and how community involvement can enhance the sustainability of buildings and communities.
6. Developing critical thinking and problem-solving skills, and the ability to apply sustainable design principles to real-world design challenges.

The course aims to equip students with the knowledge and skills needed to design and build sustainable, eco-friendly buildings that promote a healthy and harmonious way of life, in line with the principles of the Vedic tradition.

OUTLINE

UNIT 1 - Introduction to Sustainable Architecture in Vedic Tradition
Overview of the course and its goals, Brief introduction to the Vedic tradition and its principles, Historical context of sustainable architecture in the Vedic tradition

UNIT 2 - Principles of Sustainable Architecture in Vedic Tradition
Introduction to the principles of eco-friendly and sustainable architecture in the Vedic tradition, Use of natural materials in Vedic architecture, Energy-efficient design principles in Vedic architecture, Waste reduction strategies in Vedic architecture.

UNIT 3 - Traditional Vedic Building Practices and Design Principles
Overview of traditional Vedic building practices and design principles, The use of Vastu Shastra in Vedic architecture, Traditional Vedic building materials and construction techniques, Case studies of traditional Vedic buildings.

UNIT 4 - Contemporary Applications of Sustainable Architecture in Vedic Tradition
Adapting Vedic building practices and design principles for contemporary use, Sustainable design strategies for different types of buildings (e.g. residential, commercial, institutional), Case studies of contemporary sustainable Vedic buildings.

UNIT 5 - Relationship between Architecture and Natural Environment
Importance of the natural environment in Vedic philosophy, Vedic principles of site selection and orientation for buildings, Sustainable design strategies for site-specific conditions (e.g. slope, climate, vegetation).

UNIT 6 - Social and Cultural Factors in Sustainable Architecture
Importance of community involvement in sustainable architecture, Cultural considerations in sustainable architecture (e.g. local building traditions, social practices), Case studies of sustainable Vedic communities and their social and cultural contexts.

UNIT 7 - Design Project
Applying sustainable architecture principles to a real-world design challenge, Individual or group project, depending on class size, Presentation of design proposal and critique by instructor and peers.

UNIT 8 - Conclusion and Future Directions
Recap of key concepts and principles covered in the course, Future directions for sustainable architecture in the Vedic tradition, Opportunities for further study and research in this area.

OUTCOME
1. Demonstrate an understanding of the principles of eco-friendly and sustainable architecture in the Vedic tradition, including the use of natural materials, energy-efficient design, and waste reduction strategies.
2. Analyze and critique traditional Vedic building practices and design principles, and adapt them for contemporary use.
3. Evaluate the relationship between architecture and the natural environment, and design sustainable buildings that respond to site-specific conditions.
4. Understand the importance of social and cultural factors in promoting sustainable architecture, and develop strategies for involving communities in the design and construction process.
5. Apply sustainable design principles to real-world design challenges, and develop critical thinking and problem-solving skills.
6. Demonstrate effective communication skills, including the ability to present design proposals and critique the work of peers.

The course will equip students with the knowledge and skills needed to design and build sustainable, eco-friendly buildings that promote a healthy and harmonious way of life, in line with the principles of the Vedic tradition. Students will also develop an appreciation for the cultural and historical significance of sustainable architecture in the Vedic tradition, and understand its relevance to contemporary environmental issues.

REFERENCES
1. "The Science of Vastu" by Ganapati Sthapati.
2. "Sustainable Architecture in Vorarlberg: Energy Concepts and Construction Systems" by Christian Schittich.
3. "Sustainable Architecture: Principles, Paradigms, and Case Studies" by Dilip K. R.
4. "Building with Earth: Design and Technology of a Sustainable Architecture" by Gernot Minke.
5. "The Natural House: A Complete Guide to Healthy, Energy-Efficient, Environmental Homes" by Daniel D. Chiras.
6. "Sustainable Architecture and Building Design" by Naif Al-Mutairi.

QUESTIONS:
7. What are some of the key principles of sustainable architecture in the Vedic tradition, and how do they differ from modern approaches to sustainable design?
8. How does Vastu Shastra influence sustainable architecture in the Vedic tradition, and what are some of the key design principles that are based on this system?
9. What are some examples of traditional Vedic building materials and construction techniques, and how have these been adapted for contemporary use in sustainable architecture?
10. How can sustainable architecture principles be applied to different types of buildings, such as residential, commercial, and institutional buildings?
11. What role do social and cultural factors play in promoting sustainable architecture, and how can community involvement be integrated into the design and construction process?
12. How does the natural environment influence sustainable architecture in the Vedic tradition, and what are some of the key strategies for designing buildings that respond to site-specific conditions?
13. What are some of the challenges and opportunities for sustainable architecture in the Vedic tradition, and how might this approach to architecture be relevant to contemporary environmental issues?
14. How can sustainable architecture principles be integrated into a real-world design project, and what are some of the key considerations that need to be taken into account when designing sustainable buildings in the Vedic tradition?

23BVA11	YEAR:1	SEMESTER:2	SDC	VEDIC BUILDING MATERIALS & METHODS OF CONSTRUCTION	CREDITS 3:1:0

CONTACT PERIOD: 4 (3 LECTURE+1 TUTORIAL+ 0 PRACTICAL / SEMINAR) Per week	PROGRESSIVE MARKS:50	THEORY MARKS:50

AIM

The aim of the course would be to provide an understanding of the materials used in Vedic architecture, which is a traditional system of architecture that originated in ancient India. The course would cover the types of materials used, their properties, and their significance in Vedic architecture.

OBJECTIVES
1. To provide an overview of the various **building materials used in Vedic architecture**, such as wood, stone, mud, and clay.
2. To familiarize the students with the **characteristics and properties of each material and their suitability** for different types of structures.
3. To explain the **significance of each material in Vedic architecture**, including its symbolism and spiritual connotations.
4. To explore the **role of sustainable and eco-friendly materials in Vedic architecture** and their relevance in modern construction practices.
5. To provide practical **knowledge and skills for the selection, testing, and maintenance of building materials** used in Vedic architecture.
6. To encourage students to apply their learning to design and construct buildings that reflect the principles of Vedic architecture.

The aim and objective of the course would be to provide students with a comprehensive understanding of the materials used in Vedic architecture and their importance in creating structures that are not only functional and aesthetically pleasing but also spiritually uplifting and environmentally sustainable.

OUTLINE

UNIT 1 - Wood as a Building Material
Types of wood used in Vedic architecture,Properties and characteristics of wood, Design considerations for using wood in Vedic architecture, Maintenance and preservation of wooden structures.

UNIT 2 - Stone as a Building Material
Types of stones used in Vedic architecture, Properties and characteristics of stones. Design considerations for using stone in Vedic architecture, Techniques for cutting, shaping, and carving stone, Maintenance and preservation of stone structures.

UNIT 3 - Mud and Clay as Building Materials
Types of mud and clay used in Vedic architecture, Properties and characteristics of mud and clay, Design considerations for using mud and clay in Vedic architecture, Techniques for building with mud and clay, Advantages and disadvantages of mud and clay as building materials, Maintenance and preservation of mud and clay structures

UNIT 4 - Other Building Materials in Vedic Architecture
Bamboo, Cow dung, Cow urine, Lime, Brick, Terracotta, ect.

UNIT 5 - Sustainability and Eco-Friendliness in Vedic Architecture
Importance of sustainable and eco-friendly materials in Vedic architecture, Sustainable practices in Vedic architecture, Integration of modern technologies and materials in Vedic architecture.

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UNIT 6 - Conclusion and Future Directions

Recap of key concepts and principles, Discussion of future trends and developments in Vedic architecture materials,Importance of preserving and promoting Vedic architecture materials.

OUTCOME

The students who complete a course on building materials used in Vedic architecture, students should be able to:

1. Identify the different types of building materials used in Vedic architecture, their properties, and their significance.
2. Analyze the suitability of different materials for different types of structures in Vedic architecture.
3. Apply design considerations and techniques for using wood, stone, mud, and clay in Vedic architecture.
4. Understand the importance of sustainable and eco-friendly materials in Vedic architecture and apply sustainable practices.
5. Apply practical knowledge and skills for the selection, testing, and maintenance of building materials used in Vedic architecture.

The outcome of the course would be to equip students with the knowledge and skills to design and construct buildings using traditional materials and techniques that are sustainable, eco-friendly, spiritually uplifting, and culturally significant.

REFERENCES

1. "Vastu Architecture: Design Theory and Application for Everyday Life" by Michael Borden
2. "Hindu Temple Architecture" by Adam Hardy
3. "Indian Architecture: Hindu, Buddhist, Jain" by Percy Brown
4. "The Art of Building in Ancient India: Vastu-Vidya" by Vibhuti Chakrabarti
5. "Traditional Architecture in India" by Miki Desai
6. "Indian Architecture and Construction" by Sashikala Ananth
7. "The Science of Vaastu: Practical Feng Shui for the 21st Century" by G. S. Rathore
8. "Vastu: Astrology and Architecture" by Gayatri Devi Vasudev
9. "Indian Architectural Theory and Practice: Contemporary Uses of Vastu Vidya" by Yatin Pandya
10. "Principles of Indian Architecture (Vastu Vidya)" by C. B. Prabhu.

QUESTIONS:

1. What are the primary building materials used in Vedic architecture, and what are the benefits of using these materials?
2. How do the building materials used in Vedic architecture contribute to the overall aesthetic and atmosphere of the buildings?
3. How has the use of Vedic building materials evolved over time, and how have modern building materials impacted Vedic architecture?
4. What role do sustainable and eco-friendly building materials play in Vedic architecture, and how do they align with Vedic principles?
5. What are some examples of famous Vedic architecture structures, and how do they incorporate Vedic building materials and principles?
6. How has the use of Vedic building materials influenced contemporary architecture, and what lessons can be learned from this tradition?
7. What are some of the challenges of using Vedic building materials in modern construction, and how can they be overcome?

23BVA11	YEAR:1	SEMESTER:2	SDC	THE VASTU PURUSHA MANDALA AND ITS APPLICATION	CREDITS 0:2:2

CONTACT PERIOD: 06 (0 LECTURE 2 TUTORIAL+ 4 PRACTICAL / SEMINAR) per week	PROGRESSIVE MARKS:50	VIVA MARKS:50

AIM

Aim of the course would be to provide students with a deep understanding of the significance of the Vastu Purusha Mandala and its application in architecture, and to equip them with the skills and knowledge to incorporate these principles into their own work.

OBJECTIVES

The objective of the course Vastu Purusha Mandala and its application is to provide students with an understanding of Vastu Shastra and its significance in modern architecture.

Specifically, the course aims to:

1. Introduce students to the **history and definition of Vastu Shastra**, and its relevance in modern architecture.
2. Explain the concept of **Vastu Purusha Mandala,** its origins, components, and interpretation.
3. Provide students with the **design principles of Vastu Purusha Mandala**, including the orientation and placement of rooms, the use of colors, shapes, and materials, as well as furniture and decorations.
4. Examine the various **applications of Vastu Purusha Mandala,** such as in residential, commercial, and religious structures.
5. Encourage **critical thinking by presenting the criticisms and debates** surrounding the validity of Vastu Purusha Mandala and its relevance in modern architecture.
6. Provide students with the **knowledge and skills to apply Vastu Purusha Mandala** principles to their own design projects.
7. Explore the **future directions for Vastu Purusha Mandala** and its application, and its implications for the future of architecture and design.

OUTLINE

UNIT 1 - Introduction
Definition and History of Vastu Shastra, Importance of Vastu Shastra in Modern Architecture, Overview of Vastu Purusha Mandala.

UNIT 2 - Vastu Purusha Mandala
Definition and Origins of Vastu Purusha Mandala, Components of Vastu Purusha Mandala, Interpretation of Vastu Purusha Mandala.

UNIT 3 - Design Principles of Vastu Purusha Mandala
Orientation and Placement of Rooms, Use of Colors, Shapes, and Materials, Furniture and Decorations.

UNIT 4 - Applications of Vastu Purusha Mandala
Residential Buildings and Homes, Commercial and Industrial Buildings, Temples and Religious Structures.

UNIT 5 - Criticisms and Debates
Criticisms of Vastu Shastra, Debates Surrounding the Validity of Vastu Purusha Mandala, Relevance of Vastu Purusha Mandala in Modern Architecture.

UNIT 5 - Conclusion and Future Directions

Summary of Course Content, Future Directions for Vastu Purusha Mandala and Its Application, Implications for the Future of Architecture and Design

OUTCOME

Upon completion of the course Vastu Purusha Mandala and its application, students can expect to achieve the Knowledge and understanding of Vastu Shastra, its history, and its relevance in modern architecture. The in-depth knowledge of Vastu Purusha Mandala, its components, interpretation, and design principles.

REFERENCES

1. "Vastu: Breathing Life into Space" by Robert Svoboda and Lester Walker
2. "The Hindu Temple: An Introduction to Its Meaning and Forms" by George Michell
3. "Vastu Architecture: Design Theory and Application for Everyday Life" by Michael Borden
4. "The Ancient Science of Vastu" by Maharishi Mahesh Yogi
5. "Vastu: The Indian Art of Placement" by Rohit Arya

QUESTIONS:

1. What is Vastu Purusha Mandala, and how does it relate to traditional Indian architecture?
2. What are the key principles of Vastu Shastra, and how do they influence the design of buildings?
3. How does Vastu Purusha Mandala help architects and designers align buildings with the natural environment and cosmic energies?
4. What are some common misconceptions about Vastu Shastra, and how can architects and designers avoid them?
5. How has Vastu Shastra influenced modern architecture, and what are some examples of buildings that incorporate its principles?
6. What are some practical applications of Vastu Purusha Mandala in architecture, such as site selection, orientation, and spatial organization?
7. How can architects and designers integrate Vastu Shastra into their design process, while also respecting contemporary building codes and standards?
8. What are some challenges and limitations of applying Vastu Shastra to modern architecture, and how can they be addressed?
9. How does Vastu Shastra relate to other traditional systems of architecture and design, such as feng shui and geomancy?
10. How can a deeper understanding of Vastu Purusha Mandala enhance our appreciation and experience of architecture, and our relationship with the built environment?

23BVA11	YEAR:1 & 2	SEMESTER:2, 3	SDC	ELECTIVE (DRAFTING SOFTWARE)	CREDITS 0:1:1

CONTACT PERIOD: 03 (0 LECTURE 1 TUTORIAL+ 2 PRACTICAL / SEMINAR) per week	PROGRESSIVE MARKS:50	VIVA MARKS:50

AIM

The aim and objective of a course in architecture or Vedic architecture 2D drafting tool would typically be to provide students with the necessary skills and knowledge to create precise technical drawings and plans for buildings, structures, and spaces.

OBJECTIVES

1. Teaching students the basic principles and techniques of 2D drafting using tools such as AutoCAD, SketchUp, or other software.
2. Providing students with an understanding of the various components and systems of buildings, including structural, electrical, and mechanical systems.
3. Developing students' skills in creating accurate and detailed floor plans, elevations, sections, and other technical drawings using 2D drafting tools.
4. Helping students to develop effective communication and collaboration skills, which are essential for working with clients, contractors, and other stakeholders in the design and construction process.

The aim of an architecture or Vedic architecture 2D drafting tool course is to provide students with the knowledge and skills they need to create high-quality technical drawings and plans, while also considering the principles of Vedic architecture and other factors that can impact the well-being of the occupants of a building or space.

OUTLINE

ELECTIVE 1 - AUTOCAD
This is a popular 2D drafting tool used by architects, engineers, and designers to create precise technical drawings and plans.

ELECTIVE 2 - SKETCHUP:
SketchUp is a 3D modeling software that can also be used for 2D drafting. It is easy to use and has a large library of pre-made models and textures.

ELECTIVE 3 - REVIT
Revit is a software used for Building Information Modeling (BIM), which allows architects and engineers to create and manage building designs in 3D.

ELECTIVE 3 - VASTU SHASTRA SOFTWARE
Vastu Shastra is an ancient Indian science of architecture that focuses on designing buildings and spaces in harmony with nature. There are several software options available that incorporate Vastu principles into architectural design.

OUTCOME

The outcome of a course in architecture or Vedic architecture 2D drafting tool should be that students are well-prepared to enter the workforce as architects, designers, or drafters, with a strong understanding of technical drafting skills and the principles of Vedic architecture.

REFERENCES
1. "Architectural Drafting and Design" by Alan Jefferis and David A. Madsen
2. "AutoCAD 2022 for the Interior Designer" by Dean Muccio
3. "SketchUp for Site Design" by Daniel Tal
4. "Vastu: Breathing Life into Space" by Robert E. Svoboda

23BVA11	YEAR:2	SEMESTER:3	SDC	VEDIC TEMPLE DESIGN PRINCIPLES & APPLICATIONS	CREDITS 0:10:4

CONTACT PERIOD:18 (0 LECTURE+10 TUTORIAL +8 PRACTICAL / SEMINAR) Per week	PROGRESSIVE MARKS:50	VIVA MARKS:50

AIM

The aim of the course "The design of temples and other sacred buildings in Vedic architecture" is to provide students with a comprehensive understanding of the principles and practices of temple design in the context of Vedic architecture.

OBJECTIVES

1. To introduce students to the basic concepts of Vedic architecture and its relationship to temple design.
2. To provide an overview of the historical and cultural context in which Vedic temples were built.
3. To examine the symbolism and spiritual significance of different architectural elements and features found in Vedic temples.
4. To explore the use of geometry, proportion, and other design principles in Vedic temple design.
5. To study examples of Vedic temples and other sacred buildings from different regions and time periods.
6. To develop students' skills in analyzing and interpreting temple architecture and its meaning.
7. To encourage students to think critically and creatively about temple design and its role in religious and cultural practices.
8. To foster an appreciation for the artistic and aesthetic qualities of Vedic temple architecture.

By the end of the course, students should have a solid understanding of the principles and practices of temple design in Vedic architecture, and be able to apply this knowledge to analyze and interpret a wide range of temple structures.

OUTLINE

UNIT 1 - Introduction to Vedic temple design principles
Overview of the course, Brief history of Vedic temple design, Key concepts and terminology

UNIT 2 - Vedic philosophy and temple design
Vedic worldview and its influence on temple design, The role of the temple in Vedic society and culture, Vedic principles of sacred geometry and cosmology.

UNIT 3 - Elements of Vedic temple design
Site selection and orientation, Mandapa (entrance hall) design and symbolism, Garbhagriha (sanctum sanctorum) design and symbolism, Vimana (tower) design and symbolism, Shikhara (spire) design and symbolism.

UNIT 4 - Vedic temple construction techniques
Traditional construction techniques and materials, Sacred geometry and measurement systems, Rituals and ceremonies associated with temple construction.

UNIT 5 - Vedic temple rituals and practices
Daily worship practices and ceremonies, Festivals and special occasions celebrated in the temple, The role of priests and other temple personnel.

UNIT 6 - Contemporary Vedic temple design
Modern interpretations of Vedic temple design principles, Case studies of contemporary Vedic temples, Challenges and opportunities for Vedic temple design in the modern world.

UNIT 7 - Conclusion and future directions

Summary of key takeaways from the course, Reflection on the relevance of Vedic temple design principles today, Opportunities for further study and research.

Note: This is just one possible outline, and the actual course content may vary depending on the instructor's expertise and interests.

OUTCOME

1. Understanding of Vedic philosophy and its influence on temple design: Students will have a deeper understanding of Vedic philosophy and its influence on the design and construction of Hindu temples.
2. Knowledge of the key elements of Vedic temple design: Students will learn about the key elements of Vedic temple design, including site selection, mandapa design, garbhagriha design, vimana design, and shikhara design.
3. Awareness of Vedic temple construction techniques: Students will be introduced to traditional Vedic temple construction techniques and materials, as well as the importance of sacred geometry and measurement systems in temple design.
4. Familiarity with Vedic temple rituals and practices: Students will gain an understanding of the daily worship practices and ceremonies that take place in Hindu temples, as well as the role of priests and other temple personnel.
5. Exposure to contemporary Vedic temple design: Students will learn about modern interpretations of Vedic temple design principles and be introduced to case studies of contemporary Vedic temples.
6. Critical thinking and analysis skills: Students will develop critical thinking and analysis skills through the exploration of Vedic temple design principles and their relevance in the modern world.
7. Research and communication skills: Through assignments and projects, students will have the opportunity to develop their research and communication skills, including the ability to analyze and present their findings on Vedic temple design principles.

Overall, the outcome of the course on Vedic temple design principles is to provide students with a deeper understanding of the spiritual and cultural significance of Hindu temples, and to equip them with the knowledge and skills necessary to appreciate and interpret the design principles that underpin them.

REFERENCES

1. "The Hindu Temple: An Introduction to Its Meaning and Forms" by George Michell
2. "Hindu Temple Architecture" by Adam Hardy
3. "Vastu: Breathing Life into Space" by Robert E. Svoboda
4. "The Illustrated Encyclopedia of Hinduism, Volume 1: A-M" edited by James G. Lochtefeld
5. "Hindu Temples: What Happened to Them" by Sita Ram Goel
6. "The Temple Architecture of India" by Adam Hardy
7. "The Spiritual Science of Vaastu: A Comprehensive Guide for the Stages of Life" by Sashikala Ananth
8. "Vastu Architecture: Design Theory and Application for Everyday Life" by Michael Borden
9. "The Mandala in Indian and Tibetan Buddhism" by Martin Brauen
10. "Sacred Architecture of India" by Takeo Kamiya

QUESTIONS:

1. What are the key elements of Vedic temple design, and what is their significance in Hindu philosophy?
2. How did the Vedic worldview influence the design and construction of Hindu temples?
3. What are the traditional construction techniques and materials used in Vedic temple design, and how have they evolved over time?
4. How does sacred geometry and measurement systems play a role in Vedic temple design?
5. What are the different types of Hindu temples, and how do they vary in their design and construction?
6. What are the rituals and ceremonies associated with Hindu temples, and what is their significance in Hindu worship?
7. How have contemporary architects and designers interpreted Vedic temple design principles in modern times?
8. What are the challenges and opportunities for Vedic temple design in the modern world?
9. How have Hindu temples influenced other religious and cultural traditions, both in India and around the world?
10. How have Vedic temple design principles evolved over time, and what is their relevance in the modern world?

23BVA11	YEAR:2	SEMESTER:3	SDC	BUILDING SERVICES	CREDITS 0:2:3

CONTACT PERIOD:8 (0 LECTURE+2 TUTORIAL +6 PRACTICAL / SEMINAR) Per week	PROGRESSIVE MARKS:50	VIVA MARKS:50

OBJECTIVE

To familiarize the students with Services that are involved in the building to make it more efficient and comfortable.

OUTLINE

UNIT 1

Sanitary and plumbing utilities Introduction to sanitary facilities, types of sanitary facilities, introduction to drainage systems, types of drainage systems, traps - various types used. Two kinds of plumbing systems, septic tank - ventilation systems, inspection chambers/manholes.

UNIT 2

Electricity Electrically services: Basic concepts of electricity: direct and alternating currents Delivery in three phases and single stages Supply of electricity to locations and delivery of electricity to houses. Electrical distribution inside buildings Electrical layouts for enclosed spaces Exposed and uncovered wiring Types of wires Wired accessories Electrical protection principles- Earthing, MCB, ELCB, lightning conductor.

UNIT 3

Lighting Artificial lighting Direct and indirect lighting, Levels of illumination for lamp forms. Acoustics Definition and terms Space Acoustics for lecture halls and auditoriums, propagation and reverberation of sound acoustics.

UNIT 4

Vertical transport system Lifts-carrying capability and travel time, grouping of lifts-requirement for construction Escalators-provision of space and installation specifications Fire protection Analysis of fire regulations, fire safety design consideration. Fire routes of escape. Fire detectors and devices for alerts. Fire Safety and Firefighting Systems, Firefighting Water Supply.

UNIT 5

Ventilation- Mechanical ventilation in homes, Mechanical ventilation in basements. Ventilators, blowers, air filters Air conditioning Principle of the refrigeration cycle and the air cycle Local and central air-conditioning systems Work ducts and air-conditioning configurations Fittings and fixtures.

OUTCOME

At the end of the course, students will be able to create electrical layouts, plumbing layouts using software. They will also be asked to make a portfolio of the studied services.

