Tel. No.: 2419700/2419567
Fax: 0821-2419363/2419301

Email: registrar@uni-mysore.ac.in
www.uni-mysore.ac.in

UNIVERSITY OF MYSORE

Estd.1916

Vishwavidyanilaya Karyasoudha
Crawford Hall, Mysuru- 570 005

(Re-accredited by NAAC at 'A')

(NIRF-2022 Ranked 33 in University Category & 54 in Overall Category)

No.: PMEB-1/Spl./28(12)/2021-22 **Date: 03-11-2022**

NOTIFICATION

Sub.: Syllabus and Examination pattern of **B.Des. (Hons.) (Structural Civil Design)** course under Specialized Programmes from the academic year 2022-23-reg.

Ref.: 1. Decision of the BOS Meeting held on 22-08-2022.
2. Decision of the Faculty of Science & Technology meeting held on 15-09-2022.
3. Decision of the Academic Council meeting held on 23-09-2022.

******

The Board of Studies in **B.Des. (Hons.) (Structural Civil Design) (UG)** at its meeting held on 22-08-2022 has recommended approve the 4 years Syllabus of **B.Des. (Hons.) (Structural Civil Design)** course in University of Mysore under specialized/specified programs from the academic year 2022-23 as per NEP-2020.

The Faculty of Science & Technology and the Academic Council at their meetings held on 15-09-2022 and 23-09-2022 respectively, have also approved the above said proposal and the same is hereby notified.

The syllabus of **B.Des. (Hons.) (Structural Civil Design)** course may be downloaded from the University website **https://uni-mysore.ac.in/PMEB/.**

REGISTRAR
REGISTRAR
University of Mysore
MYSURU-570005

To;

1. The Registrar (Evaluation), University of Mysore, Mysuru.
2. The Dean, Faculty of Science & Technology, DoS in Earth Science, Manasagangothri, Mysuru.
3. Prof. B. Shankar, School of Planning and Architecture, UOM, Manasagangothri, Mysuru.
4. The Principal, BSD Cresta First Grade College, #182/145/C, Bannur Road, Alanahalli, 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.

o/c

University of Mysore

Manasagangotri, Mysuru – 570 006

Mob:9845155757

Prof. B. Shankar

Chairman, BoS in B. Des (Hons.) (Structural Civil Design) &

Director, SPA & Dean Faculty of Engineering

No. B.Des/ 01 /2022-22 Dated 5th Sept. 2022

To
The Registrar,
(Syndicate Section)
Crawford Hall
Mysuru

Sir,

Sub: Proceeding of the BoS in **B. Des (Hons.) (Structural Civil Design)- Regulations, Scheme & Syllabus- reg**

With reference to the above subject, I am herewith enclosing **the Proceeding the Board of Studies in B. Des (Hons.) (Structural Civil Design)** held on **22.08.2022** at 12.00 Noon along with (1) **Regulations, Scheme and Syllabus and (2) Panel of Examiners of B . Des (Hons.) (Structural Civil Design)** course to be offered under University of Mysore by BSD Cresta, Mysuru; both **hard and soft copies** are enclosed herewith.

Yours faithfully,

(Prof. B. Shankar)
Chairman, BoS in B. Des (Hons.)
(Structural Civil Design)

CC to: The Director, PMEB, University Mysore, Mysore

Prof. B. SHANKAR
Professor of Urban and Regional Planning
School of Planning and Architecture
University of Mysore, Manasagangothri
MYSURU-570 006

Proceedings of the Board of Studies Meeting in B. Des (Hons.) (Structural Civil Design) (UG) held on 22-08-2022 at 12.00 PM at the School of Planning and Architecture, Manasagangothri, Mysuru

Ref: 1. PMEB-1/20/BSD CRESTA/Spl./2021-22 dated 26-5-2022
2. UA2/281/2016-2017 dated 07-07-2022

With reference to the above cited, a meeting of the members of the Board of Studies in B. Des (Hons.) (Structural Civil Design) has been conducted at the school of Planning and Architecture, Manasagangothri, Mysuru on Monday the 22-08-2022 at 12.00 PM. The following members have attended the meeting.

1. Prof. Shankar B — Chairman
2. Dr Rakesh H M — Member
3. Ar. Niharika Nigham — Member
4. Mr. Ritesh L — Member
5. Ar. Vaishali Jha — Member

The Chairman welcomed the members present in the meeting. The importance of the meeting was presented along with the agenda of framing the syllabus of various courses to be offered as part of the proposed B. Des (Hons.) (Structural Civil Design) UG program.

Agenda 1: Syllabus, Examination and Scheme for B. Des (Hons) (Structural Civil Design)

The proposed scheme, curriculum, scheme of examination and syllabus of B. Des (Hons.) (Structural Civil Design) UG program are placed before the members of the board for discussion and suggestions were sought. After detailed presentation and discussion among the members, the Boad of Studies approved the B. Des (Hons.) (Structural Civil Design) Syllabus, Scheme of Examination with the following observations:

1. The B. Des (Hons.) (Structural Civil Design) programme has been devised under the common NEP regulations that is being followed by the university and shall also get changed from time to time by the University. The structure of NEP of the University of Mysore has been followed with titles of various courses and their respective syllabi offered under DSC, DSE and SEC. However, AECC and SEC shall be as per Science Stream of B. Sc (Hons) offered by University of Mysore.
2. The overall number of credits to be earned by the students and distribution of credits in each semester are exactly on par with the existing B. Sc (Hons) program of the university.
3. The scheme and titles of the various courses along with the credit patterns and the respective syllabi for the proposed program in B. Des (Hons.) (Structural Civil Design) is given in **ANNEXURE-I**

Agenda: 2 Panel of Examiners for the B. Des (Hons.) (Structural Civil Design) programme

The Board of Studies prepared and approved Panel of Examiners and enclosed in the **Annexure II**

The meeting ended with a word of thanks

Chairman, BoS B. Des (Hons.) (Structural Civil Design)

UNIVERSITY OF MYSORE

Curriculum of

B. Des (Hons.) (Structural Civil Design)

(Programme Offered by BSD CRESTA)

Regulations Governing the B. Des. (Hons.) (Structural Civil Design)

PREAMBLE:

The B. Des (Hons.) (Structural Civil Design) is a specialty within the field of civil design which focuses on the framework of structures, and on designing those structures to withstand the stresses and pressures of their environment and remain safe, stable and secure throughout their use.