REFERENCES

1. Water supply and Sanitation by Charanjit Shah.
2. Water supply & sanitary Engineering by S.C.Rangawala
3. Raina K.B. & Bhattacharya S.K., Electrical Design estimating and costing, New Age International (P) Limited, New Delhi,2004.
4. Rudiger Ganslandt & Harald Hofmann, Handbook of Lighting Design, Druckhaus Maack, Lüdenscheid, 1992.
5. Building Services: A Guide to Integrated Design: Engineering for Architect, RP Parlour, 2008, Integral Publishing.
6. National Building Code of India (Latest Edition), Bureau of Indian Standards.

23BVA11	YEAR:2	SEMESTER:3	SDC	ALTERNATE BUILDING MATERIAL & METHODS OF CONSTRUCTION-II	CREDITS 3:1:0

CONTACT PERIOD: 04 (3 LECTURE + 1 TUTORIAL+ 0 PRACTICAL / SEMINAR) per week	PROGRESSIVE MARKS:50	THEORY MARKS:50

AIM

The aim of the course on Alternate Building Technology and Construction Methods is to provide students with an understanding of various innovative and sustainable construction techniques that are emerging in the construction industry. The course aims to introduce students to alternative building technologies that can help reduce the environmental impact of construction projects, improve energy efficiency, and enhance the durability and safety of buildings.

OBJECTIVES

1. To familiarize students with alternative building technologies and their applications.
2. To introduce students to sustainable and environmentally-friendly construction methods.
3. To teach students about the advantages and limitations of different construction techniques.
4. To provide students with knowledge of the latest building codes and regulations related to alternative building technologies.
5. To equip students with the skills needed to evaluate and select appropriate construction methods based on project requirements and constraints.
6. To enable students to design and implement sustainable construction projects using alternative building technologies.
7. To foster critical thinking and problem-solving skills among students to address the challenges faced in adopting alternative building technologies.

The course aims to prepare students for the changing landscape of the construction industry, where sustainable and innovative construction methods are becoming increasingly important.

OUTLINE

UNIT 1 - INTRODUCTION TO ALTERNATIVE BUILDING TECHNOLOGIES
Definition and overview of alternative building technologies, Benefits of using alternative building technologies, Comparison of conventional and alternative building technologies.

UNIT 2 - SUSTAINABLE CONSTRUCTION METHODS
Sustainable design principles, Green building rating systems, Building codes and regulations related to sustainable construction.

UNIT 3 - MATERIALS FOR SUSTAINABLE CONSTRUCTION
Introduction to eco-friendly building materials, Selection of sustainable materials for construction, Properties and characteristics of sustainable materials.

UNIT 4 - ALTERNATIVE BUILDING TECHNIQUES
Prefabrication and modular construction, Earth and straw bale construction, Rammed earth construction, Bamboo construction, Timber frame construction.

UNIT 5 - ENERGY-EFFICIENT BUILDING TECHNIQUES
Passive solar design, Insulated concrete forms, Green roofs and walls, Solar energy systems, Geothermal energy systems.

UNIT 6 - CASE STUDIES

Successful implementation of alternative building technologies in real-world construction projects, Analysis of challenges faced during implementation and potential solutions.

UNIT 7 - FUTURE TRENDS

Emerging trends and technologies in sustainable construction, Challenges and opportunities in the adoption of sustainable construction methods, Strategies for promoting and encouraging the use of sustainable construction methods.

UNIT 8 - FINAL PROJECT

Application of knowledge and skills learned throughout the course, Design and implementation of a sustainable construction project using alternative building technologies, Presentation and evaluation of final project.

OUTCOME

The outcome of the course is to equip students with the knowledge and skills needed to design and implement sustainable construction projects using alternative building technologies that minimize environmental impact, improve energy efficiency, and enhance the durability and safety of buildings.

QUESTIONS

1. What are some of the benefits of using alternative building technologies, and how do they compare to conventional building methods?
2. What are some sustainable design principles that can be applied to the construction process, and how can they be incorporated into the latest green building rating systems and codes and regulations?
3. How can eco-friendly building materials be selected and recommended based on their properties and characteristics?
4. What are some alternative building techniques, and how can they be applied to different types of construction projects?
5. How can energy-efficient building techniques such as passive solar design and geothermal energy systems be designed and implemented to improve energy efficiency?
6. What are some case studies of successful implementation of alternative building technologies, and what challenges were faced during their implementation?
7. What emerging trends and technologies in sustainable construction should be considered when designing and implementing sustainable construction projects?
8. How can critical thinking and problem-solving skills be developed to address the challenges faced in adopting alternative building technologies?
9. What are some potential strategies for promoting and encouraging the use of sustainable construction methods in the construction industry?
10. How can the knowledge and skills learned in this course be applied to design and implement a sustainable construction project using alternative building technologies?

REFERENCES

1. "Alternative Construction: Contemporary Natural Building Methods" by Lynne Elizabeth and Cassandra Adams.
2. "Building Green: A Complete How-To Guide to Alternative Building Methods" by Clarke Snell and Tim Callahan.
3. "Natural Building Companion: A Comprehensive Guide to Integrative Design and Construction" by Jacob Deva Racusin and Ace McArleton.
4. "The Natural Building Companion: A Comprehensive Guide to Integrative Design and Construction" by Chris Magwood.
5. "Green Building: Principles and Practices in Residential Construction" by Abe Kruger and Carl Seville.
6. "Building with Cob: A Step-by-Step Guide" by Adam Weismann and Katy Bryce.
7. "The New Carbon Architecture: Building to Cool the Planet" by Bruce King.
8. "Building Science: Concepts and Applications" by John Straube and Eric Burnett.
9. "Sustainable Construction: Green Building Design and Delivery" by Charles Kibert.
10. "The Green Building Revolution" by Jerry Yudelson.

23BVA11	YEAR:2	SEMESTER:4	SDC	VEDIC DESIGN APPLICATIONS (URBAN DESIGN)	CREDITS 0:12:3

CONTACT PERIOD: 18 (0 LECTURE + 12 TUTORIAL + 6 PRACTICAL/ SEMINAR) Per Week	PROGRESSIVE MARKS:50	VIVA MARKS:50

AIM

The aim of the course in Vedic Urban Design and Applications is to provide students with a comprehensive understanding of the principles and practices of Vedic design, specifically as applied to urban design. This course is focused on teaching students how to incorporate ancient Vedic knowledge and wisdom into contemporary urban planning and design, creating sustainable and harmonious urban environments.

The objectives of the course may include:

OBJECTIVES

1. Understanding the principles and concepts of Vedic design, including Vastu Shastra and Sthapatya Veda, and their relevance to contemporary urban design.
2. Developing an understanding of the relationship between human beings, their environment, and the natural world, and how this can inform urban design.
3. Learning about the different elements of Vedic design, such as orientation, materials, and spatial arrangement, and how to apply these principles in urban design.
4. Developing practical skills in Vedic urban design, including site analysis, design development, and presentation.
5. Learning about case studies and examples of Vedic urban design from around the world, and understanding the challenges and opportunities presented by different urban contexts.
6. Developing an understanding of the role of culture, history, and tradition in urban design, and how to integrate these elements into contemporary urban planning.

The course in Vedic Urban Design and Applications aims to provide students with the knowledge, skills, and practical experience necessary to create sustainable and harmonious urban environments that promote human well-being and connection to the natural world.

OUTLINE

UNIT 1 - VEDIC COSMOLOGY AND ITS RELEVANCE TO URBAN DESIGN

UNIT 2 - HUMAN WELL-BEING AND ENVIRONMENTAL CONNECTION
Understanding the relationship between human beings and their environment, Biophilic design and its connection to Vedic principles, Sustainability and resilience in urban design.

UNIT 3 - ELEMENTS OF VEDIC DESIGN IN URBAN CONTEXTS
Orientation and directionality in urban design. Use of natural materials in building and design, Spatial arrangements and proportion in urban spaces.

UNIT 4 - PRACTICAL APPLICATION OF VEDIC URBAN DESIGN PRINCIPLES
Site analysis and evaluation, Development of Vedic design strategies and solutions, Presentation and communication of design concepts.

UNIT 5 - CASE STUDIES IN VEDIC URBAN DESIGN
Analysis of real-world examples of Vedic urban design from around the world, Challenges and opportunities presented by different urban contexts, Comparison of Vedic urban design to other contemporary urban design approaches.

UNIT 6 - CULTURE, HISTORY, AND TRADITION IN VEDIC URBAN DESIGN

Understanding the role of cultural context in urban design, Integrating historical and traditional elements into contemporary urban planning, Ethics and responsibility in Vedic urban design practice.

UNIT 7 - FUTURE DIRECTIONS AND OPPORTUNITIES

Emerging trends and innovations in Vedic urban design, Opportunities for research and advancement in Vedic urban design, Integration of Vedic design principles into wider urban planning and policy frameworks.

OUTCOME

The outcome of the course in Vedic Urban Design and Applications is to provide students with a comprehensive understanding of Vedic design principles and how they can be applied in urban contexts. Students will gain practical skills and knowledge to create sustainable and harmonious urban environments that promote human well-being and connection to the natural world.

QUESTIONS

1. What are the key principles and concepts of Vedic design, and how do they inform urban design?
2. How can Vedic design principles be applied in contemporary urban contexts, and what are some examples of successful implementations?
3. What is the relationship between human well-being and environmental connection in urban design, and how can Vedic principles promote this connection?
4. How can Vedic design principles be integrated with other contemporary urban design approaches, such as green infrastructure and smart cities?
5. What are some challenges and opportunities presented by different urban contexts, and how can Vedic design principles address these challenges?
6. How can historical and cultural context be integrated into contemporary urban design, and what are some examples of successful implementations?
7. What are some emerging trends and innovations in Vedic urban design, and how can designers stay up-to-date with the latest developments in the field?
8. What are some ethical and responsibility considerations in Vedic urban design practice, and how can designers ensure that their designs promote sustainability and equity?
9. What are some potential barriers to implementing Vedic design principles in urban contexts, and how can these be addressed?
10. How can Vedic design principles be integrated into wider urban planning and policy frameworks, and what are some successful examples of this integration?

REFERENCES

1. "Vedic City Planning and Architecture" by R. Vaidyanathan
2. "Vastu Architecture: Design Theory and Application for Everyday Life" by Michael Borden
3. "The Principles of Vedic Architecture" by Balkrishna Doshi
4. "Vaastu: The Indian Art of Placement" by Rohit Arya
5. "Sthapatya Veda: The Science of Vedic Architecture" by Durgadas
6. "The Vastu Workbook: Using the Subtle Energies of the Indian Art of Placement" by Talavane Krishna
7. "Vedic Architecture and Art of Living" by Peter Fritz Walter
8. "Feng Shui and Vastu: A Comparative Study" by Vasant Lad
9. "Vastu: Transcendental Home Design in Harmony with Nature" by Sherri Silverman
10. "The Science of Vastu" by Ganapati Sthapati.

23BVA11	YEAR:2	SEMESTER:4	SDC	ANALYSIS OF DESIGN STRUCTURE	CREDITS 0:6:2

CONTACT PERIOD: 10 (0 LECTURE + 6 TUTORIAL + 4 PRACTICAL/ SEMINAR) Per Week	PROGRESSIVE MARKS:50	VIVA MARKS:50

OBJECTIVES

- Understanding of basic theories and principles of structural analysis from real life projects
- Understanding of properties of materials relevant to structural analysis of the building.
- Understanding of behaviour of structural elements under various conditions.
- Understanding various concepts about structures as tall, long, thin, wide etc.
- Understanding Articulation of structural systems from foundation to roof Understanding the following:
    1. Properties of section
    2. Stress and strain:
    3. Shear force and bending moment
    4. Theory of simple Bending

OUTLINE

UNIT 1

Learning and detection of force position, bending moment and bending stress in fixed beams, over hanging beams, continuous beams, portal frames, etc. Combined bending and direct stresses, eccentricity effect of axial and eccentric loads, e.g., g. Wall of Masonry, Chimney. Stresses in Beams Basic bending of beams, Segment module, Resistance moment, Shear stress in beam section.

UNIT 2

Deflection in simply supported beams and cantilevers with distributed and point loads. (Introduction, Calculation of slope and deflection by Double Integration, Macaulay's Method, and Moment area Method. Conjugate beam method).

UNIT 3

Columns, purpose of providing the coloumns, location and orientation of the coloumn and struts- short and long columns, slenderness ratio etc. Axially loaded coloumn, Coloumn with uniaxial excentric loading, Coloumn with biaxial excentric loading, effective length of coloumn with respect to different end condition

UNIT 4

Shear Force and Bending Moments Beams shearing force and bending moment, Determination of positive and negative bending moments and shear force in fixed, cantilever and simply supported beam, and overhanging beam. (confine the loading to point and UDL covering full span only). Continuous beams – negative and positive bending moments in continuous beams covering two or more spans of uniform section and simple loading by moment distribution method. Symmetrical Portal frames.

UNIT 5

Design of tensile structures, cable structures, fabric structures and using new techniques such as bamboo as reinforcement is also to be studied.

OUTCOME

Students will analyses the documented structure and reproduce it using Revit structure, they will also have a vivid picture on how these structural members can be employed in their designs, based on load calculation of different members and produce it in digital format.

REFERENCE BOOKS

1. *Na*utiyal B. D., "Introduction to Structural Analysis", B.H.U.
2. Punmia P. C., "Strength of Materials & Mechanics of Structures".
3. Khurmi R. S., "Strength of Materials".
4. Senol Utku , "Elementary Structural Analysis".
5. Rama Armarutham S., *"Strength of Materials"*

23BVA11	YEAR:3	SEMESTER: 4, 5, 6	SDC	ELECTIVE (MULTIDISCIPLINARY)	CREDITS 0:1:1

CONTACT PERIOD: 3 (0 LECTURE + 1 TUTORIAL + 1 PRACTICAL/ SEMINAR) Per Week	PROGRESSIVE MARKS:50	VIVA MARKS:50

COURSE DESCRIPTION

This self-learning course under Vedic Architecture provides an opportunity for students to explore various subjects related to Vedic Architecture, which can help in research, innovation, and interpretation of scripts. The course is designed to be flexible, allowing students to choose from a range of subjects that are available on UGC-approved online platforms like MOOC, SWAYAM, and others.

The course aims to provide students with an in-depth understanding of Vedic Architecture and its application in modern times. It provides a multidisciplinary approach, enabling students to explore different areas of study related to Vedic Architecture, including history, culture, philosophy, science, and technology.

Students can choose from a range of subjects that are relevant to Vedic Architecture, such as Vastu Shastra, Sthapatya Veda, Indian Philosophy, Sanskrit, Indian Art and Culture, Yoga and Meditation, Ayurveda, Ecology and Environment, and others. These subjects are available on various online platforms, providing students with access to a wide range of resources and experts in the field.

The course is self-paced, allowing students to learn at their own pace and convenience. Students can choose to complete one or more subjects, depending on their interests and goals. Upon completion of each subject, students will receive a recognized certificate, which will be considered for credits.

COURSE OBJECTIVES

1. To provide students with an in-depth understanding of Vedic Architecture and its principles.
2. To enable students to explore different areas of study related to Vedic Architecture.
3. To provide students with access to a wide range of resources and experts in the field.
4. To promote research, innovation, and interpretation of scripts related to Vedic Architecture.
5. To provide recognition to students for their learning through recognized certificates.
6. To encourage self-paced learning and flexibility.

COURSE OUTLINE

The course outline will depend on the subjects chosen by the students. Students can choose from a range of subjects that are available on UGC-approved online platforms like MOOK, SWAYAM, and others. The outline for each subject will be provided on the respective platform.

ASSESSMENT

Assessment for each subject will be based on the assessment criteria provided by the respective platform. Students will receive a recognized certificate upon completion of each subject, which will be considered for credits.

CONCLUSION

The Elective (Multidisciplinary) under Vedic Architecture provides an opportunity for students to explore various subjects related to Vedic Architecture, which can help in research, innovation, and interpretation of scripts. The course is flexible and self-paced, enabling students to learn at their own pace and convenience. The recognized certificates gained by the students will be considered for credits, providing recognition for their learning.

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23BVA11	YEAR:3	SEMESTER:5	SDC	WORKING DRAWING AND TENDER DRAWINGS	CREDITS 0:9:3

CONTACT PERIOD:15 (0 LECTURE + 9 TUTORIAL + 3 PRACTICAL/ SEMINAR) Per Week	PROGRESSIVE MARKS:50	VIVA MARKS:50

OBJECTIVE

Introduction of Working Drawings and Details; Coordination between Architectural, Structural, Services and other disciplines; Preparation of Architectural Working Drawings for a design project.

OUTLINE

UNIT 1
Introduction: Overview of Working Drawings; historical perspective; consultants involved in preparation of working drawings, their role and scope; reading, error checking, problems in working drawings.

UNIT 2
Drafting Conventions: Representation of materials, graphic symbols, line type conventions, grid lines, lettering, color codes, paper sizes, title blocks, office practices, standardization of details.

UNIT 3
CAD Drawings: Working with layers, blocks, templates, assemblies, libraries, layouts, plot styles, error checking, editing.

UNIT 4
Project work: Preparation of Architectural Working drawings and details for one of the design projects of medium rise-framed structure, from earlier semester, like Residence, Primary Health Center or School etc. Alternatively, the design of this project may be taken up at the beginning of the semester in a site measuring 30 m x 40 m or less and within B+G+3 floors.

UNIT 5
Project Work:Preparation of structural and services drawings and details. Structural drawings: Conventions & symbols; Foundations, Columns, Beams, Slab. Electrical drawings: Conventions & symbols;Plans at all levels. Water Supply drawings: Conventions & symbols; Plans at all levels. Sanitary drawings: Conventions & symbols; Plans at all levels; Site Plan, Terrace Plan Mechanical drawings: Conventions & symbols; Plans at all levels; Details of Lift. Complete integration of Architectural, Structural and Services drawings and details.

PORTFOLIO

Drawings to include Site Plan, Marking Plan, Plans at all levels, Terrace Plan; all Elevations; two Cross Sections passing through staircase & lift shaft; Profile Sections; Details to include Toilet, Kitchen, Staircase, Door, Window, Railing, Gate, Sky-light.

REFERENCES

1. Engineering Drawing -N.D. Bhatt & V.M. Panchal, 48th edition, 2005 Charotar Publishing House, Gujarat.
2. Engineering Graphics – K.R. Gopalakrishna, 32nd edition, 2005 Subash Publishers Bangalore.
3. Computer Aided Engineering Drawing - by Dr. M H Annaiah, Dr CN Chandrappa and Dr. B Sudheer Premkumar, Fifth edition, New Age International Publishers.
4. ISO:128 Technical drawings — General principles of presentation.

23BVA11	YEAR:3	SEMESTER:5	SDC	PROFESSIONAL PRACTICE & OFFICE MANAGEMENT	CREDITS 3:3:0

CONTACT PERIOD: 6 (3 LECTURE + 3 TUTORIAL + 0 PRACTICAL/ SEMINAR) Per Week	PROGRESSIVE MARKS:50	THEORY MARKS:50

OBJECTIVES

To understand the responsibilities & liabilities of the Profession. To appreciate the attitude of professionalism.

OUTLINE

UNIT 1
Profession: Idea of profession; differences between profession, trade and business.. Profession of architecture: Types and extent of services offered by architects, scale of fees, stages of payment, and contract between client and architect. Practice: Types of Architectural firms, proprietorship, partnership, associate ship and private limited firms; advantages and disadvantages of each type of firm; building clientele and projects. Office Management: Administration of Architectural firms; basic accounting procedures.

UNIT 2
Code of Professional Conduct: CIAT guidelines and procedure of conduct of competitions.

UNIT 3
Tender: Tender document and its content. Types of tenders, advantages and disadvantages of each type; suitability to various projects. Tender notices, opening, scrutiny, process of selection and award. Architect's role in the tender process. Earnest Money Deposit, Security Deposit, Retention Amount, Mobilization Amount and Bonus & Penalty Clauses. Issues arising out of the tendering process and the role of an architect. Contract: General Principles, types of contract; Contract document. Contract Management: Architect's role in Contract Management. Conditions and Scope of Contract; role of an architect in ensuring completion of contract.

UNIT 4
Byelaws: Building bye laws, National Building Code, floor area ratio, floor space index, floating FAR, zoning regulations. Overview of Master Plan/CDP of relevant cities.10. Arbitration: Arbitration and conciliation; arbitrator, umpire, order of reference, selection of arbitrators, powers and duties of arbitrators, arbitration award and implementation of award. Valuation and Dilapidation: Definitions and architect's role in preparation of valuation and dilapidation reports and certifications; Physical and Economic life of buildings. Introduction to Valuation, essential characteristics, classifications and purpose of classifications. Methods of valuation, standard rent and cost of construction.

UNIT 5
Building Industry: General overview of the industry; various participants and dimensions of building industry. Role of architect, employer, and contractor. Types of insurance necessary during contract; fire insurance Easements: easement rights, architect's role in protecting easement rights. Laws related to Property and Land: Land tenure, types of land holdings, land registration, easement rights, covenants, trespass and nuisance etc. General Law: Overview & definition of common law, statute law, equity, criminal law, civil law etc., Role of courts in dispensing various types of cases. Overview of recent Bills and Acts: Real Estate (Regulation and Development) Act 2016; Land Acquisition Act, Rehabilitation Act and Resettlement Act 2013; Consumer Protection Act. FDI in real estate, goods & service taxes and other taxes applicable in architecture practice and construction industry.

REFERENCES

1) Namavati, Roshan, Professional Practice for Architects and Engineers, Lakhani Book, New Delhi, 2001.
2) Krishnamurthy K G and Ravindra S V, Professional Practice, S V Ravindra, 2009, Bangalore.

23BVA11	YEAR:3	SEMESTER:5	SDC	ENTREPRENEURSHIP AND MARKETING	CREDITS 2:3:0

CONTACT PERIOD: 5 (2 LECTURE + 3 TUTORIAL + 0 PRACTICAL/ SEMINAR) Per Week	PROGRESSIVE MARKS:50	THEORY MARKS:50

OBJECTIVE

To develop basic understanding about entrepreneurship and marketing, to develop basic entrepreneurial skills, to orient architects for their own venture setup, to boost start-ups.

OUTLINE

UNIT 1

Introduction to entrepreneurship, Benefits, responsibility, design autonomy, financial management, action term.

UNIT 2

Creativity and entrepreneurship Steps in Creativity Innovation and inventions. Using left brain skills to harvest right brain ideas Legal Protection of innovation. Skills of an entrepreneur Decision making and Problem Solving (steps indecision making).

UNIT 3

Sole Proprietorship, Partnership, Corporations, LLC/ LLP, Tax Basics, Tax and the Corporation., Licensing & Regulations, Business model, Insurance.

UNIT 4

Project Report, Aspects of a Project, Phases of a Project, Project Report,Contents of a Project Report,Proforma of a Suggested Project Report for a Manufacturing Organization, Suggested Readings.

UNIT 5

Analysis with B.E. Point and P/V Ratio Preparation of Cash Budget Problems on Standard Costing Cash Flow Statement Problem as Working Capital Requirement Forecast Problems on Journal & Ledger Suggested Readings.

OUTCOME

After completion of the above course, students will be able to.

1. Explain the organizational structure, staffing and leadership processes.
2. Describe the understanding of motivation and different control systems in management.
3. Understanding of Entrepreneurships and Entrepreneurship development process.
4. Summarize the preparation of project report, need significance of report. Also to explain about industrial ownership.

REFERENCES

1. ARCHITECT + ENTREPRENEUR A Field Guide to Building, Branding, and Marketing
2. Your Startup Design Business Eric W. Reinholdt 3
3. Dynamics of Entrepreneurial Development & Management-Vasant Desai,Himalaya
4. PublishingHouse.
5. Entrepreneurship Development – Poornima. M. Charantimath, Small Business Enterprises –
6. PearsonEducation - 2006 (2 & 4) Entrepreneurship Development - S. S. Khanka, S. Chand & Co. New Delhi.