The B. Des (Hons.) (Structural Civil Design) degree plays a vital role in fulfilling the societal infra-structural needs and demand.

Structural design is based upon applied knowledge of the structural performance of different materials and geometries. Structural design uses a number of relatively simple structural concepts to build structural systems.

Structural designers are responsible for making creative and efficient use of funds, structural elements and materials.

Structural Civil Design course makes the student independent structural designer by covering all the gaps in the education.

The Civil Structural Design degree course focuses on planning and designing of industrial and residential buildings, water supply and sanitation systems and transportation infrastructure. Course enables the student to scheme, design an entire project & produce detailed drawings.

OBJECTIVES OF THE PROGRAM

1. To empower the students with fundamental understanding of the basic design concepts by applying them to design problems.
2. To emphasize the importance of analysis, and solving problems in the field of Civil design with the effective use of necessary tools.
3. To familiarize the students about the Construction technologies for materials such as load bearing structures, steel, masonry and precast concrete, and Alternative building technologies.

4. To provide hands-on skills including lessons on prevailing building codes, building specifications, estimating, and structural and environmental systems knowledge.
5. To become competent and engaged design professionals, applying their technical and managerial skills in the planning, design, construction, operation or maintenance of the built environment and global infrastructure, and utilizing their skills to analyze and design systems, specify project methods and materials, perform cost estimates and analyses, and manage technical activities in support of civil engineering projects.

PROGRAM OUTCOMES (POs)

1. Apply the knowledge of Design fundamentals and structural specialization to arrive at design solutions in building construction.
2. An ability to apply design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to acquire and apply new knowledge as needed, using appropriate technological strategies
4. To create, select, and apply appropriate techniques, resources, and modern design and IT tools including prediction and modelling to design problem activities with an understanding of the limitations.
5. Will be able to explore new domains of knowledge in structural design through literature survey, problem identification and apply appropriate research methodology to advance its application in structural design.
6. Will be able to work in a team for achieving common goals and share the learning experience with peers.
7. Will recognize the importance of ethical practices and social responsibility in a professional career.

PEDAGOGY

1. Lecture, Interaction, Assignments and Presentations for tutorial
2. Participatory knowledge building through case study review and Analysis •
3. Continuous internal assessment and external examination

4. Field Studies for Practical Gaining of Knowledge
5. Internship Training
6. Building working knowledge through internships
7. Project work of individual and group works for team building and project preparation
8. Thesis work of individual contribution project work

ELIGIBILITY FOR ADMISSION

The candidate seeking admission to degree program in B. Des (Hons.) (Structural Civil Design) shall have to take science stream in Pre-University examination and have passed 2nd PU/12th Standard from PU Board of Karnataka or two years Job Oriented Courses conducted by the Board of Vocational Education of any State Government or any other examination considered as equivalent 12th Standard, CBSC, ICSE by the respective boards with an aggregate of 40% marks and above.

Candidate with Diploma in Architecture and any other examination considered as equivalent thereto conducted by the Dept. of Technical Education, Govt. of Karnataka/other State / University/Government/Government of India/ Ministry of Skills of NSQF Level 6/National Skill development programs of NSQF level 6 are eligible for admission to the I Semester of the B. Des (Hons.) (Structural Civil Design).

Lateral Entry

Candidate with Diploma in Civil Engineering conducted by the Dept. of Technical Education, Govt. of Karnataka/other State Government/ National Skill development programs of NSQF level 6 are eligible for admission directly to the III Semester of the B. Des (Hons.) (Structural Civil Design).

A candidate who has passed the first year Bachelor's degree examination in stream of Civil engineering of University of Mysore or any other University considered as equivalent there to is eligible for admission to this program as lateral entry.

ATTENDANCE

1. For the purpose of calculating attendance, each semester shall be taken as a Unit.

2. A student shall be considered to have satisfied the requirement of attendance for the semester, if he/she has attended not less than 75% in aggregate of the number of working periods in each of the subjects compulsorily.

3. A student who fails to complete the course in the manner stated above shall not be permitted to take the University Examination.

TEACHING AND EVALUATION

FACULTY QUALIFICATION

1st class in M. Tech/M.E/B.E/B. Arch graduates will be eligible to teach and evaluate the B. Des (Hons.) (Structural Civil Design course) excluding Languages, Constitution of India, Environmental Studies, Health Wellness/Social and Emotional learning, Sports/NCC/NSS/Other.

SCHEME OF EXAMINATION

1. There shall be a University examination at the end of each semester. The maximum marks for the university examination in each theory paper shall be 60 marks for DSC, DSE, Vocational, SEC and OEC.
2. Continuous Internal Evaluation 40 marks for DSC, DSE, Vocational, SEC and OEC.
3. There shall be a University examination at the end of each semester. The maximum marks for the university examination in each Practical paper shall be 25 marks for DSC, DSE
4. Continuous Internal Evaluation in each Practical is 25 marks for DSC, DSE
5. The maximum marks for the university examination in only Practical paper shall be 100 marks for DSC, DSE
6. Continuous Internal Evaluation in only Practical is 50 marks for DSC, DSE

Guidelines for Continuous Internal Evaluation and Semester End Examination:

The CIE and SEE will carry 40% and 60% weightage each, to enable the course to be evaluated for a total of 100 marks, irrespective of its credits. The evaluation system of the course is comprehensive & continuous during the entire period of the Semester. For a course, the CIE and SEE evaluation will be on the following parameters:

Sl. No	Parameters for the Evaluation Theory Subjects	Marks
	Continuous Internal Evaluation (CIE)	
1	Continuous Assessment – (A)	20 Marks
2	Internal Assessment Tests (IAT) –(B)	20 Marks
	Total of CIE (A+B)	40 Marks
3	Semester End Examination (SEE) – (C)	60 Marks
	Total of CA and SEE (A + B + C)	100 Marks

a. Continuous & Comprehensive Evaluation (CCE): The CCE will carry a maximum of 20% weightage (20 marks) of total marks of a course. Before the start of the academic session in each semester, a faculty member should choose for his/her course, minimum of two of the following assessment methods with

1) Internal Assessment Test Marks: 20 marks
2) Following assessment can be given for the students: 2 x 10 = 20 Marks
i. Seminars/Classroom Presentations/ Quizzes
ii. Group Discussions /Class Discussion/ Group Assignments
iii. Case studies
iv. Participatory & Industry-Integrated Learning/ Industrial visits

Sl. No.	Parameters for the Evaluation Practical (Theory + Practical) Subjects	Marks
	Continuous Internal Evaluation (CIE)	
1	Continuous Assessment (CCE) – (A)	15 Marks
2	Internal Practical Tests (IAT) –(B)	10 Marks

	Total of CIE (A+B)	25 Marks
3	Semester End Practical Examination (SEE) – (C)	25 Marks
	Total of CA and SEE (A + B + C)	50 Marks

a. Continuous & Comprehensive Evaluation (CCE):

The following assessment methods with

Drawing Sheets/Experiments/Records -10 (marks)

i. Any one of the below assessment 1 x 5 = 05 marks
Seminars/Class Room Presentations/ Quizzes
Group Discussions /Class Discussion/ Group Assignments
Case studies
Participatory & Industry-Integrated Learning/ Industrial visits

Sl. No.	**Parameters for the Evaluation of only Practical Subjects**	**Marks**
	Continuous Internal Evaluation (CIE)	
1	Continuous & Comprehensive Evaluation (CCE) – (A)	30 Marks
2	Internal Assessment Tests (IAT) –(B)	20 Marks
	Total of CIE (A+B)	50 Marks
3	Semester End Practical Examination (SEE) – (C)	100 Marks
	Total of CIE and SEE (A + B + C)	150 Marks

a. Continuous & Comprehensive Evaluation (CCE):

The following assessment methods with

i. Drawing Sheet Works -20 (marks)

ii. Any one of the below assessment 1 x 10 = 10 marks
Seminars/Class Room Presentations/ Quizzes
Group Discussions /Class Discussion/ Group Assignments
Case studies
Participatory & Industry-Integrated Learning/ Industrial visits

SEMESTER END EXAMINATION (SEE): THEORY SUBJECTS

The Semester End Examination for all the courses for which students who get registered during the semester shall be conducted. SEE of the course shall be conducted after fulfilling the minimum attendance requirement as per the University norms.

SEMESTER END EXAMINATION (SEE): PRACTICAL SUBJECTS

The Semester End Examination for all the courses for which students who get registered during the semester shall be conducted. SEE of the course shall be conducted after fulfilling the minimum attendance requirement as per the University norms.

SEMESTER END EXAMINATION (SEE): ONLY PRACTICAL SUBJECTS

The Semester End Examination for all the courses for which students who get registered during the semester shall be conducted. SEE of the course shall be conducted after fulfilling the minimum attendance requirement as per the University norms.

Semester End Examination (SEE) framework and the question paper pattern is presented below.

QUESTION PAPER PATTERN FOR INTERNAL TEST (THEORY)

TIME : 45 MINS **MARKS: 20**

PART – A

Answer any FIVE of the following questions. Each question carries 2 marks. **5 X 2 = 10**

1. ----------
2. ----------
3. ----------
4. ----------

5. ----------
6. ----------

PART – B

Answer any ONE of the following questions. Each question carries 4 Marks. **1X4=4**

7. ----------
8. ----------

PART – C

Answer any ONE of the following questions. Each question carries 6 Marks **1X6=6**

9. ----------
10. ----------

QUESTION PAPER PATTERN FOR EXTERNAL EXAMINATION (THEORY)

TIME : 2.5 HOURS **MARKS: 60**

PART – A

Answer any TEN of the following questions. Each question carries 2 marks. **10 X 2 = 20**

1. ----------
2. ----------
3. ----------
4. ----------
5. ----------
6. ----------
7. ----------
8. ----------
9. ----------
10. ----------
11. ----------
12. ----------

PART – B

Answer any FOUR of the following questions. Each question carries 4 Marks. **4X4=16**

13. ----------
14. ----------
15. ----------
16. ----------
17.----------

PART – C

Answer any FOUR of the following questions. Each question carries 6 Marks **4X6=24**

18. ----------
19. ----------
20. ----------
21. ----------
22.----------

QUESTION PAPER PATTERN FOR EXTERNAL EXAMINATION (PRACTICAL)

TIME : 3 HOURS **MARKS: 25**

PART – A

Answer any ONE of the following questions. Each question carries 10 marks. **10 X 1 = 10**

1. ----------
2.----------

PART – B

3. Portfolio---------- **10 marks**
4. Viva Voice---------- **05 marks**

QUESTION PAPER PATTERN FOR EXTERNAL EXAMINATION

(ONLY PRACTICAL)

TIME : 3 HOURS **MARKS: 100**

ANNEXURE I

PART – A

Answer any ONE of the following questions. Each question carries 30 marks. 30 X 1 = 30

1.a) & b) ----------
2.a) & b)----------

PART – B

3. Portfolio---------- 50 marks
4. Viva Voice---------- 20 marks

Minimum Marks for a Pass:

Candidates who have obtained a minimum of 35% marks in semester end examination and 40% in aggregate of Semester End Examination marks and Continuous Internal Evaluation marks.