23BVA11	YEAR:3	SEMESTER:5	SDC	PROJECT MANAGEMENT	CREDITS 2:1:0

CONTACT PERIOD: 3 (2 LECTURE + 1 TUTORIAL + 0 PRACTICAL/ SEMINAR) Per Week	PROGRESSIVE MARKS:50	THEORY MARKS:50

OBJECTIVE

To enhance the professional ability of the student to manage a construction project by exposing the students to the currently prevalent techniques in the planning, programming and management of a construction project.

OUTLINE

UNIT 1

Introduction to Project, its Stages and Project management: Project,Organisation, need for management of building /construction projects, Principles and Objectives of Project Management, brief understanding about study areas in Project Management. Types of Construction Projects, Life Cycle Stages of a Project (Construction Project).

UNIT 2

Decision making and Feasibility Study: Involvement and Roles of Consultants and Contractor in decision making at various stages. Basic understanding of decision making principles and tools (e.g.Decision Tree, SWOT Analysis, Cost-Benefit Analysis), Value Engineering, Investment Criteria, Project Feasibility Study.

UNIT 3

Computer applications in Project Management: Introduction to use of computers for solving inventory, scheduling and other issues related to construction and management. Roles of Project Manager: Roles & Responsibilities of Project/ Managers, Scope Management in Construction: Scope Planning, Definition, Verification and Control Project Management Stages: Project planning, project scheduling and project controlling.

UNIT 4

Project Scheduling – Bar Chart, Milestone Chart, Network Theories (CPM and PERT analysis) - Event, activity, dummy, network rules, graphical guidelines for network, numbering of events; Project Cost analysis (Indirect project cost, direct project cost, slope of the direct cost curve, total project cost) & brief understanding of about time, cost and resource optimization; Project Crashing (using CPM).

UNIT 5

Project Monitoring and Control – Role of the project manager in monitoring the specifications, Follow-up for quality control, the measurement book (MB), RA bills, interim and final checking and certification of works on site based on the BOQ and terms of contracts. Project updating, Progress Curves.

OUTCOMES

After completion of the above course, students will be able to Explain management functions of a manager. Also explain planning and decision making processes. Explain the organizational structure, staffing and leadership processes. Describe the understanding of motivation and different control systems in management. Understanding of Entrepreneurships and Entrepreneurship development process.

REFERENCES

1. Dr. B.C.Punmia et al. "Project planning and control with PERT and CPM", Laxmi Publications, New Delhi
2. S.P.Mukhopadhyay, "Project management for Architects' and civil Engineers", IIT, Kharagpur, 1974
3. Jerome D.Wiest and Ferdinand K.Levy, "A Management Guide to PERT/ CPM", Prentice Hall of India Pub, Ltd. New Delhi, 1982
4. R.A. Burgess and G.White, "Building production and project Management", The construction press, London,1979.
5. A Guide to Project Management Body of Knowledge; 5th ed. – An American national standard 6. –ANSI/ PMI

99 – 001-2004

5. Krishnamurthy K. G., Ravindra S. V., "Construction and Project management for Engineers, architects, planners and Builders", CBS Publishers.

23BVA11	YEAR:3	SEMESTER:6	SDC	VEDIC ARCHITECTURE THESIS	CREDITS 0:12:3

CONTACT PERIOD:18 (0 LECTURE + 12 TUTORIAL + 6 PRACTICAL/ SEMINAR) Per Week	PROGRESSIVE MARKS:50	VIVA MARKS:50

AIM

Vedic architecture thesis is to contribute new knowledge and understanding of Vedic architecture and its potential role in shaping a sustainable, harmonious, and culturally relevant built environment.

OUTLINE
Listed below are the few parameters that could govern, frame and aid in evaluating the project.

1. The thesis aims to demonstrate the principles and practices of Vedic Architecture and their application in the design of modern buildings.

2. The thesis will begin with an overview of Vedic Architecture, its history, and its significance in modern architecture. It will then delve into the science of Vastu Shastra, the principles of the five elements, and their incorporation into the design of Vedic buildings.

3. The thesis will also cover the principles of orientation and layout, materials and construction techniques used in Vedic buildings, and the use of colors, shapes, and textures to create a balanced and harmonious environment.

4. The thesis will analyze case studies of buildings designed based on Vedic Architecture principles, including their design, construction, and performance. It will also include a design project that applies the principles of Vedic Architecture to create a building that is not only beautiful but also promotes the well-being of its occupants.

5. Thesis will summarize the key findings and conclusions and suggest future directions for research and practice in Vedic Architecture. The thesis will be an attempt to contribute to the knowledge and understanding of Vedic Architecture and its relevance in contemporary building design.

The points that can be addressed:

1. Introduction: A brief overview of Vedic architecture, its history, and significance in contemporary contexts.
2. Philosophical and Spiritual Underpinnings: The philosophical and spiritual foundations of Vedic architecture, including the principles of Vastu, and how they influence the design of buildings.
3. Design Principles: The key design principles of Vedic architecture, such as the orientation and placement of buildings, use of materials, and the relationship between the built environment and nature.
4. Comparative Study: A comparative study of Vedic architecture with other architectural styles and traditions, such as Chinese Feng Shui, Japanese Zen architecture, and Western classical architecture.
5. Case Studies: Case studies of buildings that incorporate Vedic architecture principles, such as temples, homes, and public buildings, and their impact on the inhabitants and the surrounding environment.
6. Contemporary Application: The application of Vedic architecture principles in contemporary architecture and urban planning, and its potential to create sustainable and harmonious built environments.
7. Critique and Analysis: A critical analysis of the strengths and weaknesses of Vedic architecture, including its cultural and social implications, and the challenges of applying these principles in contemporary contexts.
8. Conclusion: A summary of the findings and implications of the research, and recommendations for further research and application of Vedic architecture principles.

OUTCOME

1. A thorough understanding of the principles and practices of Vedic Architecture and their application in modern building design.
2. An ability to analyze the principles of orientation and layout, materials, and construction techniques used in Vedic buildings, and their impact on the well-being of the occupants.
3. An understanding of the use of colors, shapes, and textures to create a balanced and harmonious environment in Vedic buildings.
4. An ability to study case studies of buildings designed based on Vedic Architecture principles, including their design, construction, and performance, and draw insights for modern building design.
5. An ability to apply the principles of Vedic Architecture to create a building that is not only aesthetically pleasing but also promotes the well-being of its occupants.
6. Improved research skills, including the ability to conduct literature reviews, analyze data, and draw conclusions.
7. Enhanced design skills, including the ability to incorporate Vedic Architecture principles in modern building design.
8. An ability to contribute to the growing body of knowledge on Vedic Architecture and to inspire architects and designers to incorporate its principles in their design practices.

The Vedic Architecture thesis is to develop a deep understanding of Vedic Architecture and its relevance in modern building design, and to apply this knowledge to create buildings that are not only beautiful but also promote the well-being of its occupants. The thesis is intended to contribute to the advancement of knowledge in this field.

REFERENCES

1. "The Vastu Vidya Handbook: The Indian Feng Shui" by Pravin S. Tilekar
2. "Vastu: Transcendental Home Design in Harmony with Nature" by Michael Borden
3. "Vedic Architecture: Maharishi Vastu" by Eike Hartmann
4. "Vastu Architecture: Design Theory and Application for Everyday Life" by Michael Borden
5. "Hindu Temple Architecture: Vastu Shastra" by Sashikala Ananth
6. "The Science of Vaastu" by Ravi Rao and Subhash Kak
7. "Vaastu: The Indian Art of Placement" by Rohit Arya

23BVA11	YEAR:3	SEMESTER:6	SDC	ESTIMATION AND COSTING	CREDITS 2:4:0

CONTACT PERIOD: 6 (2 LECTURE + 4 TUTORIAL + 6 PRACTICAL/ SEMINAR) Per Week	PROGRESSIVE MARKS:50	THEORY MARKS:50

OBJECTIVE

To develop the necessary skills for establishing and writing specifications based on proposed materials for the preparation of Bill of Quantities leading to cost estimation of proposed architectural works.

OUTLINE

UNIT 1

Types and purpose of estimation. Approximate estimate of buildings. Bill of quality, factors to be considered. Principles of measurement and billing. Contingencies. Measurement of basic materials like brick, wood, concrete and unit of measurement for various items of work. Abstract of an estimate. Costs associated with constructed facilities. Approaches to cost estimation. Type of construction cost estimates. Cost Indices. Applications of cost indices to estimating. Estimate based on engineer's list of quantities. Estimation of operating costs.

UNIT 2

DETAILED ESTIMATE Deriving detailed quantity estimates for various items of work for a single storied building. To include earthwork excavation, brick work, plain cement concrete, reinforced cement concrete works, wood work, iron works, plastering, painting, flooring, weathering course.

UNIT 3

Valuation. Explanation of terms. Types of values. Sinking fund. Years of purchase. Depreciation. Types of depreciation. Valuation of real properties. Types, methods and purpose of valuation.

UNIT 4

Budgeting Elements of cash flow. Time value of money. Capital investment decision. Types of business firms. Budget and Budgetary Control. Types of Budgets. Preparation of financial budget.

UNIT 5

Term project 1: Estimation of Bill of Quantities (BOQ) for Water supply and sanitary works including overhead tanks and Sump tanks.

Term project 2: Estimation of Bill of Quantities (BOQ) for a typical residential layout plan with roads, culverts, pavements, etc.

OUTCOMES

The student will be able demonstrates the following industry-oriented COs associated with the above- mentioned competency:

1. Select the modes of measurements for different items of work.
2. Prepare approximate estimates of civil engineering works.
3. Prepare detailed estimates of civil engineering works.
4. Justify the rate for given items of work using rate analysis techniques.

REFERENCE

1. M.Chakraborthi, 'Estimating, Costing, Specification and Valuation in Civil Engineering, Chakraborthi, 2010.
2. B.N. Dutta, 'Estimating and Costing' UBS Publishers and Distributors,2016.
3. S.SangaReddy and P.L.Meiyappan, 'Construction Management', Kumaran Publication, Coimbatore.
4. Gurcharan Singh and Jagdish Singh, 'Estimating Costing and Valuation', Standard Publishers Distributors,

2012.

23BVA11	YEAR:3	SEMESTER:6	SDC	SPECIFICATION WRITING	CREDITS 2:2:0

CONTACT PERIOD: 4 (2 LECTURE + 2 TUTORIAL + 0 PRACTICAL/ SEMINAR) Per Week	PROGRESSIVE MARKS:50	THEORY MARKS:50

OBJECTIVE

- To enable understanding with respect to quality and quantity of materials, quantity and classes of skilled and unskilled laborers, and tools and plants required for projects.

- To give an understanding of how to draw up specifications for the different items of a building Project and also to prepare the schedule of programming of the project.

OUTLINE
UNIT 1
General Requirements, existing conditions, concrete, masonry, metals, wood, plastics, and composites, thermal and moisture protection, openings, finishes.

UNIT 2
Specialties, equipment, furnishings, special construction. conveying equipment, fire suppression, plumbing, Heating, Ventilating, and Air Conditioning (HVAC).

UNIT 3
Electrical communications, Electronic safety and security, earthwork, exterior improvements Utilities, Transportation, Process integration, material processing and handling equipment, water and wastewater equipment.

UNIT 4
Role of the architect in monitoring the specifications follow-up for quality control, the measurement book (MB), RA bills, interim and final checking and certification of works on site based on the BOQ and terms of contracts.

UNIT 5
Preparation of specification study and details for one of the minor projects could include a case study documentation of the project proposed for the design intervention.

OUTCOMES

The student will be able demonstrates the following industry oriented COs associated with the above mentioned competency:
1. Select the modes of measurements for different items of work.
2. .Prepare detailed specifications for the projects.

REFERENCES:

1. CSI 3-Part Formatted Specifications (website:arcat.com)
2. Dutta B.N ,Estimating and Costing in Civil Engineering- Theory and Practice,UBS Publishers,1993.
3. Rangwala, Estimating, Costing and Valuation, Charotar Publishing House.

23BVA11	YEAR:3	SEMESTER:6	SDC	VALUE ENGINEERING DESIGN	CREDITS 2:1:0

CONTACT PERIOD: 3 (2 LECTURE + 1 TUTORIAL + 0 PRACTICAL/ SEMINAR) Per Week	PROGRESSIVE MARKS:50	THEORY MARKS:50

OBJECTIVE

To offer a plateau for better built environments and to help scientifically criticize and examine the functionality and performance of different building types, elements and systems in relation to quality versus cost.

OUTLINE

UNIT 1

Introduction, Value Engineering Defined, VE History, VE Terminology, VE Benefits, s, Potential VE Applications, Development of Value Engineering Approach.

UNIT 2

Phases of Value Engineering Study, Information Phase, Verb - Noun Approach, Function Relationship, Analytical Phase, Creativity, Function Analysis System Techniques (FAST) Concepts.

UNIT 3

Value Engineering in Architecture, Introduction, Defining Design Objectives Scaling Design Objectives. Weighing Design Objectives Evaluation of Alternatives.

UNIT 4

Preparation of value engineering study and details for one of the minor projects could include a case study documentation of the project proposed for the design intervention.

UNIT 5

Preparation of value engineering study and details for one of the One major project such as Institutional projects like facilities of higher learning, such as, Engineering college campus, medical college campus, management institute campus, hotel management institute, Law college campus, Dental college campus, Nursing college campus, Juvenile Correction Centre, etc.

OUTCOME

At the end of the course, students will be able to perform value engineering studies on various projects.

REFERENCES

1. VALUE ENGINEERING FOR THE PRACTICE OF ARCHITECTURE Husam Akoud
2. Value Engineering Handbook Jay Mandelbaum Danny L. Reed, Project Leader.

23BVA11	**YEAR:4**	**SEMESTER:7**	**SDC**	**INTERNSHIP**	**CREDITS 0:0:30**

CONTACT PERIOD: 15 **0 LECTURE + 0 TUTORIAL + 30 PRACTICAL/** **SEMINAR) Per Week**	**PROGRESSIVE MARKS:100**	**VIVA MARKS:500**

OBJECTIVE

To provide exposure to the various aspects of architectural practice.

OUTLINE

The student is expected to be exposed to preparation of working drawing, detailing, preparation of architectural models, computer applications in design and drafting, filing system in respect of documents, drawing and preparation of tender documents. Site experience may be given in respect of supervision of the construction activity, observing the layout on site, study of the stacking methods of various building materials, study of taking measurements and recording. Students should also acquaint themselves with local building bye-law.

Monitoring of Training:

A. Submission of Joining report : To be submitted within one week from the date of joining. Students must report for the training from the day of commencement of 9th semester as notified by the university.
B. Submission of periodical reports: Students shall maintain a record of their engagement for the period of training. This will be recorded in an authorized diary to be counter signed by the architect at the end of each week and the same diary shall be sent to the training coordinator once in a month.
C. Completion certificate: At the end of the training period, a student shall produce a certificate of satisfactory completion of training in duplicate.

Submission of Portfolio

Students shall present a portfolio containing the following works before the examiners for Viva-Voce Examination:
1. Training Report: This shall contain copies of only such drawings which have been dealt, drafted or designed by students. It shall also contain a brief description of works handled during the training along with photographs, pencil sketches etc.

2. Building Study – This shall include a detailed critical study of a building designed by the architect with whom the student has worked. The study should include function, aesthetics, context, structure etc., This shall be presented through drawings, photographs, write ups etc.

3. Building Material Study – This shall be a detailed study of new or relatively new building materials available in the market. A study of its properties, uses, cost, maintenance etc., is expected to be done. Samples of materials shall also be obtained and presented.

4. Detailing study – This shall be a study of interesting details done in the firm where the student has undertaken the training. This shall include sketches and photographs of the detail.

23BVA11	**YEAR:4**	**SEMESTER: 7, 8**	**SDC**	**RESEARCH PAPER**	**CREDITS 0:0:1**

CONTACT PERIOD: 2 **0 LECTURE + 0 TUTORIAL + 2 PRACTICAL/ SEMINAR) Per Week**	**PROGRESSIVE MARKS:100**	**VIVA MARKS:**

AIM

 This course is designed to provide students with the skills and knowledge necessary to conduct independent research and write a high-quality research paper. Students will learn the principles of research design, data collection, analysis, and interpretation, as well as the mechanics of academic writing.

OBJECTIVES

1. Develop an understanding of the research process, including identifying research questions, selecting appropriate methods, and analyzing and interpreting data.
2. Learn how to conduct a comprehensive literature review and critically evaluate existing research in their chosen field.
3. Develop skills in academic writing, including organizing and structuring a research paper, citing sources, and avoiding plagiarism.
4. Understand the importance of ethical considerations in research, including obtaining informed consent, maintaining confidentiality, and ensuring the safety and well-being of research participants.
5. Gain experience in presenting research findings orally and in writing, including creating effective presentations and defending their research.

OUTLINE

UNIT 1 - INTRODUCTION TO RESEARCH PAPER WRITING
Overview of the research process, Identifying research questions and hypotheses, Selecting appropriate research methods.

UNIT 2 - CONDUCTING A LITERATURE REVIEW
Finding and evaluating sources, Synthesizing existing research, Avoiding plagiarism.

UNIT 3 - RESEARCH DESIGN AND METHODOLOGY
Experimental and non-experimental research designs, Sampling techniques and sample size calculation, Data collection methods.

UNIT 4 - DATA ANALYSIS AND INTERPRETATION
Qualitative and quantitative data analysis, Data visualization techniques, Drawing conclusions from data.

UNIT 5 - WRITING THE RESEARCH PAPER
Creating an outline and organizing a paper, Writing an introduction, methods section, results section, and discussion section, Citing sources and avoiding plagiarism.

UNIT 6 - ETHICS IN RESEARCH
Principles of ethical research, Obtaining informed consent, Protecting research participants.

UNIT 7 - PRESENTING RESEARCH FINDINGS
Creating effective presentations, Delivering a clear and engaging presentation, Responding to questions and feedback.

UNIT 8 - FINAL PROJECT
Completing a research paper, Submitting a final draft, Defending research in an oral presentation.

ASSESSMENT:

Weekly assignments: 40%

Final research paper: 40%

Oral presentation: 20%

OUTCOME

By the end of the course, students will have developed the skills and knowledge necessary to conduct independent research, write a high-quality research paper, and present their findings effectively. They will be equipped with the foundational skills needed for further academic study and research.

REFERENCES

1. "Research Design: Qualitative, Quantitative, and Mixed Methods Approaches" by John W. Creswell
2. "The Craft of Research" by Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams
3. "Writing for Social Scientists: How to Start and Finish Your Thesis, Book, or Article" by Howard S. Becker
4. "The Elements of Style" by William Strunk Jr. and E.B. White
5. "A Manual for Writers of Research Papers, Theses, and Dissertations" by Kate L. Turabian

23BVA11	YEAR:4	SEMESTER:8	SDC	INTERNSHIP	CREDITS 0:0:30

CONTACT PERIOD: 15 0 LECTURE + 0 TUTORIAL + 30 PRACTICAL/ SEMINAR) Per Week	PROGRESSIVE MARKS:100	VIVA MARKS:500

OBJECTIVE

To provide exposure to the various aspects of architectural practice.

OUTLINE

The student is expected to be exposed to preparation of working drawing, detailing, preparation of architectural models, computer applications in design and drafting, filing system in respect of documents, drawing and preparation of tender documents. Site experience may be given in respect of supervision of the construction activity, observing the layout on site, study of the stacking methods of various building materials, study of taking measurements and recording. Students should also acquaint themselves with local building bye-law.

Monitoring of Training:

D. Submission of Joining report : To be submitted within one week from the date of joining. Students must report for the training from the day of commencement of 9th semester as notified by the university.
E. Submission of periodical reports: Students shall maintain a record of their engagement for the period of training. This will be recorded in an authorized diary to be counter signed by the architect at the end of each week and the same diary shall be sent to the training coordinator once in a month.
F. Completion certificate: At the end of the training period, a student shall produce a certificate of satisfactory completion of training in duplicate.

Submission of Portfolio

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2. Building Study – This shall include a detailed critical study of a building designed by the architect with whom the student has worked. The study should include function, aesthetics, context, structure etc., This shall be presented through drawings, photographs, write ups etc.

3. Building Material Study – This shall be a detailed study of new or relatively new building materials available in the market. A study of its properties, uses, cost, maintenance etc., is expected to be done. Samples of materials shall also be obtained and presented.

4. Detailing study – This shall be a study of interesting details done in the firm where the student has undertaken the training. This shall include sketches and photographs of the detail.

ACHARYA INSTITUTE FOR INNOVATION AND TRANSFORMATION

Regulations Governing the
Bachelor of Computer Applications (Honors)
(ARTIFICIAL INTELLIGENCE (AI) & MACHINE LEARNING (ML)/

DATA SCIENCE (DS) & CYBER SECURITY (CS))

under
CREDIT AND SEMESTER SYSTEM AND GRADING
Scheme for the Distribution of Credits, Period of
Instruction and Syllabus

PREAMBLE

We, the academic community of ACHARYA INSTITUTE FOR INNOVATION AND TRANSFORMATION, recognizing the need for qualified professionals in the fields of Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), and Cyber Security (CS), do hereby establish the course of Bachelor of Computer Applications (Honors) with specializations in AI & ML and DS & CS.

This course aims to provide a comprehensive and in-depth understanding of the theories, principles, and practices of AI, ML, DS, and CS, and to equip students with the necessary skills to become competent professionals in these fields.

The Bachelor of Computer Applications (Honors) program is designed to provide students with a strong foundation in computer science, programming, and database management, along with advanced coursework in AI, ML, DS, and CS. Students will learn how to design and develop intelligent systems, analyze and interpret complex data, and secure computer networks and systems.

The AI & ML specialization will focus on developing students' knowledge of statistical modeling, deep learning, natural language processing, computer vision, and robotics. The DS & CS specialization will cover topics such as data mining, data visualization, cloud computing, network security, and cryptography.

The course will be delivered through a combination of classroom lectures, laboratory sessions, workshops, and hands-on projects. Students will have access to state-of-the-art computing facilities and software tools, as well as opportunities to work on industry-sponsored projects and internships.

Upon completion of the Bachelor of Computer Applications (Honors) program, graduates will be able to pursue careers as data scientists, machine learning engineers, AI developers, cybersecurity specialists, and more. They will also be eligible to continue their education through advanced degree programs in related fields.

AIM

The Bachelor of Computer Applications (Honors) program with specializations in Artificial Intelligence (AI) & Machine Learning (ML) and Data Science (DS) & Cyber Security (CS) aims to provide students with a comprehensive understanding of the theories, principles, and practices of these rapidly-evolving fields, and to equip them with the necessary skills to become competent professionals in these domains.

- The program aims to produce graduates who are knowledgeable, innovative, and ethical, and who are able to apply their skills and knowledge to solve real-world problems in various industries such as healthcare, finance, entertainment, education, and more.

- The AI & ML specialization aims to provide students with a deep understanding of the algorithms, techniques, and frameworks used in developing intelligent systems, and to equip them with the skills to apply these techniques to real-world problems. Students will learn to design, develop, and optimize algorithms for tasks such as image and speech recognition, natural language processing, and robotics. They will also be able to apply machine learning techniques to analyze complex data and extract valuable insights.

- The DS & CS specialization aims to provide students with a comprehensive understanding of the theories, principles, and practices of data science and cyber security. Students will learn to design and implement data mining and visualization techniques to extract insights from large datasets, and to develop effective cybersecurity strategies to protect computer systems and networks from cyber attacks.

Overall, the Bachelor of Computer Applications (Honors) program with specializations in AI & ML and DS & CS aims to produce graduates who are not only knowledgeable in the technical aspects of these fields but also have excellent problem-solving and communication skills, and a strong sense of ethical responsibility towards the society.
The program aims to prepare students for successful careers in the computing industry and to contribute positively to society through their work.

PROGRAM OUTCOMES

Upon completion of the Bachelor of Computer Applications (Honors) program with specializations in Artificial Intelligence (AI) & Machine Learning (ML) and Data Science (DS) & Cyber Security (CS), graduates will be able to:

- Apply the principles, concepts, and techniques of computer science, programming, and database management to solve complex problems in AI, ML, DS, and CS.
- Design, develop, and optimize intelligent systems using AI and ML techniques, and apply them to various domains such as image and speech recognition, natural language processing, and robotics.
- Analyze and interpret complex data using data mining and visualization techniques, and develop effective solutions to real-world problems in data science.
- Design and implement effective cybersecurity strategies to protect computer systems and networks from cyber attacks, and understand the ethical and legal implications of cybersecurity.
- Work effectively in teams, communicate effectively with stakeholders, and demonstrate ethical and professional responsibility in all aspects of their work.
- Continue their education through advanced degree programs in related fields, or pursue careers in various industries such as healthcare, finance, entertainment, education, and more.

Overall, graduates of the Bachelor of Computer Applications (Honors) program with specializations in AI & ML and DS & CS will be well-prepared to contribute positively to the society through their work, and to meet the growing demand for qualified professionals in these rapidly-evolving fields.

DEFINITIONS OF KEYWORDS

The following are the definitions & descriptions that have been followed for the different terms used in the Regulations governing Bachelor of Computer Applications (Honors) (ARTIFICIAL INTELLIGENCE (AI) & MACHINE LEARNING(ML) / DATA SCIENCE (DS) & CYBER SECURITY (CS))

1) **Branch:** Means Specialization or discipline of Bachelor of Computer Applications (Honors) (ARTIFICIAL INTELLIGENCE (AI) & MACHINE LEARNING(ML) / DATA SCIENCE (DS) & CYBER SECURITY (CS)).

2) **Semester:** Refers to one of the two sessions of an academic year, each session being sixteen weeks duration (with working days greater than or equal to ninety). The odd semester may be scheduled from July and even semester from January of the year.

3) **Academic Year:** Refers to the sessions of two consecutive semesters (odd followed by an even) including periods of vacation.

4) **Course:** Refers to usually referred to as 'papers' and is a component of a programme. All Courses need not carry the same weight. The Courses should define learning objectives and learning outcomes. A Course may be designed to comprise lectures/ tutorials/ laboratory work/ studio/case studies/field work/thesis/ outreach activities/project work/ professional training/ viva/ seminars/ term papers/assignments/ presentations/ self-study etc., or a combination of some of these.

5) **Credit:** Refers to a unit by which the Course work is measured. It indicates the relative importance of a given course.

6) **Audit Courses:** Means Knowledge/ Skill enhancing Courses without the benefit of a grade or credit for a Course.

7) **Choice Based Credit System (CBCS):** Refers to customizing the Course work, through Core, Elective and soft skill Courses, to provide necessary support for the students to achieve their goals.

8) **Course Registration:** Refers to formal registration for the Courses of a semester (Credits) by every student under the supervision of a Faculty Advisor (also called Mentor, Counselor etc.,) in each Semester for the Faculty to maintain proper record.

9) **Course Evaluation:** Means Progressive Evaluation [Continuous Internal Evaluation (CIE)] and Semester End Examinations (SEE) to constitute the major evaluations prescribed for each Course.

10) **Progressive Evaluation:** Refers to evaluation of students' achievement in the learning process. Progressive Evaluation shall be by the Course Instructor and includes tests, homework, problem solving, reviews/juries, periodical submissions, desk – crits (criticism), quiz, mini-project and seminar throughout the Semester, with weightage for the different components being fixed at the University level.

11) **Semester end examinations (SEE):** Refers to examinations conducted at the University level in each Course covering the entire Course Syllabus. SEE shall be conducted for Term work / Theory/Viva-voce.

12) **First Attempt:** Refers to a student who has completed all formalities and has become eligible to attend the SEE and has attended at least one head of passing, such attempt shall be considered as first attempt.

13) **Credit Based System (CBS):** Refers to quantification of Course work, after a student completes Project based learning process, followed by passing in both Progressive Evaluation and SEE. Under CBS, the requirement for awarding degrees is prescribed in terms of total number of credits to be earned by the students.

14) **Credit Courses:** All Courses registered by a student in a semester to earn credits. In a widely accepted definition, students must earn credits by registering and passing the courses.

15) **Letter Grade:** It is an index of the performance of students in a said Course. Grades are denoted by letters S, A, B, C, D, E and F.

16) **Grading:** Grade refers to a qualitative measure of achievement of a student in each Course, based on the percentage of marks secured in (Progressive Evaluation and SEE). Grading is done by Absolute Grading [Refer: 23SBCA5.0]. The rubric attached to letter grades are as follows: S – Outstanding, A – Excellent, B – Very Good, C – Good, D – Above Average, E – Average and F – Fail.

17) **Grade Point (GP):** Refers to a numerical weightage allotted to each letter grade on a 10- point scale as shown:
Letter Grade and corresponding Grade Points on a typical 10 – Point scale.
Letter Grade S A B C D E F   Grade Point 10 09 08 07 06 04 00

18) **Passing Standards:** Refers to passing a Course only when getting GP greater than or equal to 04 (as per serial number 17).

19) **Credit Point:** Is the product of grade point (GP) and number of credits for a Course i.e., Credit points CrP =GP×Credits for the Course.

20) **Semester Grade Point Average (SGPA):** Refers to a measure of academic performance of student/s in a semester. It is the ratio of total credit points secured by a student in various Courses of a semester and the total Course credits taken during that semester.

21) **Cumulative Grade Point Average (CGPA):** Is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points earned by a student in various Courses in all semesters and the sum of the total credits of all Courses in all the semesters. It is expressed up to two decimal places.

22) **Transcript or Grade Card or Certificate:** Refers to a certificate showing the grades earned by a student. A grade certificate shall be issued to all the registered students after every semester end examination. The grade certificate will display the programme details (Course code, title, number of credits, grades secured) along with SGPA of that semester and CGPA earned till that semester.

23) **University:** University of Mysore (UoM), Mysuru.

	Regulations Governing **BACHELOR OF COMPUTER APPLICATIONS** **(ARTIFICIAL INTELLIGENCE (AI) & MACHINE LEARNING (ML)/** **(DATA SCIENCE (DS) & CYBER SECURITY (CS))**
23SBCA1.0	**Title, Duration and Credits of the Programme of Study**
23SBCA1.1	The programme of study shall be called the Bachelor of Computer Applications (Honors) (ARTIFICIAL INTELLIGENCE (AI) & MACHINE LEARNING (ML)/ DATA SCIENCE (DS) & CYBER SECURITY (CS)) abbreviated as **BCA (Hons) (AI&ML/ DS&CS)**
23SBCA1.2	The BCA (Hons) (AI&ML/ DS&CS) programme shall be of four(4) academic year duration divided into eight semesters and each semester is of 16 weeks duration. The actual teaching and learning days shall be for at least 90 working days in a semester.
23SBCA1.3	The calendar of events of the programme of study shall be notified by the University.
23SBCA1.4	The University examination shall be conducted at the end of each semester for all the Eight semesters.
23SBCA1.5	**Maximum Duration for Programme Completion:** (a) Students admitted to Ist year **BCA (Hons) (AI&ML/ DS&CS)** shall complete the programme. No time limit is considered. (b) As per the UGC guidelines, there are multiple exit points for a candidate admitted in this course. (c) If he/she is completing all the eight semester successfully, he/she will get **BCA (Hons) (AI&ML/ DS&CS)** (d) If he/she is completing all the six semester successfully, he/she will get **BCA (AI&ML/ DS&CS)** (e) If he/she is completing the first four semesters successfully, he/she will get an **UnderGraduate Diploma (AI & ML / DS & CS).** (f) If he/she is completing the first two semesters he/she will get a **UnderGraduate Certificate (AI & ML / DS & CS).**

23SBCA1.6	Prescribed Number of Credits for the Programme: The number of credits to be completed by students admitted for (a) BCA (Hons) (AI&ML/ DS&CS) programme shall be **203** (b) BCA (AI&ML/ DS&CS) programme shall be **170 + 6** (c) **UnderGraduate Diploma** Computer Applications (AI&ML/ DS&CS) programme shall be **120 + 4** (d) **UnderGraduate Certificate** Computer Applications (AI&ML/ DS&CS) programme shall be **60 + 2**
23SBCA2.0	**ELIGIBILITY FOR ADMISSION (AS PER THE GOVERNMENT ORDERS ISSUED FROM TIME TO TIME)**
23SBCA2.1	**Admission to 1st Semesters (1st year) :** **for Level 5 and/or Undergraduate Certificate :** (a) who have passed the two year Pre-University examination conducted by the Karnataka State Pre-University Board with any discipline; or (b) who have passed 10+2 of the Central Board of Secondary Education (CBSE)or equivalent with any discipline; or (c) Who have passed any other examination recognized by the University as equivalent thereto. **Admission to 3rd Semesters (2nd year) :** **for Level 6 and/or Undergraduate Diploma :** (d) A candidate who has passed Undergraduate Certificate - (BCA(AL/ML or DS/CS) examination or first year Bachelor's degree examination in Bachelor of Engineering of University of Mysore or any other University considered as equivalent thereto is eligible for admission to this programme as lateral entry with passing marks in aptitude test conducted by the institute or, (e) who possess Three-Year Diploma in Computer Applications or equivalent recognized by Government of Karnataka, or any other State Government or Central Government thereto is eligible for admission to this programme as lateral entry with passing marks in aptitude test conducted by the institute or, (f) who possess Three-Year Diploma in any stream recognized by Government of Karnataka, or any other State Government or Central Government thereto is eligible for admission to this programme as lateral entry with passing marks in aptitude test conducted by the institute **Admission to 5th Semesters (3rd year) :** **for Level 7 and/or BCA (AI & ML or DS & CS) :** (g) A candidate who has passed Undergraduate Diploma - (BCA(AL/ML or DS/CS) examination or second year Bachelor's degree examination in Bachelor of Engineering of University of Mysore or any other University considered as equivalent thereto is eligible for admission to this programme with passing marks in aptitude test conducted by the institute. **Admission to 7th Semesters (4th year) :** **for Level 8 and/or BCA (Honors) (AI & ML or DS & CS) :** (h) A candidate who has passed BCA (AI/ML or DS/CS) examination of University of Mysore or any other University considered as equivalent thereto is eligible for admission to this programme with passing marks in aptitude test conducted by the institute. (i) A candidate who enters Level 5 in particular specialization shall select the same specialization in Level 6 and 7.

	(j) A Candidate who enters BCA (AI/ML or DS/CS) programme from a conventional bachelors degree programme has to clear attainment of competencies required for earlier 4 Levels through on-line or off-line mode, as a part of eligibility for admission to a chosenBCA (AI/ML or DS/CS) programme.

23SBCA2.2	The candidates shall have secured a minimum of 50 % of marks in aggregate in the qualifying examination. Provided that candidates belonging to Scheduled Castes and Scheduled Tribes and any other groups classified by the Government of Karnataka for such purpose from time to time shall be considered eligible for admission, if they have passed the qualifying examination giving eligibility for the admission with 45% of marks in aggregate.
23SBCA2.3	All the candidates are seeking admission to BCA. Hons. shall pass/qualify the **Aptitude Test in Bachelor of Computer Applications (ATBCA)** conducted by the institution or any specially designed aptitude test conducted by the Competent Authority of the Central / State Government or JEE Paper-I examination conducted by CBSE . This condition shall be fulfilled by all candidates including those belonging to Scheduled Castes, scheduled tribes and other classified groups.
23SBCA2.4	Those students, who have passed a qualifying examination other than the PUC II examination of the Pre-University Education Board of Karnataka, have to obtain an eligibility certificate for seeking admission to BCA. Hons. Programme from University of Mysore in association with AIIT
23SBCA2.5	Candidates admitted to the BCA Hons programme from other Diploma streams shall not be entitled to any exemption of any Course of the programme unless and otherwise specified in 23SBCA2.1
23SBCA3.0	**Courses**

23SBCA3.1	The course includes instructions on Probability & Statistics, Machine Learning with Pattern Recognition, Neural Network & Deep Learning, Data Visualization. Electives include courses from Swayam on topics of AI and ML .
	AML = AI & ML core Subjects; DAE = Engineering Subjects; HAP = Humanities and Psychology Subjects. Subject Categories:- GE = General Education; CEA = Cultural & Extracurricular Activities; SDC = Skill Development Components; OE = Optional Details will be as per the scheme.
23SBCA3.2	The minimum number of students registered to any Elective Course offered by the Department/College shall be not less than ten. However, the above condition shall not be applicable if the class strength is less than 10.

23SBCA3.3	A student shall exercise his option in respect of Elective Courses and register for the same at the beginning of the semester concerned. The student may be permitted to opt for a change of Elective Course within 15 days from the date of commencement of the semester as per the calendar of the University.
23SBCA3.4	**Course Registration:** Every student shall register for the Courses of a semester (Credits) under the supervision of a Faculty Advisor (also called Mentor, Counselor etc.,) in each Semester for the Institution to maintain proper record.
23SBCA4.0	**Study Tour, Professional Training**
23SBCA4.1	**Study Tour** A minimum of One study tours each of 4 to 10 days duration shall be completed, one before the end of each semester. The students have to submit a study tour report as group work (4 to 6 students per group) within 15 days after the end of the study tour. The reports shall be evaluated by the departments/ colleges for awarding the progressive mark of the Soft skills. The average marks obtained by a student in the two study tour reports shall be the progressive marks for the course Soft skills. The department/ college shall use its discretion about the choice of places and buildings to be visited for study tour. The study tour may include places of architectural interest in India or abroad. Students who cannot attend the study tour due to ill-health or any other compelling reasons shall undertake a study assignment in lieu of study tour.
23SBCA4.2	**Professional Training** At the end of sixth semester students shall undergo Professional Training for a period of 16+16 weeks under the supervision of a practicing architect. The students are permitted to carry out the professional training anywhere in India or abroad. Students opting to undergo training abroad shall work only under the Principal architect of firms registered with the local affiliating body of architects. The University/college will not provide any kind of financial assistance to any student for carrying out the professional training.

23SBCA4.3	The commencement of professional training shall be the date as notified by the University. The duration of professional training shall be counted from the date of commencement of the training.
23SBCA4.4	The students shall undergo professional training in an individual organization only. The change of office /firm shall be permitted only under extraordinary circumstances with due approval of the Principal/HoD.
23SBCA4.5	All the students shall submit the logbook, training report along with the training completion certificate duly signed by the Manager of the firm to the principal. The report shall comprise of certified printout of relevant work carried out during the training period.
23SBCA4.6	The college / department shall maintain the record of the students undergoing training in the form of a joint report, periodical log reports, etc.

23SBCA4.7	The candidates who have completed the Professional Training shall attend the viva-voce examination conducted by two University appointed examiners, one internal examiner and one external examiner. Each candidate shall produce the logbook, training report and training completion certificate duly signed by the Manager of the firm for the examiners.
23SBCA4.8	Failing to undergo Professional Training: Professional Training is one of the head of passing. Completion of 16+16 weeks training is mandatory. If a student fails to undergo/ complete the 16-week training, he/she shall be considered as fail in BCA.-Hons course and shall not be awarded the BCA-Hons. Degree. The student shall appear for the subsequent SEE in Professional Training after repeating and satisfying the conditions prescribed for Training. The reappearance shall be considered as an attempt.
23SBCA4.9	**BCA Project (Thesis)** The thesis project is the culmination of the learning under BCA. Hons. programme. The thesis provides an opportunity for the students to experiment with an innovative idea with comprehensive application of various aspects of software and digital development.
23SBCA5.0	**Computation of SGPA and CGPA**
23SBCA5.1	I. The University adopts an absolute grading system wherein the marks are converted to grades, and every semester results will be declared with semester grade point average (SGPA) and Cumulative Grade Point Average (CGPA). The CGPA will be calculated for every semester, except for the first semester. II. The grading system with the letter grades and the assigned range of marks under absolute grading system are as given Annexure - 1
23SBCA5.2	Grade Card: Based on the secured letter grades, grade points, SGPA and CGPA, the transcript for each semester and a consolidated transcript indicating the performance in all semesters shall be issued.
23SBCA6.0	**Conversion of CGPA into Percentage of Marks and Class Equivalence**
23SBCA6.1	Formula for the conversion of CGPA into percentage is as per Mysore University framework.
23SBCA7.0	**Progressive Evaluation and Semester End Examination**
23SBCA7.1	Progressive Evaluation marks and SEE marks (Theory / Term work /Viva voce marks), shall be as prescribed in the Scheme of Teaching and Examination.

23SBCA7.2	**Progressive Evaluation** The minimum Progressive marks to be secured by the students in all the courses shall be 50 % of the maximum marks prescribed for the Progressive Evaluation. (a) In case of theory courses which are mainly lecture based as per the scheme of teaching and examinations, the Progressive Evaluation marks shall be based on the average of three tests conducted covering the entire syllabus. In addition, the teacher may give assignments instead of tests which may include sketching, book reviews, write-ups etc. (b) In case of courses which are mainly studio based as per the scheme of teaching and examinations, the Progressive marks shall be the sum total of marks given to the various drawings (plates) submitted from time to time by a student on tracing sheets / drawing sheets or Computer printouts/sketches/ models on the basis of (c) internal reviews / juries / desk crits (criticisms). However, if the course teacher so desires, he/she shall give some weightage for time bound exercises/ problems / tests in these courses for the award of progressive marks. In a semester, two to three such time problems / tests may be conducted. (d) In the case of courses which are mainly practical based as per the scheme of teaching and examinations, the Progressive marks shall be based on the assignments submitted by the students. A minimum of three assignments per semester shall be given. (e) In all the above three cases, viz. lectured based, studio based, and term work-based courses the concerned teacher shall give a reasonable opportunity to the student to improve his / her Progressive marks for example by re-doing the assignments or attending an additional test etc., within the time frame of the given semester. (f) The Progressive marks in the case of Digital Architectural Design Project (Thesis) at the end of semester shall be based on the evaluation of the project work (Thesis) through internal reviews/juries and desk crits etc., in accordance with the scheme of teaching and examination.

23SBCA7.3	All the relevant records and submissions of students pertaining to Progressive Evaluation shall be preserved by the Principal/ Head of the Department for at least six months after the announcement of university results and shall be made available for verification at the direction of the University authorities.

23SBCA7.4	(a) Students failing to secure a minimum of 50 % of the Progressive marks and students who remain absent for all the Progressive Evaluation shall not be eligible for the examination conducted by the University and they shall be considered as fail in that/those Course/s. However, they can appear for university examinations conducted in other Courses of the same semester and backlog Course/s if any. (b) Improvement in progressive marks shall only be allowed during the subsequent semester when the course is offered as per the scheme of teaching. (The students can register for improvement of marks of odd semester subjects during odd semester only, similarly the registration for improvement of marks of even semester subjects shall be permitted during even semester only) (c) Students who have satisfied the attendance requirement but not the minimum progressive marks requirements shall be permitted to register afresh and appear for SEE after satisfying the progressive evaluation requirements in the same Course/s when the course is offered during subsequent semester/s. (d) Each appearance to SEE to complete a course shall be treated as an attempt. (e) Candidates shall register their names in their college for satisfying progressive marks requirements within 15 days from the commencement of the subsequent semesters during which the course is offered as per the scheme of teaching. The college shall get permission from UoM for such cases.
23SBCA7.5	The list of such candidates, who have not secured the minimum progressive marks, shall be sent to the University along with the submission of progressive marks of the successful candidates.
23SBCA7.6	Improvement of Progressive Evaluation marks shall not be allowed in case thestudent has already secured the minimum required marks.
23SBCA7.7	The final list, incorporating corrections (if any) of Progressive Evaluation marks awarded to the students in all the courses, shall be displayed on the notice board of the college at least seven days before the closure of the semester. The institution shall enter the progressive marks of each semester in the format of the UoM online/Offline CIE marks portal and submit a certified copy of the same to the University Examination Section within the stipulated date notified by University. Every page of the Progressive Evaluation marks sheet (hardcopy) shall bear the signatures of the concerned Teacher/Teachers, Head of the Department and Principal.
23SBCA7.8	Any corrections or overwriting of Progressive Evaluation marks shall bear the signature(s) of concerned Teacher(s) and in such cases the Head of the Department shall indicate the number of corrections on every sheet and attest it with his/her signature.

23SBCA7.9	Progressive Evaluation marks shall reach the University before the commencement of examination as per the notification from the office of the Registrar (Evaluation) from time to time. After the submission of Progressive Evaluation marks to the University, any request under any circumstances for change of Progressive Evaluation marks shall not be considered.
23SBCA7.10	**Semester End Examination and Passing standards** For a pass in a course (theory/viva voce/term work), a candidate shall secure a minimum 40 % in the University examination. (a) The University examination in Term work refers to the evaluation of complete course portfolios produced by students during a semester. (b) The Term work examination shall be conducted, in the absence of candidates, by internal and external examiners appointed by the University. (c) The viva voce examination, as per scheme of teaching and examination, shall be conducted by internal examiner (Course teacher /senior faculty/ visiting teacher working as full time or part-time teacher in an institution) and external examiners (a teacher or a professional not working in the same institution) appointed by the University. Consolidated marks shall be awarded by the examiners after a joint evaluation. (d) The viva voce examination, in the Digital Architectural Design Project (Thesis) shall be conducted by one internal and two external examiners, all appointed by the university. The maximum number of candidates assigned shall not exceed 10 per batch and 3 batches per day to a panel of examiners in a day. (e) Candidates shall be present in person for Digital Architectural Design Project (Thesis) examinations and submit the portfolio of works done (detailed set of drawings, sketches and models) during the semester and answer the queries of the examiners in respect of portfolio.
23SBCA7.11	(a) Students who obtain any grade from S to E in courses prescribed for only progressive marks and for both progressive and SEE marks shall be considered as passed the course. (b) If a student secures an F grade in any of the head of passing, he/she must reappear in that head for the SEE. The Progressive Evaluation marks awarded to the student/s at first attempt in the failed Course/s shall be carried forward.
23SBCA7.12	Students who pass a Course of a semester shall not be allowed to appear for any individual course again, unless they opt for rejection of results of the entire semester.
23SBCA7.13	A student may, at his/her desire, reject the total performance of a semester (including Progressive Evaluation marks) or reject the result of his/her performance in university examination of a semester only without rejecting the progressive marks. Rejection is permitted only once during the entire programme of study.
23SBCA7.14	The student who desires to reject the results of a semester shall reject performance in all the Courses of the semester, irrespective of whether the student has passed or failed in any Course. However, the rejection of performance of each semester Professional Training shall not be permitted.

23SBCA7.15	(a) Students, who desire to reject the total performance of a semester including Progressive Evaluation marks, have to repeat that odd or even semester of the prevailing scheme by taking readmission during the subsequent academic year/s. They shall also be governed by 23SBCA11.1 and 11.2.
	(b) If the rejection of SEE results excluding the progressive marks is of odd semester, students shall be allowed to take admission to the immediate next even semester. If the rejection of SEE results exclude the progressive marks is of even semester, then students shall not be allowed to take admission to the next odd semester as per 23SBCA9.2. In such cases, students shall take admission to the next odd semester of the prevailing scheme during the subsequent academic year/s, after obtaining the eligibility to move to higher semester. They shall also be governed by 23SBCA11.1 and 11.2.
	(c) Readmission to odd/even semester as per 23SBCA7.15 (i) and (iii) shall not be considered as fresh admission and therefore students shall continue to have the same University Seat Number, which was allotted earlier. The Course duration (as per 20OBCA1.5) will be counted with reference to old USN.
	(d) Applications for rejection and approval to reappear for university examinations shall be sent to the Registrar (Evaluation) through the Principal of the College within 30 days from the date of announcement of the results. Late submission of applications shall not be accepted for any reason.
	(e) Application for approval of readmission shall be sent to the Registrar through the Principal of College within 30 days from the date of the announcement of the results. Late submission of application shall not be accepted for any reasons.
23SBCA7.16	Students who opt for rejection of results of university examination are eligible for the award of degree but are not eligible for the award of ranks.
23SBCA8.0	**Attendance Requirement**
23SBCA8.1	Courses of each semester shall be treated as a separate unit for calculation of the attendance. The candidate has to put in a minimum attendance of 85% in each Course with a provision to condone 10% of the attendance by the Vice-Chancellor on the specific recommendations of the Principal of the college where the candidate is studying, based on medical grounds, participation in University/State/ National/ International level sports and cultural activities, seminars, workshops, paper presentation etc., of significant value.
20 BCA 8 . 1 (continued)	The supporting documents for condoning the shortage of attendance are to be submitted along with the recommendations. The basis for the calculation of the attendance shall be the period prescribed by the University by its calendar of events.
23SBCA8.2	The Course Instructor/ Mentor/College shall inform the students as well as their parents about the attendance status periodically. Students who are facing the shortage of attendance be mentored to make up for the shortage. Principals shall also notify monthly, the list of candidates who are short of attendance.