Scheme of DETAIL OF B.DES (Hons.) (STRUCTURAL CIVIL DESIGN)

COURSE DETAIL OF B.DES (Hons.) (STRUCTURAL CIVIL DESIGN)							
Sem	**Category of Course**	**Theory/ Practical**	**Credits**	**Paper Title**	**Marks**		
					EXAM	**IA**	**TOTAL**
1	DSC 1	Theory	3	Basic Design	60	40	100
		Practical	2		25	25	50
	DSC 2	Theory	3	Fundamentals of Design I	60	40	100
		Practical	2		25	25	50
	DSE 1	Theory	3	Elements of Mechanics	60	40	100
	OE 1	Theory	3	Open Elective	60	40	100
	AECC	Theory	3	Language 1	60	40	100
			3	Language 2	60	40	100
	SEC	Theory	2	Digital Fluency	25	25	50
	VB	Practical	1	Yoga		25	25
			1	Health and Wellness		25	25
	Total Credits		26				800

COURSE DETAIL OF B.DES (Hons.) (STRUCTURAL CIVIL DESIGN)							
Sem	**Category of Course**	**Theory/ Practical**	**Credits**	**Paper Title**	**Marks**		
					EXAM	**IA**	**TOTAL**
2	DSC 3	Theory	3	Technical Communication for Designers	60	40	100
		Practical	2		25	25	50
	DSC 4	Theory	3	Fundamentals of Design II	60	40	100
		Practical	2		25	25	50
	DSE 2	Theory	3	Building Materials 1	60	40	100
	OE 2	Theory	3	Open Elective	60	40	100
	AECC	Theory	3	Language 1	60	40	100
			3	Language 2	60	40	100
	SEC	Theory	2	Environmental studies	25	25	50
	VB	Practical	1	Sports		25	25
			1	NSS		25	25
	Total Credits		26				800
	Total Credits (1st + 2nd Sem)		52				

Exit Option with Certificate (with completion of courses equal to a minimum of 48 Credits)

COURSE DETAIL OF B.DES (Hons.) (STRUCTURAL CIVIL DESIGN)							
Sem	**Category of Course**	**Theory/ Practical**	**Credits**	**Paper Title**	**Marks**		
					EXAM	**IA**	**TOTAL**
3	DSC 5	Practical	5	Design Studio-1	100	50	150
	DSC 6	Theory	3	Computer Aided Design - CAD	60	40	100
		Practical	2		25	25	50
	DSE 3	Theory	3	Building Materials II	60	40	100
	OE 3	Theory	3	Open Elective	60	40	100
	AECC	Theory	3	Language 1	60	40	100
			3	Language 2	60	40	100
	SEC	Theory	2	Artificial Intelligence	25	25	50
	VB	Practical	1	Sports		25	25
			1	NSS		25	25
	Total Credits		26				800

COURSE DETAIL OF B.DES (Hons.) (STRUCTURAL CIVIL DESIGN)							
Sem	**Category of Course**	**Theory/ Practical**	**Credits**	**Paper Title**	**Marks**		
					EXAM	**IA**	**TOTAL**
4	DSC 7	Practical	5	Design Studio-II	100	50	150
	DSC 8	Theory	3	Strength of Materials	60	40	100
		Practical	2		25	25	50
	DSE 4	Theory	3	Structural Analysis	60	40	100
	OE 4	Theory	3	Open Elective	60	40	100
	AECC	Theory	3	Language 1	60	40	100
			3	Language 2	60	40	100
	SEC	Theory	2	Constitution of India	25	25	50
	VB	Practical	1	Sports		25	25
			1	R & R		25	25
	Total Credits		26				800
	Total Credits (1st+2nd+3rd+4th Sem)		104				

Exit Option with Diploma (with completion of courses equal to a minimum of 96 Credits)

COURSE DETAIL OF B.DES (Hons.) (STRUCTURAL CIVIL DESIGN)							
Sem	**Category of Course**	**Theory/ Practical**	**Credits**	**Paper Title**	**Marks**		
					EXAM	**IA**	**TOTAL**
5	DSC 9	Practical	5	Cad Structural Analysis -1	100	50	150
	DSC 10	Practical	5	Concrete Technology	100	50	150
	DSE 5	Theory	2	Building estimation and evaluation	60	40	100
		Practical	1		25	25	50
	DSE 6	Theory	2	Design of RCC Structural Elements	60	40	100
		Practical	1		25	25	50
	VC	Theory	3	Voc 1	60	40	100
	SEC	Theory	3	Cyber security	25	25	50
	VB	Practical	1	Sports		25	25
			1	NSS		25	25
	Total Credits		24				800

COURSE DETAIL OF B.DES (Hons.) (STRUCTURAL CIVIL DESIGN)							
Sem	**Category of Course**	**Theory/ Practical**	**Credits**	**Paper Title**	**Marks**		
					EXAM	**IA**	**TOTAL**
6	DSC 11	Practical	5	Cad Structural Analysis -2	100	50	150
	DSC 12	Practical	5	Advanced Cad in Design	100	50	150
	DSE 7	Theory	2	Design & Drawing of Steel Structures	60	40	100
		Practical	1		25	25	50
	DSE 8	Theory	2	Soil Mechanics	60	40	100
		Practical	1		25	25	50
	VC	Theory	3	Voc 2	60	40	100
	SEC	Theory	3	Professional Communication	25	25	50
	VB	Practical	1	Sports		25	25
			1	Culture		25	25
	Total Credits		24				800
	Total Credits (1st+2nd+3rd+4th+5th+ 6th Sem)		152				

Exit Option with Bachelors of Design (with completion of courses equal to a minimum of 140 Credits)

COURSE DETAIL OF B.DES (Hons.) (STRUCTURAL CIVIL DESIGN)							
Sem	**Category of Course**	**Theory/ Practical**	**Credits**	**Paper Title**	**Marks**		
					EXAM	**IA**	**TOTAL**
7	DSC 13	Theory	3	Finite Element analysis of structures	60	40	100
		Practical	2		25	25	50
	DSC 14	Theory	3	Hydraulic Structures and irrigation design	60	40	100
		Practical	2		25	25	50
	DSE 9	Theory	3	Elements of Transportation design	60	40	100
	DSE 10	Practical	6	Internship Minimum of 60 days	150	50	200
	VC	Theory	3	Voc 3	60	40	100
	CC	Practical	3	Research Methodology	60	40	100
	Total Credits		25				800