23SBCA8.3	A candidate who does not satisfy the attendance requirement (in one or more Courses) as mentioned in 23SBCA8.1 shall not be eligible to appear for the SEE of that semester and shall not be permitted to take admission to the next higher semester. The candidate shall be required to repeat that semester during the subsequent year.
23SBCA8.4	The list of the candidates falling short of attendance shall be sent to the Registrar (Evaluation) at least once in a month and the final list shall be sent one week prior to the commencement of the examination. The detained students should obtain permission from Registrar, UoM for readmission to the semester concerned as a repeater.
23SBCA9.0	**Vertical Progression (Promotion/ Eligibility to higher semesters)**

23SBCA9.1	(a) There shall be no restriction for promotion from an odd semester to the next even semester, provided the student has fulfilled the attendance requirement, except in the case of promotion from VI semester to VII semester.
	
	(b) A student shall be eligible for promotion from VII semester to VIII semester provided he/she has passed the course Professional Training of VII semester. If the candidate has not undergone the training/ discontinued after registration to training/not undergone the prescribed training period of 16 weeks/ failed in viva voce examination, he/ she shall repeat the Professional Training during again to appear for the SEE.
	
	(c) A student shall be declared fail if the candidate
	  (i) Fails to satisfy the minimum progressive marks conditions.
	  (ii) Absents himself / herself to the University examination.
	  (iii) Is held guilty of examination malpractice and for any other reasons and declared the performance of any Course/s null and void by a competent authority.
	  (iv) If a student secures F grade in any of the Course/s, he/she shall reappear in that Course/s during the subsequent SEE. The progressive marks awarded to the student at first attempt in the concerned Course/s shall be carried forward. Newly earned progressive marks is considered only incases of 23SBCA7.4.

23SBCA9.2	**Vertical Progression:** (a) Each credit Course shall be treated as a head of passing. (b) Students having not more than four F grades in the two semesters of the first year of the Programme shall be eligible to move to Year II. (c) Students having not more than four F grades in the four semesters of I and II year shall be eligible to move to III year. (d) Students having not more than four F grades in the six semesters of I, II and III years shall be eligible to move to IV year.
23SBCA10.0	**Award of Degree**

23SBCA10.1	(a) Students shall be declared to have completed the BCA (Hons) (AI&ML/ DS&CS) programme and shall be eligible for the award of BCA (Hons) (AI&ML/ DS&CS) degree, provided the students have undergone the stipulated Course work of all the semesters under the same Scheme of Teaching and Examination and has earned the prescribed number of credits as per the provision 23SBCA1.6.
	(b) [To be read along with 23SBCA11.1 and 11.2.]
	(c) If the students exits in 3 years, they shall be declared to have completed the BCA (Hons) (AI&ML/ DS&CS) , programme and shall be eligible for the award of BCA (Hons) (AI&ML/ DS&CS)) provided the students have undergone the stipulated Course work of all the semesters under the same Scheme of Teaching and Examination and has earned the prescribed number of credits as per the provision 23SBCA1.6. [To be read along with 23SBCA11.1 and 11.2.]
	(d) For the award of Hons., a CGPA ≥5.00 at the end of Programme shall be mandatory. [to be read with 23SBCA10.0 and 11.0]
23SBCA10.2	**Noncompliance of CGPA ≥ 5. 00 at the end of the programme**
	(a) Students who have completed all the courses of the programme but do not have a CGPA ≥ 5.00 at the end of the programme, shall not be eligible for the award of the degree. In such cases, students shall be permitted to appear again for SEE in course/s [other than Professional training and BCA Project (Thesis)] of any Semester/s without the rejection of progressive evaluation marks for any number of times, subject to the provision of maximum duration of the programme to make up the CGPA equal to or greater than 5.00 for the award of the Degree.
	(b) In case, the students earn improved grade/s in all the reappeared course/s, the CGPA shall be calculated considering the improved grade/s. If it is ≥ 5.00, the students shall become eligible for the award of the degree. If CGPA <5.00, the students shall follow the procedure laid in 23SBCA10.2 (a).
	(c) In case, the students earn improved grade/s in some course/s and the same previously earned pass grade/s in the other reappeared course/s, the CGPA shall be calculated considering the improved grade/s. If it is ≥ 5.00, the students shall become eligible for the award of the degree. If CGPA <5.00, the students shall follow the procedure laid in 23SBCA10.2 (a).
	(d) (d)In case, the students earn improved grade/s in some courses and fail in the other reappeared course/s, the CGPA shall be calculated by considering the improved grade/s and the previously earned pass grade/s of the reappeared course/s in which the students have failed. If it is ≥ 5.00, the students shall become eligible for the award of the degree. If CGPA <5.00, the students shall follow the procedure laid in 18OBA10.2 (a).
23SBCA10.2 (Continued)	(e) In case the students fail (i.e., earns F grade) in all the reappeared course/s, pass grade/s of the course/s earned by the students before reappearance shall be retained. In such cases, the students shall follow the procedure laid out in 23SBCA10.2 (a).
	(f) Students shall obtain written permission from the Registrar (Evaluation) to reappear in SEE to make up the CGPA equal to or greater than 5.00.

23SBCA11.0	**Temporary Discontinuation/Break in the Program**
23SBCA11.1	(a) If a candidate, for any reason, temporarily discontinues the Programme or takes a break from the Programme during any semester intentionally, he/ she shall be permitted to continue the Programme by registering for the same semester of the prevailing scheme. The candidate shall complete all the remaining Course work subject to the provision 23SBCA1.5. Also, the Candidates may have to complete additional Course/s, if any, as per the decision of Board of Studies and approval of Dean, Faculty of BCA (Hons) (AI&ML/ DS&CS) on establishing the equivalence between two schemes.
	(b) A Grade card shall be issued to that effect. Additional Course/s shall not be considered for the eligibility criteria prescribed for promotion. However, based on the individual cases, they shall be considered to decide the SGPA and CGPA to admit the student for the award of degree. Such candidates shall not be eligible for the award of rank.
	(c) Candidates who take admission to any semester of the existing scheme from another scheme, as a repeater/fresher because of various reasons, including the case of 23SBCA11.1(a),
23SBCA11.1 (Continued)	shall attend and complete all the remaining semester/s of the Programme adhering to the regulations of the prevailing scheme, and shall complete additional Course/s, if any, as per the decision of Board of Studies in BCA (Hons.) and approval of Dean, Faculty of BCA (Hons) (AI&ML/ DS&CS) , on establishing the equivalence between two schemes.
	(a) A Grade card shall be issued to that effect. Additional Courses shall not be considered for the eligibility criteria prescribed for promotion. However, based on the individual cases, they shall be considered to decide the SGPA and CGPA to admit the student for the award of degree. Such a candidate shall not be eligible for the award of rank.
	(b) The credits to be earned by the candidates under 23SBCA11.1 (a and b) and BCA13.1 (b) and (c) shall be decided by the University along with the additional Course/s to be completed.
23SBCA11.2	(a) The candidates who have temporarily discontinued the Programme of study or changed the scheme of study from one to another because of various reasons, or transferred from autonomous/other University to non- autonomous UoM affiliated college, shall be eligible for the award of degree provided the credits earned is equal to or greater than the credits decided by the University in the individual cases.
	(b) In case, the credits earned is less than the credits decided by the University in the individual cases, after the completion of all the semesters of the Programme under the prevailing scheme, the candidate shall register for a Course or courses not studied earlier and make up the credits earned equal to or greater than the required for the award of degree.
23SBCA12.0	**Award of Prizes, Medals and Ranks**
23SBCA12.1	For the award of Prizes and Medals, the conditions stipulated by the Donor shall be considered subject to the provisions of the statutes framed by the University for such awards.

23SBCA12.2	(a) For award of rank in BCA (Hons.) the CGPA secured by the students from I to VIII semester shall be considered.
	(b) A student shall be eligible for a rank at the time of award of BCA (Hons) (AI&ML/ DS&CS), provided the student
	(i) Has passed I to VIII semester in all the Courses in first attempt only. Is not a repeater in any semester because of rejection of result of a semester/ shortage of attendance etc.
	(ii) Has completed all the semesters without any break/discontinuity.
	(iii) Has completed all the semesters (I to VIII) in UoM constituent college or in any UoM affiliated non-autonomous college.
	(iv) Has not been transferred from any autonomous institution affiliated to UoMor from any other University.
	(c) The total number of ranks awarded shall be 10% of the total number of students appeared in VIII semester subject to a maximum of 10 ranks.
	(d) Illustration:
	(i) If 1333 students appeared for the VIII semester BCA (Hons) programme, the number of ranks to be awarded shall be 10.
	(ii) If 90 students appeared for the VIII semester BCA (Hons) programme, the number of ranks to be awarded shall be 09.
	(e) In case of fractional number of ranks, it is rounded to higher integer only
23SBCA12.3	Ranks are awarded based on the merit of the students as determined by CGPA. If two or more students get the same CGPA, the tie shall be resolved by considering the number of times a student has obtained higher SGPA. If it is not resolved even at this stage, the number of times a student has obtained higher grades like S, A,B etc., shall be taken into account to decide the order of the rank.
23SBCA13.0	**Transfers of Students**
23SBCA13.1	Transfer of students from one college to another college within the Karnataka state shall be permitted only at the beginning of third, and fifth, semesters, subject to availability of seats within the permitted intake in respective colleges and subject to the prior approval of the University.
	Transfer of students from one non - autonomous to another non – autonomous college affiliated to UoM is permitted with the approval of the Registrar, UoM subject to provision 23SBCA9.2.
	The students seeking transfer shall have to
	(i) Obtain No Objection certificate for admission from the University and from both the colleges before the commencement of term as notified by UoM.
	(ii) Complete the Programme subject to the provision 23SBCA1.5.
	Transfer of students from an autonomous to non – autonomous college, affiliated toUoM is permitted with the approval of the Registrar, UoM provided the candidates have passed in all the Courses of the previous semesters.

23SBCA13.1	**The students seeking transfer shall have to** (i) Obtain No Objection certificate for admission from the University and from both the colleges before commencement of term as notified by UoM. (ii)Complete additional Course/s, if any, as per the decision of concerned Board of Studies and approval of Dean, Faculty of BCA (Hons) (AI&ML/ DS&CS) on establishing the equivalence between two schemes. A Grade card shall be issued to that effect. Additional Course/s shall not be considered for the Eligibility criteria prescribed for promotion, Class, calculation of SGPA and CGPA. However, a pass in the additional Courses, if any, is mandatory before the completion of Degree. (iii) Earn the credits decided by the University as per 23SBCA11.2.
23SBCA13.1 (Continued)	**The students seeking admission from other Universities to UoM shall have to** (i)Apply for establishment of equivalence with prescribed fees as notified by the UoM and obtain No Objection certificate for admission from the University before the commencement of term as notified by UoM. (ii) Produce No Objection certificate for admission from both the colleges before the commencement of term as notified by UoM. (iii) Complete additional Course/s, if any, as per the decision of concerned Board of Studies and approval of Dean, Faculty of **BCA (Hons) (AI&ML/ DS&CS)**, on establishing equivalence between two schemes. A Grade card shall be issued to that effect. Additional Course/s shall not be considered for the eligibility criterion prescribed for promotion, Class, calculation of SGPA and CGPA. However, a pass in the additional Courses, if any, is mandatory before the completion of Degree. (iv) Earn the credits decided by the University as per 23SBCA 11.2.
23SBCA13.2	The University may prescribe a fee for administrative purpose, which shall be notified from time to time, for transfer from one college to another (Change of College).
23SBCA14.0	**Applicability and Power to Modify**
23SBCA14.1	The regulations governing the **BCA (Hons) (AI&ML/ DS&CS)** of University of Mysore shall be a binding on all
23SBCA14.2	i) Notwithstanding anything contained in the foregoing, the University shall have the power to issue directions/ orders to address any difficulty. ii) Nothing in the foregoing may be construed as limiting the power of the University to amend, modify or repeal any or all of the above.

ANNEXURE 1

Letter Grade	Grade Point
O (Outstanding)	100
A+ (Excellent)	90-99
A (Very Good)	80-89
B+ (Good)	70-79
B(Above Average)	60-69
C (Average)	50-59
P(Pass)	40-49
F(Fail)	Below 40
Ab(Absent)	0

Note

- A student obtaining Grade I shall be considered failed and will be require to reappear in the examination

- For non-credit courses Satisfactory or "Unsatisfactory shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA

- The formula for conversion of Grade Point Average (GPA) into the Final Grade

Sl. No.	Mark From	Mark To	Grade	Grade Value	Advantage	Fail
1	0	42	F	0	No	Yes
2	43	50	E	5	No	No
3	5	60	D	6	No	No
4	61	70	C	7	No	No
5	71	80	B	8	No	No
6	81	90	A	9	No	No
7	91	100	S	10	No	No

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

BCA (Honors) Artificial Intelligence (AI) & Machine Learning (ML)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Mathematical Foundation for AI-ML	4	2	0	6	2	50	50		100	6
2		SDC	Introduction to C Programming	0	4	4	8			50	50	100	6
3		SDC	Computer Networks	0	4	4	8			50	50	100	6
4		SDC	Fundamentals of Computers	2	2	0	4	2	50	50		100	4
5		SDC	Elective	0	3	0	3			100		100	3
6		GE	SOFT SKILL-TECHNICAL READING, WRITING AND PEER TEACHING-I	2	1	0	3	2	50	50		100	3
7		GE	LIFE SKILL AND PUBLIC SERVICES-I	0	1	2	3			50	50	100	2
8		CEA	Yoga, Sports & Culture	0	1	0	1			100		100	1
			Total	**8**			**36**		**150**	**500**	**150**	**800**	**31**
	No. of subjects/Heads			8	No. of Theory Examinations =3								

HAP = Humanities and Psychology subjects

Subject Categories :   **GE** = General Education   **CEA** = Cultural & Extracurricular Activities   **SDC** = Skill Development components   **OE** = Optional Elective

Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

BCA (Honors) Artificial Intelligence (AI) & Machine Learning (ML)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Statistical Foundation	4	2	0	6	2	50	50		100	6
2		SDC	Python-Programming	0	4	4	8			50	50	100	6
3		SDC	Introduction to Data Structures & Algorithms	0	4	4	8			50	50	100	6
4		SDC	DBMS with SQL	2	2	0	4	2	50	50		100	4
5		OE	Open Elective	0	3	0	3			100		100	3
6		GE	SOFT SKILL-TECHNICAL READING, WRITING AND PEER TEACHING-II	2	1	0	3	2	50	50		100	3
7		GE	LIFE SKILL AND PUBLIC SERVICES-II	0	1	2	3			50	50	100	2
8		CEA	Yoga, Sports & Culture	0	1	0	1			100		100	1
			Total	**8**			**36**		**150**	**500**	**150**	**800**	**31**
		No. of subjects/Heads		8	No. of Theory Examinations =3								
HAP = Humanities and Psychology subjects													
Subject Categories : **GE** = General Education **CEA** = Cultural & Extracurricular Activities **SDC** = Skill Development components **OE** = Optional Elective													
Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each													
Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.													

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

BCA (Honors) Artificial Intelligence (AI) & Machine Learning (ML)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Probability and Statistics	4	2	0	6	2	50	50		100	6
2		SDC	Introduction to Artificial Intelligence	0	4	4	8			50	50	100	6
3		SDC	Data Mining	0	4	4	8			50	50	100	6
4		SDC	Digital Image Processing	2	2	0	4	2	50	50		100	4
5		OE	Open Elective	0	3	0	3			100		100	3
6		GE	SOFT SKILL-TECHNICAL READING, WRITING AND PEER TEACHING-III	2	1	0	3	2	50	50		100	3
7		GE	LIFE SKILL AND PUBLIC SERVICES-III	0	1	2	3			50	50	100	2
8		CEA	Yoga, Sports & Culture	0	1	0	1			100		100	1
			Total	**8**			**36**		**150**	**500**	**150**	**800**	**31**
		No. of subjects/Heads		8	No. of Theory Examinations =3								

HAP = Humanities and Psychology subjects

Subject Categories :   **GE** = General Education   **CEA** = Cultural & Extracurricular Activities   **SDC** = Skill Development components   **OE** = Optional Elective

Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

BCA (Honors) Artificial Intelligence (AI) & Machine Learning (ML)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Machine Learning Fundamentals	4	2	0	6	2	50	50		100	6
2		SDC	Cloud Computing	0	4	4	8			50	50	100	6
3		SDC	Web Technology Fundamentals	0	4	4	8			50	50	100	6
4		SDC	Cyber Law & Information Security	2	2	0	4	2	50	50		100	4
5		OE	Open Elective	0	3	0	3			100		100	3
6		GE	SOFT SKILL-TECHNICAL READING, WRITING AND PEER TEACHING-IV	2	1	0	3	2	50	50		100	3
7		GE	LIFE SKILL AND PUBLIC SERVICES-IV	0	1	2	3			50	50	100	2
8		CEA	Yoga, Sports & Culture	0	1	0	1			100		100	1
			Total	**8**			**36**		**150**	**500**	**150**	**800**	**31**
		No. of subjects/Heads		8	No. of Theory Examinations =3								

HAP = Humanities and Psychology subjects

Subject Categories : **GE** = General Education **CEA** = Cultural & Extracurricular Activities **SDC** = Skill Development components **OE** = Optional Elective

Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

BCA (Honors) Artificial Intelligence (AI) & Machine Learning (ML)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Introduction to Natural Language Processing	4	2	0	6	2	50	50		100	6
2		SDC	AI with Expert Systems	0	4	4	8			50	50	100	6
3		SDC	Neural Network and Deep Learning	2	2	0	4	2	50	50		100	4
4		SDC	Capstone Project	0	2	8	10			50	50	100	6
5		OE	Open Elective	0	3	0	3			100		100	3
6		CEA	Yoga, Sports & Culture	0	1	0	1			100		100	1
			Total	**6**			**32**		**100**	**400**	**100**	**600**	**26**
	No. of subjects/Heads			6	No. of Theory Examinations =2								
	HAP = Humanities and Psychology subjects												
	Subject Categories : **GE** = General Education **CEA** = Cultural & Extracurricular Activities **SDC** = Skill Development components **OE** = Optional Elective												
	Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each												
	Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.												

BCA (Honors) Artificial Intelligence (AI) & Machine Learning (ML)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		SDC	Machine Learning with Pattern Recognition	4	2	0	6	2	50	50		100	6
2		SDC	NLP and Information Retrieval	0	4	4	8			50	50	100	6
3		SDC	Optimization Techniques	2	2	0	4	2	50	50		100	4
4		SDC	Capstone Project		2	8	10			50	50	100	6
5		OE	Open Elective	0	3	0	3			100		100	3
6		CEA	Yoga, Sports & Culture	0	1	0	1			100		100	1
			Total	**6**			**32**		**100**	**400**	**100**	**600**	**26**
		No. of subjects/Heads		6	No. of Theory Examinations =2								
			HAP = Humanities and Psychology subjects										
		Subject Categories : **GE** = General Education **CEA** = Cultural & Extracurricular Activities **SDC** = Skill Development components **OE** = Optional Elective											
		Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each											
		Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.											

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

BCA (Honors) Artificial Intelligence (AI) & Machine Learning (ML)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		GE	Internship			0						100	12
2		GE	Internship Report	0	0	6	6			50	50	100	6
			Total	0					0			200	18
No. of subjects/Heads				2	No. of Theory Examinations =0								
HAP = Humanities and Psychology subjects													

Subject Categories :   **GE** = General Education   **CEA** = Cultural & Extracurricular Activities   **SDC** = Skill Development components   **OE** = Optional Elective

Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each

Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.

SCHEME(2022-2023) OF PROJECT BASED LEARNING AND EXAMINATION

BCA (Honors) Artificial Intelligence (AI) & Machine Learning (ML)

SN	Subject Code	Subject Category	Title of subject	Teaching Scheme in Periods per Week (60 mins)				Examination Scheme					
				Lecture (L)	Tutorials (T)	Practicals (P)	Total Hrs	Duration (Hrs)	Theory Marks	Prog/CIE Marks	Viva Marks	Total	Credits
1		GE	THESIS	0	3	24	27			50	50	100	15
			Total	0					0			100	15
No. of subjects/Heads				1	No. of Theory Examinations =0								
HAP = Humanities and Psychology subjects													
Subject Categories : GE = General Education CEA = Cultural & Extracurricular Activities SDC = Skill Development components OE = Optional Elective													
Minimum Marks for passing: Progressive Marks 50%, Theory marks, Term work marks and Viva marks 40 % in each													
Progressive Marks to be awarded by the subject teacher. Term Work & Viva Voce examination shall be conducted jointly by one internal & and one external examiner appointed by the University.													

ACHARYA INSTITUTE FOR INNOVATION & TRANSFORMATION

Bachelor of Computer Applications (Hons)
(UNIVERSITY OF MYSORE)

SYLLABUS

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

March 2023

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
I				**MATHEMATICAL FOUNDATION FOR AI-ML**	6	90	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	4	2	0	50	50	0	100

Course Objectives

In order to be able to formulate what a computer system is supposed to do, or to prove that it does meet its specification, or to reason about its efficiency, one needs the precision of mathematical notation and techniques. For instance, to specify computational problems precisely one needs to abstract the detail and then use mathematical objects such as matrices, differentiation and integration To prove that a proposed solution does work as specified, one needs to apply the principles of mathematical logic, and to use proof techniques such as induction. And to reason about the efficiency of an algorithm, one often needs to count the size of complex mathematical objects. The Mathematics foundation course aims to provide this mathematical background.

Course Outcomes

After successful completion of this course, the student will be able to;

1. Have an idea about basic mathematical techniques which are necessary to analyze the statically technique.

2. Able to know the concept of matrices and its operations.

3. Able to complete the adjoint and determinant of a square matrix, hence it's inverse.

4. Capable of solving the simultaneous equations using matrix methods.

5. Understands the technique differentiation, integration and its applications.

UNIT- I

Matrix Algebra I: Introduction-Definition of Matrix-Various types of Matrices –Row Matrix- Column Matrix-Square Matrix-Rectangular Matrix-Scalar Matrix-Unit Matrix-Null Matrix- orthogonal Matrix-Addition of Matrices-Subtraction of Matrices-Multiplication of Matrices and their applications.

UNIT- II

Matrix Algebra II: Transpose of a Matrix-Symmetric Matrix-Skew Symmetric Matrix -Orthogonal Matrix - Singular Matrix - Non Singular Matrix - Determinant of a Matrix -Adjoint of a Square Matrix - Inverse of a Matrix up to 3 order only.

UNIT- III

Matrix Algebra III: Rank of a Matrix - Definition - To find Rank of a Matrix for a given Matrix.

Solutions of Linear equations: 1.Matrix inversion method 2.Cramer's Rule up to 3 order only

UNIT-IV

Numerical Integration, Finite Difference and Interpolation Numerical Integration :

1. Trapezoidal rule 2. Simpson's 1/3 rule 3.Simpson's 3/8 rule

Finite Difference and Interpolation:

Finite Differences - Forward Differences - Backward differences.

Newton's forward interpolation formula - Newton's backward interpolation formula.

UNIT-V

Set Theory : Definition of Set- Types of Sets-Union of Sets-Intersection of Sets-Venn diagrams- Operations on Sets-Complement of Set-Distributive Laws-De'Morgan's Laws

Note:

1. Concentration on numerical problems only.

2. Proofs of theorems and Derivations of expressions are omitted.

Text Books:

1. Mathematical Methods by Dr.T.K.V. Ivengar, Dr.B.Krishna Gandhi, Dr. S.Ranganatham, and

Dr.M.V.S.S.N. Prasad by S.Chand publications 6th revised edition 2011.

2. Quantitative Techniques by C.Satyadevi by S.chand Company

Reference Book:

1. Higher Engineering Mathematics by Dr.B.S.Grewal by Karna **publisher"s 34th edition.**

Web Resources:

1. *https://www.my-mooc.com/en/categorie/mathematics*
2. *http://www.nptelvideos.in/2012/11/discrete-mathematical-structures.html*
3. *https://ocw.mit.edu/courses/mathematics/*

SEME STER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
I				**FUNDAMENTALS OF COMPUTERS**	4	60	4
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	2	2	0	50	50	0	100

Course Outcomes (COs):
Introduction to computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers
Operating systems, functions of operating systems, classification of operating systems, kernel, shell, basics of Unix, shell programming, booting
Databases, why databases are used, users, SQL, data types in SQL, introduction of queries - select, alter, update, delete, truncate, using where, and or in not in
Internet basics, features, applications, services, internet service providers, domain name system, browsing, email, searching
Web Programming basics, introduction of HTML and CSS programming
Introduction of computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers.

UNIT- I
Fundamentals of Computers: Introduction to Computers - Computer Definition, Characteristics of Computers, Evolution and History of Computers, Types of Computers, Basic Organisation of a Digital Computer; Number Systems – different types, conversion from one number system to another; Computer Codes – BCD, Gray Code, ASCII and Unicode; Boolean Algebra – Boolean Operators with Truth Tables; Types of Software – System Software and Utility Software; Computer Languages - Machine Level, Assembly Level & High Level Languages, Translator Programs – Assembler, Interpreter and Compiler; Planning a Computer Program - Algorithm, Flowchart and Pseudocode with Examples

UNIT -II
Introduction to computers: Characteristics of computers, Classification of Digital Computer Systems: Microcomputers, Minicomputers, Mainframes, Supercomputers. Anatomy of Computer: Introduction, Functions & Components of a Computer, Central Processing Unit, Microprocessor, Storage units, Input and output Devices. How CPU and memory work. Program execution with illustrative examples. Introduction to microcontrollers.

UNIT -III
Operating System Fundamentals: Operating Systems: Introduction, Functions of an operating System, Classification of Operating Systems, System programs, Application programs, Utilities, The Unix Operating System, Basic Unix commands, Microkernel Based Operating System, Booting.

UNIT IV
Introduction to Database Management Systems: Database, DBMS, Why Database -File system vs DBMS, Database applications, Database users, Introduction to SQL, Data types, Classification of

SQL-DDL with constraints, DML, DCL, TCL

UNIT -V
Internet Basics: Introduction, Features of Internet, Internet application, Services of Internet, Logical and physical addresses, Internet Service Providers, Domain Name System.
Web Basics: Introduction to web, web browsers, http/https, URL, HTML5, CSS

Textbooks:
1. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition), BPB Publication
2. David Riley and Kenny Hunt, Computational thinking for modern solver, Chapman & Hall/CRC,
Reference:
1. J. Glenn Brook shear," Computer Science: An Overview", Addision-Wesley, Twelfth Edition,
2. R.G. Dromey, "How to solve it by Computer", PHI

PRACTICALS

Part A: Hardware
1. Identification of the peripherals of a computer, components in a CPU and their functions.
2. Assembling and disassembling the system hardware components of personal computers.
3. Basic Computer Hardware Troubleshooting.
4. LAN and WiFi Basics.
5. Operating System Installation – Windows OS, UNIX/LINUX, Dual Booting.
6. Installation and Uninstallation of Software – Office Tools, Utility Software (like Anti-Virus, System Maintenance tools); Application Software - Like Photo/Image Editors, Audio Recorders/Editors, Video Editors …); Freeware, Shareware, Payware and Trialware; Internet Browsers, Programming IDEs,
7. System Configuration – BIOS Settings, Registry Editor, MS Config, Task Manager, System Maintenance, Third-party System Maintenance Tools (Similar to Cleaner and Jv16 PowerTools …)
Part B: Software
1. Activities using Word Processor Software
2. Activities using Spreadsheets Software
3. Activities using Presentation Software
4. Activities involving Multimedia Editing (Images, Video, Audio …)
5. Tasks involving Internet Browsing
6. Flow charts: Installation and use of flow algorithms software for different arithmetic tasks like sum, average, product, difference, quotient and remainder of given numbers, calculate area of Shapes (Square, Rectangle, Circle and Triangle), arrays and recursion.

NOTE: In addition to the ones listed above, universities can include other activities so as for the student to become proficient in using personal computers for multiple purposes for which modern computers can be put to use.
Reference:
1. Computational Thinking for the Modern Problem Solver, By Riley DD, Hunt K.A CRC press, 2014
2. Ferragina P, Luccio F. Computational Thinking: First Algorithms, Then Code. Springer
Web References:
http://www.flowgorithm.org/documentation/

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
I				**C PROGRAMMING**	8	120	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	4	4	0	50	50	100

Course Objectives:

This course aims to provide exposure to problem-solving through programming. It introduces the concepts of the C Programming language.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand the programming languages and flow charts.
2. Apply logical skills to analyze a given problem
3. Develop an algorithm for solving a given problem.
4. Understand 'C' language constructs like Iterative statements, Array processing, Pointers, etc.
5. Apply 'C' language constructs to the algorithms to write a 'C' language program.

UNIT- I

Introduction to Algorithms and Programming Languages: Algorithm – Key features of Algorithms, Flow Charts, Programming Languages – Generations of Programming Languages Introduction to C: Introduction – Structure of C Program – Writing the first C Program – Files used in C Program – Compiling and Executing C Programs - Programming
Examples

UNIT -II

C Fundamentals : Keywords – Identifiers – Basic Data Types in C – Variables – Constants – I/O Operators in C – I/O Statements (scanf, printf)
Decision Control Statements: Introduction to Decision Control Statements – Conditional Branching Statements : simple if, if..else, nested if, switch statements – Programming Examples

UNIT -III

Iterative Control Statements: Iterative Statements – Nested Loops – Break and Continue Statement - Goto Statement
Arrays: Introduction – Declaration of Arrays – Accessing elements of the Array – Storing Values in Array – one dimensional array for inter-function communication – Two dimensional Arrays – two dimensional arrays for inter-function communication
Strings: Introduction – String operations – String functions

UNIT IV

Functions: Introduction – using functions – Function declaration/ prototype – Function definition – function call – return statement – Passing parameters – Scope of variables – Storage Classes – Recursive functions.
Structure and Unions: Introduction – Nested Structures – Arrays of Structures – Structures and Functions – Unions – Arrays of Unions Variables

UNIT -V

Pointers: Introduction to Pointers – declaring Pointer Variables - Passing Arguments to Functions using Pointer – Pointer and Arrays – Dynamic Memory Allocation
File Handling: Introduction to Files, File modes, File operations, Using Files in C, Reading Data from Files, Writing Data from Files, Detecting the End-of-file
Text Books:
1. Computer Fundamentals and Programming in C by Reema Thareja from Oxford University Press

Reference Books:

1. E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3.
2. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publ, 2002.
3. Yashavant Kanetkar - Let Us 'C' – BPB Publications.
4. Brain W Kernighan and Dennis M Ritchie - The 'C' Programming language - Pearson publications.

Web Resources:
1. http://algorithmsforinterviews.com "Algorithms for Interviews"

Write, and execute C program for the following:

1. to read radius of a circle and to find area and circumference

2. to read three numbers and find the biggest of three

3. to check whether the number is prime or not

4. to read a number, find the sum of the digits, reverse the number and check it for palindrome

5. to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers

6. to read percentage of marks and to display appropriate message (Demonstration of else-if ladder

7. to find the roots of quadratic equation

8. to read marks scored by n students and find the average of marks (Demonstration of single dimensional array)

9. to remove Duplicate Element in a single dimensional Array

10. to perform addition and subtraction of Matrices

11. to find factorial of a number

12. to generate fibonacci series

13. to remove Duplicate Element in a single dimensional Array

14. to find the length of a string without using built in function

15. to demonstrate string functions

16. to read, display and add two m x n matrices using functions

17. to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.

18. to Swap Two Numbers using Pointers

19. to demonstrate student structure to read & display records of n students

20. to demonstrate the difference between structure & union.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
I				**COMPUTER NETWORKS**	8	120	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	4	4	0	50	50	100

Course Outcomes:

After this course, the student will be able to

1. Identify the different components in a Communication System and their respective roles.

2. Describe the technical issues related to the local Area Networks

3. Identify the common technologies available in establishing LAN infrastructure.

UNIT- I:

Introduction to Network:- Definition, Applications, line configuration, Network topologies, Transmission mode, Types of Networks (LAN, WAN, MAN), Protocols, Network models: The OSI model, TCP/IP Protocol Suite.

Physical Layer: Signals –Analog signals, Digital signals, Transmission media - Guided & Un- Guided.

UNIT - II:

Network LAN Technologies: Ethernet, Fast Ethernet, Gigabit Ethernet, and Wireless LAN's. Data Link Layer: Error Detection and correction - Types of Errors, Error Detection, Error correction. Data link Protocols – Stop-and-wait ARQ, Go-back-n ARQ, Automatic Repeat Request (ARQ).

UNIT - III:

Network Devices: Modem, Hub, Switch, Router, Repeaters, bridges, Gateway.

Network Layer: Internetwork Protocol (IP), Addressing (Classes, Dotted-decimal notation, Sample Internet), Subnet mask, Network layer Protocols – ARP, IPv4, and IPv6.

UNIT -IV:

Transport Layer: TCP protocol, UDP protocol, Process-to-Process delivery, Congestion: Congestion control, congestion avoidance, congestion discarding, Quality of Service (QOS).

UNIT -V:

Application Layer: Domain Name System (DNS) - domain name space, distribution of name space, DNS in the Internet, SMTP, SNMP, FTP, POP3, HTTP, WWW.

1. Write a program for print the IP Address of a WWW.YAHOO.COM

2. Write a program to print the IP Address of the local machine and hostname.

3. Write HTML program to implement get( ) and post( ) methods

4. Write a program to identify the well known ports on a Remote system.

5. Write a program to print the parts of URL.

6. Write a program to send & receive data from a datagram packet.

7. Write a program for a chat application.

8. Write a program for the simple file transfer between two systems by opening socket connection to our server on one system and sending a file from one system to another.

9. Write a program for the HTTP server.

Text Books:

1. Data Communication and Computer Networks by Behrouz A. Forozoun, Published by Thomas casson, MC GRAW HILL 2nd edition.

References Books:

1. Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, 2003

2. An introduction to computer networks by PETER L DORODAL.

3. Communication networks by JEAN WAIRAND –WCB/MCGRAW HILL -1998, 2nd Edition.

4. Computer Networks by Bhushan Trivedi, Oxford University Press

5. Nader F. Mir, "Computer and Communication Networks", Pearson Education, 2007

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
I				**Communicative English**	3	45	3
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	3	0	0	100	0	100

Course Objectives:
° Learn Basics of Communication.
° Learn and develop the skills of writing, speaking, reading and listening.
° Know telephonic conversation skills, Interview skills and Group Discussion basics.
° Gain the knowledge and develop personality , soft skills ,presentation skills.
° To develop reading skills.

Course Outcomes:
° Inculcate Process of Communication and identify barriers in communication.
° Demonstrate the competency in English language through understandability and
practice in four skills of language such as writing, speaking, reading and listening.
° Develop skills for working in a team and individually.
° Inculcate soft skills and develop personality through participation in group discussion,
mock interview, group and individual presentation
° Practice reading skills in English language specific to eminent Indian Authors.

UNIT-I
The Process of Communication: Communication, the Process of Communication, Barriers of
Communication, Different Types of Communication, Characteristics and Conventions of
Conversation, Conversational Problems of Second/Foreign Language Users, Difference
Between Conversation and Other Speech Events

UNIT- II
Telephone Techniques: Speaking and Listening, Conference Calls, Vocabulary Building,
Writing, Grammar and Usage, Pronunciation, Job Applications and Interviews: Reading,
Curriculum Vitae, Preparing for an Interview, Listening and Speaking in the Interviews Group
Discussions: Group-Discussion, Study Skills, Language Focus, Speaking.

UNIT- III
Soft Skills Practice, Personality Development, Participating in Group Discussion and Job
Interviews, Time Management Presentation Skills, Leadership Skills, Assertiveness, Lateral
Thinking, Teamwork and Interpersonal Skills, Emotional Intelligence, Self-Confidence and
Courage, Attitude.

UNIT- IV

Speaking Skills and Presentation: Presentation Design and Delivery. Monologue Dialogue, Group Discussion. Effective Communication/ Mis-Communication. Interview, Public Speech. Effective Writing, Report Writing, Resume, Circular, Notice and letter Writing.

UNIT- V

Importance of English as a vehicle of Spoken and written Communication. Close Reading Comprehension Summary Paraphrasing Analysis and Interpretation. Translation (from Indian language to English and vice-versa). Introduction to Articles of eminent Indian authors. Short Stories of eminent Indian authors.

References:

° Darer. Shankar-Communication Skills in English Language

° Dr. Uremia Rai and S.M.Rai- Business Communication

° B. K. Das- an Introduction to Professional English and Soft Skills

° Barun K. Mitra- Personality Development and Soft Skills

° Shashikumar and Dhameja-Spoken English

° Raymond Williams- English Grammar

° Wren and Martin -English Grammar and Composition

° Justin Seeley -Designing Presentation

° Laura Bergelles- Public Speaking Foundations

° M.a.K. Halliday- Spoken and Written Language

° B Balasubramanian-Phonetics for Indian Students

° R C Sharma- Business Correspondence

° Dowel Jones- the Handbook of English Phonetics

° Merriam Webster - Guide to Business Correspondence.

° Ashish Singh - How to Communicate Effectively

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
1,2,3,4				**SOFT SKILLS-TECHNICAL READING, WRITING & PEER TEACHING**	3	45	3
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	2	1	0	50	50		100

AIM

The aim of the course on Soft Skill-Technical Reading, Writing, and Peer Teaching is to equip learners with the essential skills and knowledge needed to communicate effectively in technical settings. The course focuses on developing technical reading, writing, and peer teaching skills, as well as enhancing collaborative and team communication abilities.

OBJECTIVES

1. To understand the importance of effective technical communication in various settings, including the workplace and academic environments.
2. To develop critical technical reading skills that enable learners to identify key information, evaluate sources, and summarize and take notes effectively.
3. To enhance technical writing skills by developing an understanding of audience, purpose, document design, and clear and concise writing techniques.
4. To foster peer teaching skills by developing presentation and facilitation skills, providing effective feedback, and engaging in collaborative learning.
5. To develop an appreciation for visual communication techniques and accessible document design principles.
6. To enhance team communication and collaboration skills, including conflict resolution and collaborative writing and editing techniques.
7. To apply technical reading, writing, and peer teaching skills in a real-world project, presenting and evaluating final projects.
8. To encourage self-reflection and goal-setting for continued growth and development in technical communication skills.

By the end of the course, learners should be able to communicate technical information effectively, both in writing and in person, and engage in collaborative learning and teamwork effectively. They should also have a deeper understanding of document design, visual communication techniques, and accessibility principles.

OUTLINE

UNIT 1 - INTRODUCTION TO TECHNICAL COMMUNICATION
What is technical communication?, Importance of effective communication in the workplace, Overview of the course.

UNIT 2- TECHNICAL READING SKILLS
Active reading strategies, Identifying key information, Summarizing and note-taking techniques, Evaluating

sources.

UNIT 3- TECHNICAL WRITING SKILLS
Understanding audience and purpose, Organizing and structuring information, Writing clear and concise instructions, Editing and proofreading.

UNIT 4 - PEER TEACHING SKILLS
Understanding the benefits of peer teaching, Preparing and delivering effective presentations, Facilitating group discussions and activities, Providing feedback and evaluation.

UNIT 5- DOCUMENT DESIGN AND VISUAL COMMUNICATION
Basic principles of document design, Using visuals effectively (graphs, charts, images), Creating accessible and inclusive documents.

UNIT 6 - COLLABORATION AND TEAM COMMUNICATION
Communication in team environments, Handling conflicts and disagreements, Collaborative writing and editing.

UNIT 7 - FINAL PROJECT
Applying technical reading, writing, and peer teaching skills to a real-world project, Presenting and evaluating final projects.

UNIT 8 - WRAP-UP AND REFLECTION
Reviewing key concepts and skills learned, Reflecting on personal growth and development, Setting goals for continued improvement in technical communication.

OUTCOME
The course should help learners to communicate technical information more effectively and work collaboratively in team environments. They should also be able to apply the skills they have learned to future projects and continue to improve their technical communication abilities.

QUESTIONS
1. Why is effective technical communication important in the workplace?
2. What are some strategies for active technical reading and note-taking?
3. How can you tailor technical writing to your audience and purpose?
4. What are some techniques for organizing and structuring technical information effectively?
5. How can you provide constructive feedback to your peers during presentations or group discussions?
6. What are some basic principles of document design that can improve the effectiveness of technical documents?
7. How can you use visuals effectively to enhance understanding in technical documents?
8. What are some accessibility principles to consider when creating technical documents?
9. How can you collaborate effectively in team environments?
10. What are some techniques for resolving conflicts and disagreements within a team?
11. How can you apply technical reading, writing, and peer teaching skills to a real-world project?
12. How can you continue to develop your technical communication skills after the course is over?

REFERENCES

1. "Technical Communication" by Mike Markel
2. "The Elements of Technical Writing" by Thomas E. Pearsall
3. "Technical Writing: Principles, Strategies, and Readings" by Diana C. Reep and Laura J. Gurak
4. "The Essentials of Technical Communication" by Elizabeth Tebeaux and Sam Dragga
5. "Designing Visual Language: Strategies for Professional Communicators" by Charles Kostelnick and David D. Roberts
6. "Writing Science: How to Write Papers That Get Cited and Proposals That Get Funded" by Joshua Schimel
7. "Peer Power: Transforming Workplace Relationships" by Cynthia Clay and Ray Olitt
8. "Collaborative Writing in Industry: Investigations in Theory and Practice" by Rachel Spilka.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
1,2,3,4				**LIFE SKILL AND PUBLIC SERVICE**	3	45	2
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	1	2	0	50	50	100

AIM

Life skills directly influence student's careers and lives. Both UNESCO and WHO have listed major life skills. For being cognizant of their own as well as others' emotions, students must be in a position to empathize, communicate, and overcome challenges. Adjusting emotions as per the changing situations is the key to win-win outcomes.

OBJECTIVES

UNIT 1
Interpersonal skills:- By engaging themselves in design experiences, students may present their interpersonal skills. Listening closely to their faculty and friends and connecting with them and building a positive friendship will go a long way to ensuring the success of people and teams.

UNIT 2
Resilience:- It is unavoidable to suffer from mistakes. Nevertheless, perceiving mistakes as stepping stones and learning from them will undoubtedly assist in the improvement and growth of the student, this is done by design crits with eminent industry faculty practicing, who can critique the works of the student and establish the tolerant mindset. Feedback reception to enhance: This is an important part of the learning and development experience of the student. Students should be open to constructive criticism as this keeps them from being complacent and allows one to look sideways to address the problem.

UNIT 3
Cross-cultural sensitization:- It is compulsory for any student to engage in social services such as NSS, NCC, Bharat scouts and guides, NYKS, Air Force, Army and Navy, as this helps to foster harmony and a sense of belonging in the work world by returning to society.

UNIT 4
Time management:- As any task is time-bound in a fast-paced business environment, our progress depends to a great degree on our ability to effectively handle time. Our time management ability will be reflected in striking a study-life balance, grappling with managing schedules, coping with shifting interests, etc., and splitting the time between professional, social and physical activity will be a priority. Decision- making capability: To make a confident decision, it requires an analytical mind, information processing capacity and a rational judgment. This characteristic becomes increasingly more important for their position as one scales up the corporate ladder.

UNIT 5

Technical savviness:- It is imperative that students step up their understanding of technology as technology becomes an integral part of our life. Since our entire syllabus is focused on digitizing the education system, it is often helpful to be familiar with certain theoretical methods as well, aside from being well-versed with the technologies associated with their scope of work.

OUTCOME

- At the end of the such public service initiatives students are trained to lead a program and make quick decisions,
- Trained to equip volunteers with minimum required skills to carry out programmes.
- Equip themselves to work with others comfortably.
- Students would have learnt several other values such as selflessness, honesty, discipline, hard work and ways to build self-confidence and gain leadership qualities.

REFERENCES

1)   Life Skills Education Dr. K Ravikanth Rao,Dr. P Dinakar 2)Life Skills" Dr. Ali Khwaja.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
1,2,3,4,5,6				**YOGA, SPORTS AND CULTURE**	1	15	1
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	1		0	100	0	100

AIM

The positive impact of sports stretches far beyond the physical. Exercise and sporting activity can have significant knock-on effects on other areas of a student's academic performance. Our aim is to encourage students to engage themselves in a mainstream sports activity or cultural activity like dance to keep the students physically fit and give themselves an adrenaline rush to improve their divergent thinking and enhance them to think out of the box.

OBJECTIVES

Engage in any one or more sports activity or cultural activity, it can be any form of dance or martial art for a prescribed period of time on a daily basis.

To maintain a healthy BMI, that will be monitored on a timely basis and credits will be provided for the same.

OUTCOME

1) To achieve the following through the chosen sport-
2) Stay fit and healthy
3) Boost self-esteem
4) Reduce stress
5) Improve sleep
6) Develop leadership skills
7) Instill patience, discipline and perseverance
8) Credits will be given for well-maintained Body Mass Index achieved through sporting and cultural activities
9) Students will have to participate in any 2-district level, state level or national level competitions
10) This will lead to improved physical health, mental health, enhance team spirit and be a great stress buster.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
II				**STATISTICAL FOUNDATIONS**	6	90	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	4	2	0	50	50		100

Course Outcomes

1. Knowledge of Statistics and its scope and importance in various areas

2. Knowledge of various types of data in diagrammatic representation.

4. Knowledge of various types of data, their organization and evaluation of summary measures such as measures of central tendency and dispersion etc.

5. Insights into preliminary exploration of different types of data.

UNIT - I

Introduction to Statistics : Introduction of Statistics-Sources of data-techniques of data collection-primary data and secondary data-methods of collecting primary data and secondary data-classification of data-frequency distribution.

Diagrammatic and graphic representation : Bar diagrams-Pie charts-histogram-frequency polygon-ogive curves.

UNIT – II

Measures of Central Tendency: Introduction-features of good average-Arithmetic mean, merits and demerits-Arithmetic mean individual observation ,discrete series ,continuous series- Median, merits and demerits-Median individual observation ,discrete series ,continuous series-

UNIT - III

Measures of Dispersion I : Introduction-properties of a good measures of dispersion-methods of studying dispersion-Range, Quartile deviation, Mean deviation(MD), its merits and demerits, calculation for Individual observation, calculation on discrete and continuous Series.

UNIT - IV

Variance - Standard Deviation : Variance, its merits and demerits, calculation for Individual observation, calculation on discrete and continuous Series. Standard Deviation, its merits and demerits, calculation for Individual observation, calculation on discrete and continuous Series. Coefficient of Variation.

UNIT - V

Moments: Central and Non - Central moments, Sheppard's correction for moments for grouped data. Concept of Skewness, Karl pearson's coefficient of skewness, Bowley's Coefficient of skewness, kurtosis and their measures.

Note:

1. Concentration on numerical problems only.

2. Proofs of theorems and Derivations of expressions are omitted.

Text Books:

1. Statistical methods - S.P. Gupta.

2. Fundamentals of Mathematical Statistics - SC Gupta and V.K. Kapoor

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
II				**Python Programming**	8	120	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	4	4	0	50	50	100

Course Outcomes:

Upon successful completion of the course, a student will be able to:

1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.

2. Demonstrate proficiency in handling Strings and File Systems.

3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.

4. Interpret the concepts of Object-Oriented Programming as used in Python.

UNIT – I

Introduction to Python: Features of Python Language, installing Python, Environment Setup, python syntax, running a python script,

Python Programming basics: Literals, Data Types: Numeric data types: int, float, complex, string data type, python variables, Expressions, comment statements.