COURSE DETAIL OF B.DES (Hons.) (STRUCTURAL CIVIL DESIGN)							
Sem	**Category of Course**	**Theory/ Practical**	**Credits**	**Paper Title**	**Marks**		
					EXAM	**IA**	**TOTAL**
8	DSC 15	Theory	3	Design of Prestressed elements	60	40	100
		Practical	2		25	25	50
	DSE 11	Theory	5	Earthquake resistant design of structures	60	40	100
	DSE 12	Theory	5	Elements of Transportation design	60	40	100
	CC	Practical	6	Research Project	200	100	300
	VC	Theory	3	Voc 4	60	40	100
	Total Credits		22				750
	Total Credits (1st+2nd+3rd+4th+5th +6th Sem+7th+8th)		196				

Exit Option with Bachelors of Design with honors(with completion of courses equal to a minimum of 180 Credits)

Open Electives	
Category	Subjects
OE-1	Solid waste management
OE-2	Alternative Building Materials
OE-3	Design and drawing of Façade
OE-4	Basic design of Structural elements
OE-5	Applied Geology
OE-6	Town planning

CONTACT PERIOD	YEAR: 1	SEMESTER 1	DSC	BASIC DESIGN	CREDITS: 3

SUBJECT CODE	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 3 HRS

OBJECTIVES

- To understand the basics of design.
- To encourage creative thinking in students.
- To understand the difference between art and design, their contribution to the field.
- To understand different types of art forms in India with respect to state, their beliefs and methods.

UNIT 1	Hrs
Introduction to Basic design Definitions of creativity, understanding components of creativity, definitions of problem solving, theories of creativity, goals and objectives, value judgments, defining problems, information gathering, creative incubation, creative thinking and creative process and illustrations.	
UNIT 2	
Thinking Technique Understanding Principles in generative, convergent, lateral, interactive, graphical thinking, check lists, analysis and synthesis simulation, action ability and implementations of intentions. Blocks in creative thinking.	
UNIT 3	
Technique of Creativity Mind mapping, brain storming with related stimuli and unrelated stimuli, positive techniques for creativity, creative pause, Focus, Challenge, alternatives, concepts, sensitizing techniques, group or individual techniques. Brain writing with unrelated stimuli, idea mapping, random input, story boarding exercises, problem solving techniques –brain storming, lateral thinking of De Bono	
UNIT 4	
Art and Design Understanding the basic difference of art and design and their relationship. Understanding different art form and design styles through famous artist and designers. Different mediums of sketching and drawing.	
UNIT 5	
Art Forms of India Understanding different art forms of different states of India, methods and technique involved in making those art forms.	

COURSE OUTCOME

- Students will understand the process of mind mapping.
- Students will be able to synthesis Visual elements in the surrounding.
- Students will analyse various art forms of India.

REFERENCES

i. Drawing on the Right Side of the Brain - by Betty Edwards
ii. ii. Keys to Drawing by Bert Dodson

SUBJECT CODE	YEAR: 1	SEMESTER 1	DSC	BASIC DESIGN	CREDITS: 2

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 25	PRACTICAL MARKS: 25	DURATION OF EXAM: 3 HRS

OBJECTIVES

- To familiarize students with the concepts of free hand sketching.
- To understand different medium used for drawing / sketching and how to use them.
- To upgrade the basic drawing skills of the students.

UNIT 1	Hrs
Free Hand Sketching Exercises of freehand pencil drawings, sketches of objects, solids, pattern, texture etc.	
UNIT 2	
Rendering Technique Exercises of rendering techniques using pencil, pen, charcoal, color pencil, poster color, soft pastel etc. of objects, solid, light, shade, shadow and textures.	
UNIT 3	
Nature Drawing Exercise of free hand sketching of nature, outdoor study of landscape elements. And understanding how to render them.	
UNIT 4	
Gesture Drawing Introduction to human figure drawing. To study the gestures and different poses of the human figure.	

COURSE OUTCOME

- Students will be able to draw free hand drawings.
- Students will acquire knowledge about different rendering medium.

REFERENCES

i. Drawing on the Right Side of the Brain - by Betty Edwards
ii. Keys to Drawing by Bert Dodson.
iii. Maureen Mitton, Interior Design Visual Presentation: A Guide to graphics, models and presentation techniques, 3rd edition, wiley publishers, 2007
iv. Mogali Delgade Yanes and Ernest Redondo Dominquez, Freehand drawing for Architects and Interior Designers, ww.Norton& co., 2005

v. Francis D.Ching, Design Drawing, Wiley publishers CURRICULUM AND SYLLABUS B.Des (Interior Design) 14
vi. Moris, I.H.Geometrical Drawing for Art Students.
vii. Thoms, E.French. Graphics Science and Design, New York: MC Graw Hill.
viii. Shah, M.G., Kale, C.M. and Patki, S.Y. Building Drawing: with an integrated approach to built environment, 7th ed. Tata McGraw Hill Pub., Delhi, 2000.
ix. Bies, D.John. Architectural Drafting: Structure and Environment Bobbs – Merril Educational Pub., Indianapolis.

SUBJECT CODE	YEAR: 1	SEMESTER 1	DSC	Fundamentals of Design - I	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 3 HRS

OBJECTIVES

- To understand types of design and its importance.
- To understand basic elements and principles of design with their impact on design and psychology.
- To understand Design Contextualism.

UNIT 1	Hrs
Introduction of design Introduction to design- importance and scope of design, Design –Definition, meaning, purpose, Types - Structural and decorative characteristics, classification of decorative design - Naturalistic, conventional, geometric, abstract, historic, biomorphic.	
UNIT 2	
Basics of Compositions Understanding the basic concepts of composition 2d-3d and its application and impact in design.	
UNIT 3	
Elements of Design Importance of Elements of design - Line and direction, form and shape, size, color, light, pattern, texture and space - application of elements to form designs and impact on psychology.	
UNIT 4	
Color Concepts	

Introduction to Concept of color - significance of color in the interiors and exteriors-Dimensions of color –Hue, value, intensity, Effects of Hue, value and Intensity. Introduction to Color Schemes and types, Color harmonies-related and contrast, Advanced and receding factors considered in selecting color harmonies, Application of color in human psychology.	
UNIT 5	
Principle of Design Principles of design –Balance, rhythm, emphasis, harmony, proportion - meaning and application of design. Development of design from motifs and application.	

COURSE OUTCOME

- Students will be able translate the basic principle and elements of design in drawings.
- Students will get knowledge colors and their impact on human psychology.