Operators-Arithmetic operators, Assignment operators, Comparison operators, Logical operators, Identity operators, Membership operators, Bitwise operators

UNIT-II

Standard I/O Operations, python casting

Control statements- Conditional branching: if, if-else, nested if, if-elif-else statements, Iterative statements: while loop, for loop, nested loops, pass statement, continue statement, break statement, and else statement used with loops, Programming using Python conditional and loops block

UNIT – III

Functions: Introduction, function definition, creating a function, Function Calling, declaration and defining functions, variable scope and lifetime, built-in functions

Sequences: Lists : Creating lists, accessing values in lists, list operations, Tuples : Creating Tuples, accessing values in Tuples, Tuple operations, Sets : Creating a set, accessing values in Set, Set operations, and Dictionaries: Creating a dictionary, Accessing values in Dictionary, Dictionary operations

UNIT – IV

Strings and Regular expressions: Introduction to strings, String operations, Built-in string methods and functions, comparing strings, Functions in regular expression.

Object Oriented Programming: Classes and Objects, Class method and self argument, The Init Method, Class Variables and Object Variables, The Del Method, Public and Private Data Members Private Methods, Built-In Functions to Check, Get, Set and Delete Class Attributes, Garbage Collection (Destroying Objects)

UNIT - V

Inheritance and polymorphism: Inheriting Classes in Python, Polymorphism and Method Overriding, Types of Inheritance, Composition/ Containership, Abstract Classes and Interfaces, Exception Handling: Introduction, Types of errors, Handling exceptions, multiple except blocks and multiple exceptions, finally block.

SUGGESTED PRACTICALS :

Write a program to perform different Arithmetic Operations on numbers in Python
2. Write a program to calculate mean of numbers
3. Write Python script to find mode of numbers
4. Write a Python program to find variance of the given values
5. Write a program to find length of the given string
6. Write a program to create, append, and remove lists in python.
7. Write a program to demonstrate working with tuples in python.
8. Write a program to demonstrate working with dictionaries in python.
9. Write a python program to find the largest of three numbers.
10. Write a Python script that prints prime numbers
11. Write a python program to find the factorial of a number using Recursion.
12. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
13. Write a python program to define a module and import a specific function in that module to another program.
14. Write a Python class to implement pow(x, n)
15. Write a Python class to reverse a string word by word.

Text Books:
1. "Reema Thareja", Python Programming using problem solving approach, First Edition, Oxford higher Education.
Reference Books:
1. Kenneth A. Lambert, Fundamentals of Python
2. James Payne, Beginning Python using Python 2.6 and Python 3
3. Charles Dierach, Introduction to Computer Science using Python

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
II				**DATABASE MANAGEMENT SYSTEMS**	4	60	4
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	2	2	0	50	50		100

UNIT - 1

Databases and Database Users: Introduction, An example, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using DBMS Approach, A Brief History of Database Applications, When Not to Use a DBMS. Database System Concepts and Architecture: Data Models, Schemas, and Instances, Three-schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client-Server Architectures, Classification of Database Management Systems.

UNIT – 2

Data Modeling Using Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design Company Database Diagrams, Naming Conventions and Design. Issues, File organization and storage, secondary storage devices, type of single level ordered index, multi-level indexes, indexes on multiple keys, other types of indexes.

UNIT – 3

Relational Model and Relational Algebra: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from SET Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra. Relational Database Design: Anomalies in a database, functional dependency, normal forms, lossless join and dependency, BCNF, normalization through synthesis, higher order normal forms. SQL- SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Specifying Constraints as Assertion and Trigger, Views(Virtual Tables) in SQL, Embedded SQL, Dynamic SQL,

UNIT – 4

Introduction to transaction processing, transaction and system concepts, desirable properties of transactions, transaction support in SQL. Concurrency control techniques: two-phase locking techniques, concurrency control based on timestamp ordering. Recovery techniques: recovery concepts, recovery in multi-database systems, database backup and recovery from catastrophic failures.

Text Books:
1. Elmasri and Navathe: Fundamentals of Database Systems, 7th Edition, Addison -Wesley, 2016.
2. Silberschatz, Korth and Sudharshan Database System Concepts, 7th Edition, Tata McGraw Hill, 2019.

References:
1. C.J. Date, A. Kannan, S. Swamynatham: An Introduction to Database Systems, 8th Edition, Pearson education, 2009
2. Database Management Systems :Raghu Ramakrishnan and Johannes Gehrke: , 3rd Edition, McGraw-Hill, 2003

PART A

1.   Draw E-R diagrams and convert entities and relationships to relation tables for a given scenario. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college)

Consider the Company database with following Schema

EMPLOYEE (FNAME, MINIT, LNAME, SSN, BDATE,ADDRESS,SEX,SALARY, SUPERSSN, DNO)

DEPARTMENT (DNAME, DNUMBER,MGRSSN,MSRSTARTDATE)

DEPT_LOCATIONS (DNUMBER, DLOCATION)

PROJECT (PNAME, PNUMBER, PLOCATION, DNUM)

WORKS_ON (ESSN, PNO<HOURS)

DEPENDENT (ESSN, DEPENDENT_NAME, SEX, BDATE, RELATIONSHIP)

2.   Perform the following:
    a.   Viewing all databases, Creating a Database, Viewing all Tables in a Database,

        Creating Tables (With and Without Constraints),

        Inserting/Updating/Deleting Records in a Table, Saving (Commit) and

        Undoing (rollback)

3.   Perform the following:

    a.   Altering a Table, Dropping/Truncating/Renaming Tables, Backing up /

    Restoring a Database.

4.   For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause).

5.   Execute the following queries

    a.   How the resulting salaries if every employee working on the 'Research' Departments is given a 10% raise.

    b.   Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department

6.   Execute the following queries
    a.   Retrieve the name of each employee Controlled by Department number 5 (use EXISTS operator).
    b.   Retrieve the name of each dept and number of employees working in each Department which has at least 2 employees

7.   Execute the following queries
    a.   For each project, retrieve the project number, the project name, and the number of employee who work on that project.(use GROUP BY)
    b.   Retrieve the name of employees who born in the year 1990's

8.   For each Department that has more than five employees, retrieve the department number and number of employees who are making salary more than 40000.

9.   For each project on which more than two employees work, retrieve the project number, project name and the number of employees who work on that project.

10.   For a given set of relation tables perform the following: Creating Views (with and without check option), Dropping views, Selecting from a view

PART B

Create the following tables with properly specifying Primary keys, Foreign keys and solve the following queries.

BRANCH (Branchid, Branchname, HOD) STUDENT
(USN, Name, Address, Branchid, sem)
BOOK (Bookid, Bookname, Authorid, Publisher, Branchid)
AUTHOR (Authorid, Authorname, Country, age) BORROW
(USN, Bookid, Borrowed_Date)

1. Perform the following:
    a.   Viewing all databases, Creating a Database, Viewing all Tables in a
    Database, Creating Tables (With and Without Constraints),
    Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing
    (rollback)
    Execute the following Queries:

2.   a. List the details of Students who are all studying in 2nd sem BCA.
       b. List the students who are not borrowed any books.

3.   a. Display the USN, Student name, Branch_name, Book_name, Author_name,
      Books_Borrowed_ Date of 2nd sem BCA Students who borrowed books.
       b. Display the number of books written by each Author.

4.   a. Display the student details who borrowed more than two books.
        b.Display the student details who borrowed books of more than one Author.

5.   a. Display the Book names in descending order of their names.
        b. List the details of students who borrowed the books which are all published by the same
        publisher.

      Consider the following schema:
      STUDENT (USN, name, date_of_birth, branch, mark1, mark2, mark3, total, GPA)

6.   Perform the following:
      a.   Creating Tables (With and Without Constraints),
      Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing
      (rollback)

7.   Execute the following queries:
       a. Find the GPA score of all the students.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
II				**Introduction to Data Structures & Algorithms**	8	120	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	4	4	0	50	50	100

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Understand how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.

2. Learn the benefits of dynamic and static data structures implementations

3. Design and develop various programs using data structures

4. Demonstrate different methods for traversing trees

5. Develop ability to implement different Sorting and Search methods

6. Understand the concept of recursion and how it can be implemented using a stack .

UNIT – I

INTRODUCTION TO DATA STRUCTURE: Definition, Data Types, Abstract Data Types (ADT), classification of data structure - primitive & non-primitive data structures, Linear and Non-linear data structures

ARRAYS: Definition, one dimensional array, two dimensional arrays, Applications, pointers. LINKED LIST: Definition, linked list ADT, single linked list, double linked list, circular linked list, comparison of linked list with Arrays.

UNIT – II

STACKS: Definition, Stack as an ADT & Operations on stack, Applications of stack, Representation of stack.

QUEUES: Definition, Queue as an ADT & Operations on Queue, Application of Queues, Representation of Queues, Various Queue Structures: circular Queue, DEQueue.

UNIT – III

TREES: Definition, Basic Tree Terminology. Binary Tree – Definition, Properties of Binary Trees, Types of Binary Trees, Representation of Binary Tree, Binary Tree Traversals.

Binary Search Tree (BST) – Definition, Operations on a Binary Search Tree, Examples of BST.

UNIT - IV

GRAPHS: Definition, Basic Graph Terminology, Representation of Graphs, Graph Traversal – DFS and BFS. Topological sort, Shortest Path problem, Minimum Spanning Tree.

UNIT – V

SORTING: Definition, Sorting methods - Bubble Sort, Selection Sort, Quick Sort, Insertion Sort, Merge Sort.

SEARCHING: Definition, searching methods - Linear or Sequential Search, Binary Search.

Text Books:

1. "Classic Data Structures ", by DEBASIS SAMANTHA 2nd EDITION, PHI publications , 2009

2. "Data Structures and Algorithms", by NARASIMHA KARUMANCHI , CAREERMONK Publications , 2017

Reference Books:

1. Data structures by Lipschutz, McGraw Hill Education

2. Fundamentals of Data Structures in C by Sahni Horowitz, University Press

3. Data Structures And Algorithms by Alfred V Aho and John E Hopcroft and Jeffrey D Ullman, Pearson Education

4. "Data Structures through C", Yashavant Kanetkar, BPB Publications

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
II				**Environmental Science**	3	45	3
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	3	0	0	100	0	100

Course Objectives:
° Build an understanding of the fundamental concepts of Environmental studies.
° Capability to identify relevant environmental issues, analyzes the various underlying
causes.

UNIT-I
The Multidisciplinary nature of environmental studies and Natural resources.
Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining,
dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, dams benefits
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources
Food resources: World food problems, changes caused by agriculture
and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity
Energy resources: Growing energy needs, renewable and non-renewable energy sources
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion.
UNIT-II
Ecosystems, Biodiversity and its Conservation.
Concept, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the
ecosystem, ecological succession, food chains, food webs and ecological pyramids.
Introduction, types, characteristic features, structure and function of the following ecosystem: - Forest
ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans,
estuaries). Biodiversity introduction-Definition: genetic, species and ecosystem diversity. Biogeographical
classification of India. Value of biodiversity: consumptive use, productive use,
social, ethical, aesthetic and option values, biodiversity at global, national and local levels,
UNIT-III
Environmental Pollution. Definitions. Causes, effects and control measures of:
(a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution
(e) Noise pollution (f) Thermal pollution (g) Nuclear hazards.
Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
UNIT-IV
Social Issues and the Environment. From Unsustainable to Sustainable development. Urban
problems related to energy. Water conservation, rain water harvesting, watershed management.
Resettlement and rehabilitation of people; its problems and concerns. Case studies.
Environmental ethics: Issues and possible solutions. Climate change, global warming, acid
rain, ozone layer depletion, nuclear accidents and holocaust.
UNIT-V
Human Population and the Environment.Population growth, variation among
nations.Population explosion- Family welfare Programme.Environment and human health,
Human Rights, Value Education, HIV/AIDS, Women and Child Welfare.Role of information
Technology in Environment and human health, Case Studies.
References:
Environmental Studies For Undergraduate Courses - UGC e-Text book by
Erach Bharucha available at http://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
III				**PROBABILITY AND STATISTICS**	6	90	6
	L	T	P	THEORY	INTERNA L	PRACTICA L	TOTAL MARKS
	4	2	0	50	50		100

Course Outcomes
After successful completion of this course, the student will be able to;
1. Able to know the concepts of set theory and operations in sets.
2. Knowledge to conceptualize the probabilities of events including frequent and axiomatic approach. Simultaneously, they will learn the notion of conditional probability.
3. Knowledge related to concept of discrete and continuous random variables and their probability distributions including expectation and moments,
4. Knowledge related to the concept of random variable, Probability mass function and probability density function.
5. Knowledge related to the concept of Mathematical expectation.

UNIT - I
Set theory for Probability: Definition of Set- Types of Sets-Union of Sets-Intersection of Sets- Venn diagrams-Operations on Sets-Complement of Set-Distributive Laws-De'Morgan's Laws

UNIT - II
Introduction to Probability: Basic concepts of Probability, random experiment, trial, outcome, sample space, event, mutually exclusive event, equally likely events, favorable events, classical, statistical and axiomatic definitions of probability.

UNIT - III
Probability theorems: Conditional probability, Independent events Addition and multiplication theorems of probability for 2 events (Statement and proof), Addition and multiplication theorems of probability for n events statements only, Bayees theorem Statement and its applications.

UNIT - IV
Random variable: Definition of Random variable, discrete and continuous random variables, functions of random variable, probability mass function, probability density function, distribution function and its properties, For a given probability mass function calculation of mean and variance, For a given probability density function calculation of mean and variance.

UNIT-V
Mathematical expectation : Mathematical Expectation of random variable and function of random variable, Moments and covariance using mathematical expectation, with examples. Addition and multiplication theorem on expectation. Definitions of M.G.F, P.G.F,C.F and their properties, and applications

Note:
1. Concentration on numerical problems only.
2. Proofs of theorems and Derivations of expressions are omitted.
Text Book:
1. Statistical Methods by S.P.Gupta.
2. Fundamentals of Mathematical Statistics - S.C. Gupta & V.K.Kapoor.
Reference Books:
2. Fundamentals of statistics - Goon, Gupta and Das Gupta.

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
III				**Digital Image Processing**	4	60	4
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	2	2	0	50	50	0	100

Image Representation and Properties:
Introduction - Image Representation - Image Digitization - Digital Image Properties – Discrete Fourier Transform - Image Pre-Processing in Spatial and Frequency Domain: Pixel Brightness Transformation - Geometric Transformations - Local Preprocessing - Image Smoothing – Edge Detectors - Corner Detectors - Image Restoration.
Image Segmentation:
Thresholding – Edge- Based Segmentation – Region Based Segmentation, Mean shift segmentation, Graph cut algorithm– Matching – Evaluation Issues in Segmentation, Watersheds.
Color Image Processing:
Color Fundamentals – Color Models – Pseudocolor Image Processing – Basics of Full Color Image Processing – Color Transformations – Smoothing and Sharpening – Color Segmentation – Noise in Color Images.

TEXT BOOKS / REFERENCES:
1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Third Edition, Pearson Education, 2009.
 2. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and Machine Vision", Third Edition, Cengage Learning, 2007.
3. William K. Pratt, "Digital Image Processing", Fourth Edition, Wiley Interscience, 2007.
4. Anil K Jain, "Fundamentals of Digital Image Processing", Prentice Hall, 1989.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
III				**INTRODUCTION TO ARTIFICIAL INTELLIGENCE**	8	120	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	4	4	0	50	50	100

Course Objective:
1. To illustrative description of the inherent principles of AI, eliminating heavy mathematical treatment
2. To introduce the concept of swarm intelligent systems
3. To extensive the coverage of neural networks and fuzzy logic concepts
4. To understand basic concepts and working of generic algorithms.
5. To understand the concept of artificial neural networks.

Syllabus
Unit I
Introduction to soft computing, Need for Artificial Intelligence, Artificial Neural Networks , Fuzzy Systems, Genetic Algorithm and Evolutionary Programming, Swarm Intelligent Systems, Swarm Intelligent Systems, Comparison among Intelligent Systems
Unit II
Artificial Neural Networks- I: Introduction to Neural Networks, Biological Inspiration, Comparison between Brain and Computer, Biological Neural Networks to Artificial Neural Networks, Information Processing at the Neurons and Synapses, Classification of ANNs, Neural Network Architecture, Learning/Training, Training and Testing Modes, Activation/Transfer Function, First-generation Neural Networks, McCulloch and Pitts Neuron Model, Learning Rules: Hebbian and Delta, Perceptron Network , Adaline Network , Madaline Network
Unit III
Artificial Neural Networks- II: Backpropagation Neural Networks, Kohonen Neural Network, Learning Vector Quantization, Hamming Neural Network, Hopfield Neural Network, Bi-directional Associative Memory, ART Network, Boltzman Machine Neural Networks , Radial Basis Function Neural Networks, Support Vector Machines.
Unit IV
Fuzzy Logic: Fuzzy Logic Introduction, Human Learning Ability, Undecidability,Imprecision, and Uncertainty, Probability Theory vs Possibility Theory, Fuzzy sets and Classical sets, Fuzzy set operations, Fuzzy relations, Fuzzy compositions, Natural Language and Fuzzy Interpretations, Structure of Fuzzy Inference System
Unit V
Genetic Algorithm: Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications
Text Books
1. "Soft Computing and Intelligent Systems Design: Theory, Tools and Applications" by Karray
Reference Books
1. "Soft Computing :Fundamentals And Applications" by Pratihar D K
2. "Soft Computing Applications and Intelligent Systems" by ShahrulAzman Noah and SitiNorul Huda Sheikh Abdullah
3. "Soft Computing and Its Applications, Volume Two: Fuzzy Reasoning and Fuzzy Control: Volume 2" by Kumar S Ray

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
III				**DATA MINING**	8	120	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	4	4	0	50	50	100

Course Objectives:
It presents methods for mining frequent patterns, associations, and correlations.
It then describes methods for data classification and prediction, and data–clustering approaches.
It covers mining various types of data stores such as spatial, textual, multimedia, streams.

Course Outcomes:
Ability to understand the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system.
Apply preprocessing methods for any given raw data.
Extract interesting patterns from large amounts of data.
Discover the role played by data mining in various fields.
Choose and employ suitable data mining algorithms to build analytical applications
Evaluate the accuracy of supervised and unsupervised models and algorithms.

UNIT - I
Data Mining: Data–Types of Data–, Data Mining Functionalities– Interestingness PatternsClassification of Data Mining systems– Data mining Task primitives –Integration of Data mining system with a Data warehouse–Major issues in Data Mining–Data Preprocessing.

UNIT - II
Association Rule   Mining: Mining Frequent Patterns–Associations and correlations – Mining Methods– Mining Various kinds of Association Rules– Correlation Analysis– Constraint based Association mining.
Graph Pattern Mining, SPM.

UNIT - III
Classification: Classification and Prediction – Basic concepts–Decision tree induction–Bayesian classification, Rule–based classification, Lazy learner.

UNIT - IV
Clustering   and   Applications: Cluster analysis–Types of Data in Cluster Analysis–Categorization of Major Clustering Methods– Partitioning Methods, Hierarchical Methods– Density–Based Methods, Grid–Based Methods, Outlier Analysis.

UNIT - V
Advanced Concepts: Basic concepts in Mining data streams–Mining Time–series data––Mining sequence patterns in Transactional databases– Mining Object– Spatial– Multimedia–Text and Web data – Spatial Data mining– Multimedia Data mining–Text Mining– Mining the World Wide Web.

TEXT BOOKS:
1. Data Mining – Concepts and Techniques – Jiawei Han & Micheline Kamber, 3rd Edition Elsevier.
2. Data Mining Introductory and Advanced topics – Margaret H Dunham, PEA.

 REFERENCE BOOK:
1. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005.

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
III, IV, V, VI				**ELECTIVE - [MULTI DISCIPLINARY]**	3	45	3
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	3	0	0	100	0	100

SWAYAM

Is India's national Massive Online Open Courses (MOOC) platform. It offers over 2,150 courses taught by close to 1,300 instructors from over 135 Indian universities and ITs. It allows students in India to earn academic credit online. Since the platform was launched in 2017, over 10 million learners have taken courses on SWAYAM.

SWAYAM is a program initiated by Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. SWAYAM seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy. This is done through an indigenous developed IT platform that facilitates hosting of all the courses, taught in classrooms from 9th class till post-graduation to be accessed by anyone, anywhere at any time.

SWAYAM offers

Best in class Instructors drawn from high-ranked Universities and IITs. Weekly Assignments to ensure students' progress in a timely manner. Easy Credit Transfer by complementing students' program Systematic Approach enabling students towards learning goals

Qualifying Certificates may, in turn, be used by students enrolled in India's higher education to earn academic credit for completing SWAYAM courses earmarked as credit-eligible by their universities. SWAYAM is supported by various industries such and as such the students undertaking the courses will have added advantage of ranking for placements. Laboratory facility will be allotted by the Course Coordinator depending on the available time-slots. For further information about how India is leveraging SWAYAM at the university level, please contact the Course Coordinator in the College and taking his guidance, register for the same.

Some of the suggested courses under SWAYAM for students to choose from are listed below:
1. Design and Analysis of Algorithms
2. Python for Data Science
3. Cloud Computing
4. Deep Learning for Visual Computing
5. Deep Learning for Computer Vision
6. Artificial Intelligence: Search Methods for Problem Solving
7. Robotics
8. Mobile Development
9. Java Programming

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
IV				**WEB TECHNOLOGY FUNDAMENTALS**	8	120	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	4	4	0	20	50	100

Course objectives/learning outcomes
1. Learn about Internet and its environment in making websites
2. Understand different components and technologies of the World Wide Web as a platform.
3. Design and develop web pages using various tags
4. Distinguish between server-side and client-side web technologies.
5. Describe various web technology and application development issues and trends.
6. Conduct independent research on a subject related to the course material.

UNIT -I
Introduction to Internet: Definition of Internet – History of Internet – Advantages & disadvantages of Internet – Tools of internet - How internet works. Introduction to WWW: Definition of WWW – WWW tools - Web Terminology – web browser – web server
E-Mail : Definition of e-mail – advantages & disadvantages of e-mail, message components

UNIT-II
Introduction to HTML: Basic HTML – HTML document structure – HTML tags – Basefont tag – title tag – body tag – Horizontal Rule Tag - Text formatting tags – Character tags - Character entities
HTML Lists : Ordered List , Unordered List & Definition List – Using colors – Using Images
Hyperlinks: Textual links, Graphical links, types of document links, anchor tag

UNIT -III
HTML Tables – table creations tags, Nested Tables
Frames: Frame introduction - frame creation tags – Nested Frames – Forms: Form Controls : textbox, button, password, checkbox, radio button, select, text area - Processing of forms

UNIT – IV
Introduction to Scripting: JavaScript Introduction - Simple Program - Obtaining User Inputs with Prompt Dialogs - variables – operators (arithmetic, relational, logical, increment and decrement). JavaScript – Control Statements: Introduction – conditional control statements (if, if…else, switch) – Repetitive statements (for, while, do…while) - break and continue Statements

UNIT – V
JavaScript Functions: Introduction - Program Modules in JavaScript - Programmer-Defined Functions - Function Definitions - Scope Rules - JavaScript Global Functions
Advanced HTML : Cascading Style Sheets (CSS): Introduction – Using Styles: As an attribute, tag & external file – Defining Your own styles – Properties and values : properties related to Fonts , Backgrounds & colors, text , boxes & borders

Suggested Practical Examples :

1. Create a simple HTML page which demonstrates all types of lists.
2. Create a letterhead of your college using following styles
3. image as background
4. use header tags to format college name and address
5. Create a web page, which contains hyperlinks like fruits, flowers, animals. When you click on hyperlinks, it must take you to a related web page; these web pages must contain related images.
6. Create a hyperlink to move around within a single page rather than to load another page.
7. Create a leave letter using different text formatting tags.
8. Create a table format given below using row span and colspan.
   RNO   NAME   MARKS
                  M1 M2 M3 M4 M5
   Insert 5 records.
9. Create a table with different formats as given below.
   i.Give different background and font colors to table header, footer and body.
   ii. Use table caption tag.
10. Divide a web page vertically and horizontally with scroll bars, name them as shown below decorate it with some items.
   F1   F2
   F3
11. Create a student Bio-Data, using forms.
12. Create a web page using following style sheets
   i. Inline style sheets.
   ii. Embedded style sheets.
   iii. External style sheets
    Create a web page by using html & CSS

Prescribed Books:
1. Chris Bates, Web Programming Building Internet Applications, Second Edition, Wiley.
2. Deitel & Deitel, Goldberg "Internet and world wide web – How to program", Pearson Educations Asia

Reference Books:
1. Paul S.WangSanda S. Katila, An Introduction to Web Design Plus Programming,Thomson.
2. Robert W.Sebesta, Programming the World Wide Web, Third Edition, Pearson Education.
3. Joel Sklar, Principles of Web Design, Thomson.
4. Raj Kamal, Internet and Web Technologies, Tata McGraw Hill.
5. Gopalan&Akilandeswari, Web Technology: A Developer"s Perspective, PHI.