REFERENCES:

i. Barnes, Susan B. An Introduction to Visual Communication: From Cave Art to Second Life, Peter Lang Publishing Inc, 2011
ii. Bergström, Bo. Essentials of Visual Communication, Laurence King Publishing, 2009
iii. Pratap R.M (1988), Interior Design principles and practice, standard publishers' distribution, Delhi.
iv. Seetharaman, P and Pannu, P. Interior Design and Decoration, CBS publishers and Distributors, New Delhi
v. McPhee, K., Design Theory and Software Design, Technical Report TR 96- 26, October 1996, Department of Computing Science, The University of Alberta, Canada, 1996.
vi. Lawson, B., How Designers Think, The Architectural Press Ltd., London, 1980.

SUBJECT CODE	YEAR: 1	SEMESTER 1	DSC	Fundamentals of Design - I	CREDITS: 2

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 25	PRACTICAL MARKS: 25	DURATION OF EXAM: 3 HRS

OBJECTIVES

- To implement concepts of Fundamentals of Design.
- To understand different Design Philosophies through the works done by eminent Designers.
- To understand Design Contextualism.

UNIT 1	Hrs
Types of Design Assignment on Naturalistic, conventional, geometric, abstract, historic, biomorphic with the help of sketches and sheets.	
UNIT 2	
Elements of Design Types of line and its application in design, form and shape, size, color, light, Pattern, Texture and Space - Application of elements to form designs with the help of sketches and mood board.	
UNIT 3	
Principle of Design Principles of design –Balance, rhythm, emphasis, harmony, proportion, Application of principle of with the help of sketches and models.	
UNIT 4	
Color Concepts Color wheel, Primary Color, Secondary Color, Tertiary Color, Complimentary color, Split Complimentary Color, types color contrast (7 types) Munsell, Parang System, Pantone etc.	

COURSE OUTCOME

- Students will be able translate the basic principle and elements of design in drawings.
- Students will get knowledge colors and their impact on human psychology.

REFERENCES:

i. Barnes, Susan B. An Introduction to Visual Communication: From Cave Art to Second Life, Peter Lang Publishing Inc, 2011
ii. Bergström, Bo. Essentials of Visual Communication, Laurence King Publishing, 2009
iii. Ahmed A Kasu, An Introduction to Art, Craft, Technique, Science & Profession of Interior
iv. Design, Ashish Book Centre, New Delhi, Pg: 701
v. Caroline Clifton et. al., The complete Home Decorator, Portland House New York.
vi. Faulkner, S.-and Faulkner, (1987), Inside Today's Home, Rine hart publishing company, New York.

SUBJECT CODE	YEAR: 1	SEMESTER 1	DSE	ELEMENTS OF MECHANICS (THEORY)	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- To make students learn the scope of various fields of civil design.
- To develop students' ability to analyze the problems involving forces, moments with their applications.
- To develop the student's ability to find out the center of gravity and moment of inertia and their applications.
- To make the students learn about kinematics and kinetics and their applications.

UNIT 1	Hrs
Analysis of force systems: Concept of idealization, force, a system of forces, superposition, transmissibility, Resolution, and composition of forces, Law of Parallelogram of forces, polygonal law, Resultant of concurrent coplanar force system, coplanar non-concurrent force system, a moment of forces, couple, Varignons theorem, resultant of coplanar non-concurrent force system, free body diagram, Lamis theorem, equations of equilibrium, equilibrium of concurrent and non-concurrent coplanar force system	
UNIT 2	
Friction: Types of friction, laws of friction, limiting friction, coefficient of friction concept of static and dynamic friction, numerical problems on impending motion on horizontal and inclined planes along with connected bodies, **Centroid:** Introduction, methods of determining the centroid, locating the centroid of simple figures from first principle, the centroid of composite and built-up sections.	
UNIT 3	
Moment of inertia: Introduction, method of determining the second moment of area of plane sections from first principles, parallel axis theorem and perpendicular axis theorem section modulus, the radius of gyration, moment of inertia of composite area and built-up sections, concept of product of inertia (Problems included)	
UNIT 4	
Support reactions: Types of loads and types of supports, statically determinate and indeterminate beams, support reactions in beams, Numerical problems on support reactions for statically determinate beams (point load, udl, uniformly varying loads and moments)	

Analysis of trusses: Types of trusses, analysis of statically determinate trusses using the method of joints and method of sections.	
UNIT 5	
Kinematics: Displacement, average velocity, instantaneous velocity, speed, acceleration, average acceleration, variable acceleration, acceleration due to gravity, Newton's law of motion, rectilinear motion and numerical problems, curvilinear motion, superelevation, projectile motion, relative motion, numerical problems, motion under gravity, numerical problems **Kinetics:** D 'Alembert's principle and its application in-plane motion and connected bodies	

COURSE OUTCOME

- Compute the resultant of a force system and resolution of a force.
- Comprehend the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces.
- To learn the reactive forces and the effects that develop as a result of the external loads

REFERENCES

i. R. C. Hibbbler, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
ii. Bansal R. K., A Text Book of Engineering Mechanics, Laxmi Publications.
iii. Andy Ruina and Rudra Pratap, Introducing to Statics and Dynamics, Oxford University Press.
iv. Reddy Vijaykumar K and K Suresh Kumar, Engineering Mechanics.
v. F.P. Beer and E. R. Johnston, Mechanics for Engineers, Statics and Dynamics, McGraw Hill.
vi. Irving H. Shames, Engineering Mechanics, Prentice-Hall.

SUBJECT CODE	YEAR: 1	SEMESTER 2	DSC	TECHNICAL COMUNICATION FOR DESIGNER	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- To understand the fundamentals of graphical representation in drawing.

- To learn various angles of viewing an object and representing it drawing.
- To learn the concepts of various types of projections.
- To develop skills of technical writing, proposal writing.