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
IV				**CLOUD COMPUTING**	8	120	6
	L	T	P	THEORY	INTERNA L	PRACTICA L	TOTAL MARKS
	0	4	4	0	50	50	100

Course Outcomes:
° Define Cloud Computing and memorize the different Cloud service and deployment models
° Describe the importance of virtualization along with their technologies.
° Use and Examine different cloud computing services
° Analyze the components of Google Cloud platform
° Describe the key components of Amazon web Service
° Design & develop backup strategies for cloud data based on features.
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Unit-wise Syllabus
Unit - I
Introduction to Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Biocomputing, Mobile Computing, Quantum Computing, Optical Computing, Nano-computing, Network Computing. Cloud Computing Fundamentals: Motivation, Need, Definition of Cloud Computing. Principles of Cloud computing: Five Essential Characteristics, Four Cloud Deployment Models, Three Service Offering Models, Cloud Ecosystem, Requirements for Cloud Services. Cloud Computing Architecture: cloud Architecture, User/Client Layer, Network Layer, Cloud Management Layer, Hardware Resource Layer, , Network Connectivity in Cloud Computing, Public Cloud Access Networking, Private Cloud Access Networking.

UNIT – II
Cloud Computing Management: Cloud Application, Benefits and Drawbacks Applications on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure, Managing the Cloud Application, Migrating Application to Cloud, Cloud Deployment Models: Private Cloud, Outsourced Private Cloud, Community Cloud, On-Premise Community Cloud, Hybrid Cloud. Cloud Service Models: Infrastructure as a Service, : Platform as a Service, Software as a Service, Introduction to Open Source Tools for IaaS, Paas & SaaS : Apache.

UNIT - III
Technological Drivers for Cloud Computing: SOA and Cloud, SOA and SOC, Benefits of SOA, Multi-core Technology: Multi-core Processors and VM Scalability, Memory and Storage Technologies, Cloud Storage Requirements, Networking Technologies, Web 2.0 : Characteristics, Difference from Web 1.0, Applications, Social Media, Marketing, Education. Web 3.0:Components , Semantic Web, Web Services, Characteristics, Convergence of Cloud and Web 4.0, Connecting Information: Facebook. Agile Software Models: Agile SDLC for Cloud Computing, Features of Cloud SDLC, Agile Software Development Process, Advantages of Agile. Cloud Application Development Platforms: Windows Azure, Google App Engine, Forcecom. IBM Cloud Computing API

UNIT - IV
Virtualization : Full Virtualization, Para virtualization, Hardware-Assisted Virtualization, Hypervisor, OS Virtualization, Server Virtualization, Memory Virtualization, Storage Virtualization, Network Virtualization, Application Virtualization, Processor Virtualization, Memory Virtualization, Storage Virtualization, Network Virtualization, Data Virtualization, Application Virtualization, Hypervisors, Types of Hypervisors, Security Issues and Recommendations, From Virtualization to Cloud Computing VMware. Microsoft Hyper-V.
UNIT - V
Cloud Service Providers ; EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue Service, Microsoft Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM SmartCloud. Security in Cloud Computing, Cloud General Challenges,

Text Books:
° Essentials of Cloud Computing, K Chandrasekaran, CRC Press [ISBN: 3: 978--4822-0544-2]
° Raj Kumar Buyya, James Broberg and rezeiM.Goscinski, -Cloud Computing: Principles and Paradigms,-Wiley 2011.
° Srinivasan, J.Suresh,-Cloud Computing – a Practical Approach for Learning and Implementation, Pearson India, [ISBN 978131776513]
° Toby Velte, Anthony Velte, Robert Elsenpeter,-Cloud Computing, a Practical Approach - McGraw Hill, 2010 [ISBN: 0071626948]
References:
° Greg Schulz -Cloud and Virtual Data Storage Networking, Auerbach Publications [ISBN: 978-1439851739].
° Marty Poniatowski-Foundations of Green It- [ISBN: 978-0137043750].
° Learning Spring Application Development, Ravi Kant Soni, Packt Publishing.
° Michael Miller, Cloud Computing, 2008.
° Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, Cloud Computing for Dummies, 2009.
° BorkoFurht, Armando Escalante (Editors), Handbook of Cloud Computing, Springer, 2010.

Suggested Practical for development of applications for following tasks/tools:
1. Any one Tool for IaaS
2. Any one Tool for PaaS
3. Any one Tool for SaaS
4. Any one Tool for Virtualization (VMware or Microsoft Hyper-V.)
5. Any one Tool for Cloud Service (Amazon Web Services or Microsoft Azure)

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
IV				**Introduction to Machine Learning**	6	90	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	4	2	0	50	50	0	100

This course provides a concise introduction to the fundamental concepts in machine learning and popular machine learning algorithms.
In the course we will discuss various issues related to the application of machine learning algorithms.
The course will be accompanied by hands-on problem solving with programming in Python and some tutorial sessions.

Unit 1:
Introduction: Basic definitions, types of learning, hypothesis space and inductive bias, evaluation, cross-validation

Unit 2 :
Linear regression, Decision trees, overfitting
Supervised learning algorithms including linear regression, logistic regression, decision trees, k-nearest neighbor.

Unit 3:
Instance based learning, Feature reduction, Collaborative filtering based recommendation
Basics of computational learning theory.

Unit 4:
Probability and Bayes learning
 An introduction to Bayesian learning and the naïve Bayes algorithm, support vector machines and kernels and neural networks with an introduction to Deep Learning.
Logistic Regression, Support Vector Machine, Kernel function and Kernel SVM

Unit 5:
Neural network: Perceptron, multilayer network, backpropagation, introduction to deep neural network
Computational learning theory, PAC learning model

Books and references:
Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
Introduction to Machine Learning Edition 2, by Ethem Alpaydin

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
IV				Cyber Law and Information Security	4	60	4
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	2	2	0	50	50	0	100

Course Objectives:
° Understand the fundamental concepts of Cyber and Information Security
° Gain the knowledge of different types and working of malware and security hazards
real-world incidents.
° Understand cryptography techniques and apply them for secure data communication
and authentications
° Understand the working and implementation of Firewall.
° Understand the concept of cyberspace and cyber crime and digital signature

Course Outcomes:
1. Explain various security concepts and apply them in daily cyber use.
2. Configure firewall and other security setting in computer
3. Perform the malware and spam email identification, analysis, virus scanning and
cleaning and other services using security tools
4. Explain and practice the Cyber Law, Ethics, and Intellectual Property Rights, Patent
and Trademark and Design Law

Unit-wise Syllabus
UNIT-I
Information security: overview, information security importance, information security
components. Threats to information system- external and internal thread, security threat and
vulnerability- overview, malware, type of malware: virus, worms, trojans, rootkits, robots,
adware's, spywares, ransom wares, zombies etc., desktop security

UNIT-II
Application security- database security, e- mail security, internet security, principles of
security- confidentiality, integrity, availability, introduction to cryptography- symmetric key
cryptography, asymmetric key cryptography, message authentication, applications of
cryptography. Security technology- firewall, type of firewall, firewall benefits, VPN, antivirus
software

UNIT-III
Cyberspace- cloud computing & security, social network sites security, attack prevention passwords,
protection against attacks in social media, securing wireless networks, security
threats.

UNIT-IV
Cybercrime-concept of cybercrime, type of cybercrime, phishing, cyber crime prevention, case
study, security threats to e- commerce- electronic payment system,
Digital Signature– digital signature process.

UNIT-V
ISO- international organization for standardization, world intellectual property organization, cyber law- cyber law in India, IT act 2000, intellectual property rights- definition, intellectual property, categories of intellectual property, rights protected under intellectual property, copyright, patent and trademark, design- design law in India

References:
° Allan Friedman and P. W. Singer, Cyber Security and Cyber war: What Everyone Needs to Know by Published Oxford University
° Don Franke, Cyber Security Basics: Protect Your Organization by Applying the Fundamentals by Publisher CreateSpace Independent Publishing Platform, 2016
° Mayank Bhushan, Fundamental of Cyber Security

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
V				**ARTIFICIAL INTELLIGENCE WITH EXPERT SYSTEMS**	8	120	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	4	4	0	50	50	100

Course Objective:

1. To understand AI methodology and fundamentals; intelligent agents.

2. To understand search algorithms; game playing; supervised and unsupervised learning; decision tree learning.

3. To learn neural networks, nearest neighbor methods, dimensional reduction, clustering.

4. To understand kernel machines, support vector machines; uncertainty and probability theory.

5. To understand probabilistic reasoning in AI.

Syllabus

Unit I

History & Knowledge Representation: Artificial Intelligence: History and Applications, Intelligence, Communication, Learning, Artificial Intelligence, Progress of Artificial Intelligence, Modeling, Simulation, and AI, Intelligent Systems, Comparison of Various Intelligent Systems

Knowledge Representation: Reasoning, Issues, and Acquisition, Propositional Calculus, Predicate Calculus, Rule-based Knowledge Representation, Symbolic Reasoning Under Uncertainty, Basic Knowledge Representation Issues, Knowledge Acquisition

Unit II

Heuristic Search & State Space Search: Heuristic Search: Search as a Problem-solving Technique, Techniques for Heuristic Search, Admissibility, Monotonicity, Heuristic Classification, Intelligent Agents

State Space Search: Implementation and Applications, Strategies for State Space Search, Implementation of Graph Search, Search Based on Recursion, Production Systems, Natural Language Processing , Applications of Search Techniques in Game Playing and Planning, Predicate Calculus and Planning

Unit III

Artificial Intelligence Problem-solving Languages: PROLOG , Control Structures used in Rule-Based Systems , Search, Search Strategies Using Search Techniques , Implementation of Search, Construction and Debugging Methods for a Program, LISP, Problem-solving by LISP, Implementation of LISP , Comparison of LISP and PROLOG

Unit IV

Expert & Fuzzy Systems: Expert Systems : Features ,Characteristics, Architecture, Goals, Basic Activities, Advantages, Stages in the Development of an Expert System, Probability-based Expert Systems, Expert System Tools , Applications

Fuzzy Systems : Foundation of Fuzzy Systems, Fuzzy Relations ,Arithmetic Operations of Fuzzy Numbers, Linguistic Descriptions and their Analytical Forms , De- fuzification Methods, Fuzzy Logic in Control and Decision-making Applications,

Unit V

Swarm Intelligent Systems: Swarm Intelligent Systems: Background of Ant Intelligent Systems, Importance of the Ant Colony Paradigm, Ant Colony Systems, Biological Ant Colony Systems, Artificial Ant Colony Systems, Development of the Ant Colony System, Applications of Ant Colony Intelligence

Text Books
1. N. P. Padhy, ''Artificial Intelligence and Intelligent Systems", 1st Edition, Oxford University Press , 2005.
2. Stuart Russell and Peter Norvig,"Artificial Intelligence A Modern Approach", 3'rd Edition , Pearson Education, 2010.
Reference Books
3. 2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", 3'rd Edition, TataMcGraw Hill Edition, 2008.
4. SarojKaushik, "Artificial Intelligence", (1e),Cengage Learning Publications, 2011.
5. Don W. Patterson,"Introduction to Artificial Intelligence and Expert Systems", PHI Publication,2006.

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
V				**NEURAL NETWORK AND DEEP LEARNING**	4	60	4
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	2	2	0	50	50	0	100

Objectives: The objective of this course is to teach students the basic concepts of neural networks, neurons, and deep learning

UNIT – I
The neural network: The neuron, linear perceptron, feed-forward neural network, limitations of linear neurons, sigmoid, tanh, relu neurons, softmax output layer, information theory, cross entropy, Kullback-Leibler divergence
Training feed-forward neural network: Gradient Descent, delta rules and learning rates, gradient descent with sigmoidal neurons, the backpropagation algorithms, stochastic and minibatch gradient descent, test sets, validation sets and overfitting, preventing overfitting
UNIT – II
TensorFlow: Computation graphs, graphs, sessions and fetches, constructing and managing graph, flowing tensors, sessions, data types, tensor arrays and shapes, names, variables, placeholders and simple optimization, linear regression and logistic regression using tensorflow
UNIT – III
Implement Neural Network: Introduction to Keras, Build neural network using Keras, Evaluating models, data preprocessing, feature engineering, feature learning, overfitting, underfitting, weight regularization, dropout, universal workflow of deep learning
UNIT – IV
Convolutional Neural Network: Convolution operation, filters and feature maps, motivation, sparse interactions, parameter sharing and equivariant representation, padding and stride, max pooling, full architectural description of convolutional network, build cnn using data augmentation, using pretrained convnet, visualize what convnet learn.

UNIT – V
Models for Sequence Analysis: Analysing Variable-length inputs, Seq2seq with neural ngram, part of speech tagger, dependency parse, syntaxnet, recurrent neural network, challenges with vanishing gradients, long short term memory units

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
V				**Introduction to NLP**	6	90	6
	L	T	P	THEORY	INTERNA L	PRACTICA L	TOTAL MARKS
	4	2	0	50	50		100

Objectives:

Primary aim of the course is to introduce learners with essentials of natural language processing.
The essentials cover linguistic aspects, core algorithms for solving basic tasks, statistical and shallow machine learning models for several natural language processing tasks.

UNIT1:
Introduction:
Different levels of NLP; Text Normalization: Basic pre-processing, Word and sentence segmentation, Lemmatization, Stemming, Morphology;

UNIT 2 :
Language Models:
n-gram models, smoothing techniques;
Sequence Learning Tasks and Models

UNIT 3:
 Examples of NLP tasks
Statistical Models - HMM, MEMM, CRF;
Syntactic Parsing: Regular and Context-Free Languages,
Context-Free Parsing, CKY Algorithm;
Dependency Parsing: Dependency Grammar, Graph-based dependency parsing, Transition-based dependency parsing;
UNIT 4:
 Vector-space Models:
Word and Meanings, Distributional and Distributed Semantics, Lexical Semantic Analysis, GloVe, word2vec;
UNIT 5:

Reference Resolution; Applications

References:
1. D. Jurafsky, J.H. Martin, Speech and Language Processing, 3rd Online Edition (available at https://web.stanford.edu/~jurafsky/slp3/).
2. J. Eisenstein, Introduction to Natural Language Processing, MIT Press, 2019.

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
V,VI				**Capstone Project**	10	90	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	2	8	0	50	50	100

Objective :
 A capstone project or capstone experience involves the identification of an existing problem in a real-world setting and the application of learned skills and methods to develop a solution that addresses the problem directly. In some cases, a capstone project will be geared toward research, while others are more oriented toward problem-solving. Solutions are usually interactive, meaning they can be implemented and used.

 Typically there are several goals for a capstone and they often include:

1. Defining an information problem or opportunity
2. Decide what techniques are required in order to master this information problem or opportunity
3. Include all aspects of the information problem – using people, technology and information
4. Make a positive difference for the community whether it is a business, school, library, hospital, or other organization
5. Choose a topic or focus area the students are enthusiastic about

SEMESTER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
VI				**MACHINE LEARNING AND PATTERN RECOGNITION**	4	60	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	4	2	0	50	50		100

Objectives: The objective of this course is to teach students the basic concepts of machine learning, supervised learning, unsupervised learning, and reinforcement learning

UNIT – I
Introduction: Learning systems, real world applications of machine learning, why machine learning, variable types and terminology, function approximation
Types of machine learning: Supervised learning, unsupervised learning, reinforcement learning
Important concepts of machine learning: Parametric vs non-parametric models, the tradeoff between prediction accuracy and model interpretability, the curse of dimensionality, measuring the quality of fit, bias-variance trade off, overfitting, model selection, no free lunch theorem

UNIT – II
Linear Regression: Linear regression, estimating the coefficients, accessing the accuracy of coefficient estimates, accessing the accuracy of the model, multiple linear regression, qualitative predictors
Classification: Logistic regression, estimating regression coefficients, making predictions, multiple logistic regressions, linear discriminant analysis, bayes' theorem of classification, LDA for p=1, LDA for p>1, quadratic discriminant analysis

UNIT – III
Resampling Methods, Model Selection and Regularization: Cross-validation, leave-oneout cross- validation, k-fold cross-validation, the bootstrap, subset selection, shrinkage methods, ridge and lasso regression, dimension reduction methods, principal components regression, partial least square

Tree Based Methods: Advantages and disadvantages of trees, regression Trees, classification trees, bagging, random forest, boosting

UNIT – IV
Support Vector Machine: Maximum margin classifier, classification using a separating hyperplane, the maximal margin classifier, support vector classifier, support vector machines, classification with non-linear decision boundaries, support vector machine, one-versus-one classification, one-versus- many classification

UNIT – V
Unsupervised Learning: Principle component analysis, what are principal components, clustering methods, k-means clustering, hierarchical clustering, Independent component analysis, latent semantic indexing, Markov Models, Hidden Markov Models

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
VI				**NLP AND INFORMATION RETRIEVAL**	3	45	6
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	4	4		50	50	100

Course Objective:

1. To introduces the fundamental concepts and techniques of natural language processing (NLP).

2. To gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.

3. To examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.

4. To understanding semantics and pragmatics of English language for processing ·

5. To be able to write programs in Python to carry out natural language processing

Syllabus

Unit I

Introduction to NLP: What is Natural Language Processing (NLP), Origins of NLP, Language and Knowledge, The Challenges of NLP, Language and Grammar, Processing Indian Languages, NLP Applications, Some Successful Early NLP Systems, Information Retrieval Language Modeling: Various Grammar-based Language Models, Statistical Language Model

Unit II

Word Level Analysis: Regular Expressions, Finite-State Automata, Morphological Parsing, Spelling Error Detection and Correction, Words and Word Classes, Part-of-Speech Tagging, Syntactic Analysis: Context-Free Grammar, LEEE Contents, Constituency, Parsing, Probabilistic Parsing, Indian Languages

Unit III

Semantic Analysis: Meaning Representation, Lexical Semantics, Ambiguity, Word Sense Disambiguation. Discourse Processing: Introduction, Cohesion, Reference Resolution, Discourse Coherence and Structure

Unit IV

Natural Language Generation & Machine Translation: Architectures of NLG Systems, Generation Tasks and Representations, Applications of NLG. Machine Translation: Introduction , Problems in Machine Translation , Characteristics of Indian Languages , Machine Translation Approaches , Direct Machine Translation , Rule-based Machine Translation , Corpus-based Machine Translation , Semantic or Knowledge-based MT systems , Translation involving Indian Languages

Unit V

Information Retrieval: Basics, Design Features of Information Retrieval systems ,Contents EN, Information Retrieval Models, Classical Information Retrieval Models, Non-classical models of IR , Alternative Models of IR , Evaluation of the IR System

Text Books:

1. Natural Language Processing and Information, Oxford University, Siddiqui, Tanveer and Tiwary, April 2008.

2. "Foundations of Statistical Natural Language Processing" by Chris Manning and HinrichSchuetze.

Reference Books

1. "Natural Language Processing Tools" by Elaine UiDhonnchadha and Elaine U.

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
VI				**OPTIMIZATION TECHNIQUES**	4	60	4
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	2	2	0	50	50		100

Course Objective:

1. To introduce the fundamental concepts of Optimization Techniques.

2. To make the learners aware of the importance of optimizations in real scenarios.

3. To provide the concepts of various classical and modern methods of for constrained and unconstrained problems in both single and multivariable.

4. To introduce the concept of modeling approach.

5. To introduce the concept of linear programming.

Syllabus

Unit I

Nature of Operation Research: History, Nature of OR, Impact of OR, Application Areas.
Overview of modeling approach: Formulating the problem, constructing a mathematical model, Deriving a solution, Testing a model and the solution, establishing control over the solution, Implementation issues.

Unit II

Linear Programming: Introduction, Graphical solution, Graphical sensitivity analysis, The standard form of linear programming problems, Basic feasible solutions, Simplex algorithm, Artificial variables, Big M and two phase method, Degeneracy, Alternative optima, Unbounded solutions, Infeasible solutions.

Unit III

Dual Problem: Relation between primal and dual problems, Dual simplex method. Assignment problem: Hungarian method.

Unit IV

Traveling Salesman Problem: Branch and Bound Technique. Sequencing Problem: 2 machines n jobs, 3 machines n jobs, n machines m job.

Unit V

Pert and CPM: Arrow network, Time estimates, earliest expected time, latest allowable occurrence time, latest allowable occurrence time and stack, Critical path, Probability of meeting scheduled date of completion of project, Calculation of CPM network, Various floats for activities, Project crashing.

Text Books:

1. Gillet, B.E., "Introduction to Operation Research: a computer oriented algorithmic approach" Tata McGraw Hill, NY.

2. KantiSwaroop, Gupta P.K. Man Mohan, "Operations Research", Sultan Chand and Sons.

References Books:

1. Kambo, N.S., "Mathematical Programming Techniques", McGraw Hill

2. Operations Research : Principles and Practice 2nd edition Ravindran Wiley Production.

3. Elementary Number Theory with applications: Thomas Koshy, 2nd Ed., Elsevier.

SEMESTER VII

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
VII				**INTERNSHIP**	0	15 weeks	15
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	0	0	0		100	100

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
VII				**INTERNSHIP REPORT**	6		3
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	0	6	0		100	100

OBJECTIVE

To provide exposure to the various aspects of software development.

OUTLINE

The student is expected to be exposed to all aspects of software development including and not limited to software development cycles, product familiarity, workflow management, software development methodology followed and all other relevant details as needed to fulfill their duties as a software intern.

Monitoring of Training:

A. Submission of Joining report : To be submitted within one week from the date of joining. Students must report for the training from the day of commencement of 9th semester as notified by the university.
B. Submission of periodical reports: Students shall maintain a record of their engagement for the period of training. This will be recorded in an authorized diary to be counter signed by the manager at the end of each week and the same diary shall be sent to the training coordinator once in a month.
C. Completion certificate: At the end of the training period, a student shall produce a certificate of satisfactory completion of training in duplicate.

Submission of Report

Students shall present a report containing the following works before the examiners for Viva-Voce Examination:
Training Report:
It shall also contain a brief description of works handled during the training along with code, product output etc.

SEMES TER	COURSE CODE			COURSE TITLE	Hrs/Wk	TOTAL HRS	CREDITS
VIII				**THESIS**	27	180	15
	L	T	P	THEORY	INTERNAL	PRACTICAL	TOTAL MARKS
	0	3	24	0	50	50	100

Course Description:

Thesis course serves as a concluding achievement for graduating students, allowing them to apply knowledge that they have gained from the Computer Science curriculum toward a year-long project.

Moreover, the aim of the course is to introduce the basic ideas, concepts and principles of writing a thesis / research study; the problem, the review of related literature and studies, and the procedure of investigation. This would allow students to integrate their academic work in the design and development of a significant product that showcases the student's skills

Course Outcomes :

1. Analyze complex problems, and identify and define the computing requirements needed to design an appropriate solution;

2. Apply computing and other knowledge domains to address real-world problems;

3. Design and develop computing solutions using a system-level perspective;

4. Utilize modern computing tools;

5. Gather related literature on an identified topic and identify the research gap.

6. Formulate the research objective, and scope and limitations for a chosen topic

7. Propose software solution to the identified research problem that employs new design, tools, as well as unique and useful enhancement.

 UNIT 1:

Outline the research gap from the gathered literature
- Explain the importance of research.
- Use a particular research method.
- Identify the research gap from the gather related literature

UNIT 2:

Formulate the research objective, and scope and limitations for a chosen topic

- Examine how a problem is known to be a research problem.
- Discuss the elements of a research problem.
- Recognize how a research problem is selected.
- Frame research title, objectives, assumptions, and hypothesis.

UNIT 3:

Propose software solution to the identified research problem that employs new design, tools, as well as unique and useful enhancement.
- Explain the meaning of descriptive research, and design and development research.
- Determine what techniques /design shall be used in creating a proposal.

Develop Project design/Research Methodology