UNIT 1	Hrs
Orthographic Projections: Introduction to orthographic projections, line of sight, what is parallel projections, isometric projections. Understanding projection plane, principal plane, orthographic view and auxiliary plane. Convention orthographic view.	
UNIT 2	
Isometric Projections Introduction to Isometric projections and methods to make projections, (Box and Offset method). Difference between Isometric view and Isometric Projections.	
UNIT 3	
Perspective Drawings What is perspective drawing and importance of perspective drawing, understanding Picture Plane (P.P.), horizon line (H.P.) Ground plane (G.P.) Station Point (S.P.) Sight Line, Vanishing Point (V.P.) True object (T.P.)	
UNIT 4	
Sciography What is Sciography, what is light source, light ray, sun angle, shade and shadow, shadow line and shade line.	
UNIT 5	
Introduction to Technical Writing, Proposals Writing Introduction to technical writing process, understanding of writing process, how to write various technical reports. Types and elements of technical articles, journal articles and conference papers. Introduction to technical proposal writing, Purpose, importance, structure.	

COURSE OUTCOME

- Students will be able to understand symbolic representations and types of line.
- Students will get knowledge about geometric views, orthographic projections, perspective drawings, and Sciography which will enhance their visualization

REFERENCES

i. Ching, F. (1943). Architectural graphics (6th ed.). New Jersey, John Wiley and Sons, Inc.
ii. Dinsmore, G. (1968). Analytical graphics. Princeton, D. Van Nostrand Co.
iii. Gill, R. (1991). Basic perspective. London, Thames and Hudson.
iv. Gill, R. (2006). Perspective (1st ed.). London, Thames and Hudson.
v. Graphic-Sha Staff. (1987). Interiors: Perspectives in Architectural Design/Included, An Actual CG Perspective. Tokyo, Japan: Books Nippan.

SUBJECT CODE	YEAR: 1	SEMESTER 2	DSC	TECHNICAL COMUNICATION FOR DESIGNER	CREDITS: 2

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 25	PRACTICAL MARKS: 25	DURATION OF EXAM: 3 HRS

OBJECTIVES

- To understand the fundamentals of graphical representation in architecture.
- To learn various angles of viewing an object and representing it architecturally.
- To learn the concepts of various types of projections.
- To develop skills of surface development and interpreting the illustration of architectural sections.

UNIT 1	Hrs
Graphical Codes, Symbols and Scales Styles of lettering, Types of lines, Types of Planes, Types of Scales.	
UNIT 2	
Orthographic projections 1 &2 Dimensions -Points, Lines. 2 &3 dimensions - Planes — Parallel, Perpendicular and inclined projections. Various solid and hollow geometrical objects — Parallel, Perpendicular and inclined projections.	
UNIT 3	
Geometric views and Projections Isometric views and projections, Axonometric views, Oblique views	
UNIT 4	
Perspective Drawings Two-point perspective of simple geometrical objects. One-point perspective of simple geometrical objects. Two-point perspective of complex geometrical objects and buildings. One-point perspective of complex geometrical objects and building interiors/ exteriors. Multiple point perspectives.	
UNIT 5	
Sciography Application on two dimensional objects in plans and elevations. Sciography of three-dimensional objects in plan, elevations and views. Sciography on Complex objects.	

COURSE OUTCOME

- Students will be able to understand symbolic representations and types of line.
- Students will get knowledge about geometric views, orthographic projections, perspective drawings, and Sciography which will enhance their architectural skills.

REFERENCES

i. Ching, F. (1943). Architectural graphics (6th ed.). New Jersey, John Wiley and Sons, Inc.
ii. Dinsmore, G. (1968). Analytical graphics. Princeton, D. Van Nostrand Co.
iii. Gill, R. (1991). Basic perspective. London, Thames and Hudson.
iv. Gill, R. (2006). Perspective (1st ed.). London, Thames and Hudson.
v. Graphic-Sha Staff. (1987). Interiors: Perspectives in Architectural Design/Included, An Actual CG Perspective. Tokyo, Japan: Books Nippan

SUBJECT CODE	YEAR: 1	SEMESTER 2	DSC	Fundamentals of Design - II	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 3 HRS

OBJECTIVES

- To implement concepts of Fundamentals of Design.
- To understand different Design Philosophies through the works done by eminent Designers.
- To understand Design Contextualism.

UNIT 1	Hrs
Introduction to Design process Understanding the process of design and its importance. Factors that affect design Like Principle of Totality, Principle of Time, Principle of Value, Principle of Resources, Principle of Iterations, Principle of Synthesis, Principle of Change, Principle of Relationship, Principle of Competence, Principle of Service.	
UNIT 2	
Process of Data Collection Importance of Data collection, Types of Data collection (Literature, Case study, Research papers and Books). Understanding criteria of selecting case study. How to get inferences and relationship between data collection and design process. Understanding the concepts of anthropometric and ergonomics.	
UNIT 3	
Understanding Compositions in Design Importance composition in design through Golden Ration, Grid, Rule of Third etc. and discussing their examples.	
UNIT 4	
Design Theories and Philosophies	

Understanding Organization theories, Gestalt's Laws and its application in design. Understanding less is more, God is in the details etc. Its application through case studies.	
UNIT 5	
Understanding work of Famous designers Discussions on work of famous designers and their process and methods of designing.	

COURSE OUTCOME

- Students will be able to understand process of designing and types of data collections.
- Students will be able to understand theories and philosophies involved in design.
- Students will get knowledge about famous designers and their work.

REFERENCES:

i. Barnes, Susan B. An Introduction to Visual Communication: From Cave Art to Second Life, Peter Lang Publishing Inc, 2011
ii. Bergström, Bo. Essentials of Visual Communication, Laurence King Publishing, 2009
iii. Pratap R.M (1988), Interior Design principles and practice, standard publishers' distribution, Delhi.
iv. Seetharaman, P and Pannu, P. Interior Design and Decoration, CBS publishers and Distributors, New Delhi
v. McPhee, K., Design Theory and Software Design, Technical Report TR 96- 26, October 1996, Department of Computing Science, The University of Alberta, Canada, 1996.
vi. Lawson, B., How Designers Think, The Architectural Press Ltd., London, 1980.

SUBJECT CODE	YEAR: 1	SEMESTER 2	DSC	Fundamentals of Design - II	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 25	PRACTICAL MARKS: 25	DURATION OF EXAM: 3 HRS

OBJECTIVES

- To understand the basic concepts of solid and voids and their application.
- To understand the composition of 2d and 3d.

UNIT 1	Hrs
Surface Development	

Introduction to surface development for objects like prism, sphere, cuboid etc. and making different forms with the help of paper, compress board etc.	
UNIT 2	
Mass and Voids Assignments on concepts of solids and voids and its application with help of sketches, drawings and models. Concepts of addition and subtraction with the help of sketches, models. (Paper, compress board, etc.)	
UNIT 3	
Texture and Pattern Understanding the basic texture & patterns making with clay, pop, colours, etc and develop models, sculpture etc.	
UNIT 4	
Composition of 2d and 3d Making Two-dimensional & three-dimensional composition using the guidelines of Golden Ration, Grid, Rule of Third etc.	

COURSE OUTCOME

- Students will be able to understand process of surface development.
- Students will be able to apply concepts of mass and voids in forms and develop models for the same.
- Students will understand the basic of model making.

REFERENCES:

i. Barnes, Susan B. An Introduction to Visual Communication: From Cave Art to Second Life, Peter Lang Publishing Inc, 2011
ii. Bergström, Bo. Essentials of Visual Communication, Laurence King Publishing, 2009
iii. Pratap R.M (1988), Interior Design principles and practice, standard publishers' distribution,Delhi.
iv. Seetharaman, P and Pannu, P. Interior Design and Decoration, CBS publishers and Distributors, New Delhi
v. McPhee, K., Design Theory and Software Design, Technical Report TR 96- 26, October 1996, Department of Computing Science, The University of Alberta, Canada, 1996.
vi. Lawson, B., How Designers Think, The Architectural Press Ltd., London, 1980.

SUBJECT CODE	YEAR: 1	SEMESTER 2	DSE	BUILDING MATERIALS I (THEORY)	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- To know the Basic materials used in construction.
- To understand the methods of construction techniques.
- Understand the industrial trends of the building materials.

UNIT 1	Hrs
Bricks Brick- Bricks in construction, Manufacturing process, physical and chemical properties Applications: Foundation, wall material, types of brick walls, brick masonry (English, Flemish, Other types) detailed brick layout at corners, junctions and brick piers, style of construction. Types of bricks – traditional, wire cut, molded bricks and its sizes, etc	
UNIT 2	
Stones Stone- Introduction, Properties and applications. Types of stones, dressing of stones, finishes, its application in construction. Geological Classification of rocks – stones (granite, laterite, quartzite, marble, slates), Uses of stone, deterioration & preservation of stone, Stone for finishing, cutting & polishing. Types of stone masonry.	
UNIT 3	
Cement, Mortar & Asphalt & Bitumen Cement and its application Properties of cement, Types of cement –Portland, Pozzolana etc. Mortar its application properties Types of mortar lime mortar and cement mortar, Concrete and admixtures, R.C.C, R.B. concrete. Definition, classification, properties, uses of Bitumen and Asphalt in construction	
UNIT 4	
Timber Timber and its usage in construction -– Introduction and Properties. Timber – as a building material, Seasoning & preservation of timber, Hardwood & softwood.	

Industrial timber – Ply woods, Block boards, Fiber board Market survey – sizes & rates, brands. Market forms of timber	
UNIT 5	
Metals Ferrous and non-ferrous metals -– Introduction and Properties, Alloys and its application in construction. Steel and its application, Steel alloys. Aluminum and its application in construction, Aluminum alloys Advanced materials- Composite materials, Properties and applications	

COURSE OUTCOME

- Identify and understand the application of bricks, stone, cement, timber, metal, and plastics based on properties and types.
- To impart knowledge on the various materials while highlighting the current trends and innovations in the usage of materials in construction.

REFERENCES

i. Chakraborti “Civil Engineering Drawing.” Bhaktivedanta Book Trust, Kolkata. 2015.
ii. Gurucharn Singh, “Building Materials.” Standard Publishers and Distributers, Delhi, 2014.
iii. Sanjay Mahajan “Building Construction I and II”. Satya Prakashan, New Delhi, 2014.
iv. Sucheta Singh, Veena Gandotra and Promila Sharma, “Organic Building Materials in Residential constructions.” Concept Publishing Company, New Delhi., 2009.
v. Sushil Kumar, “Building Construction.” Standard Publishers and Distributers, Delhi, 2018.

SUBJECT CODE	YEAR: 2	SEMESTER 3	DSC	DESIGN STUDIO I (PRACTICAL)	CREDITS: 5

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 50	PRACTICAL MARKS: 100	DURATION OF EXAM: 3 HRS

OBJECTIVES

- To understand Site, Contours, Natural Features.
- To adapt lessons learnt from fundamentals in design development.
- To develop models and results of the given design

Projects shall be dealt through collecting information, critical evaluation, and representation through literary and visual resources. There shall be at least two design problems during this course to achieve the objectives stated here above.

The suggestive design topics may include 3 to 4 spaces viz.
Rain water harvesting system, Water tank design, Rural sanitations of villages, Construction of a low cost house

Deliverable shall be in the form of Portfolio/Sheets/Models/Reports/Multimedia Presentation, etc.

SUBJECT CODE	YEAR: 2	SEMESTER 3	DSC	COMPUTER AIDED DESIGN (CAD) THEORY	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- To enable students to understand the importance of AutoCAD in planning and detailing and learn the application of AutoCAD in design.

UNIT 1	Hrs
Introduction to CAD, importance and application of CAD in planning. Fundamentals of computers, file menu-saving closing files, importing and exporting files, saving files in different formats. Printing and publishing, undo/redo, matching properties & its application.	
UNIT 2	
Introduction to object drawing, different types of lines - spline, construction lines, splines, multiline, types of objects, circles and curves arc, polygon, ellipse and its application and usage in drafting	
UNIT 3	
Introduction to drawing setting and types of setting drawing limits units, object selection, drafting, setting, polar tracking, grid and snap, its application advantages and uses. Introduction to hatch, dimensions, text, layer, point style creation, dimension, text, multiline, spline, editing, creating and inserting blocks, attributions, along with different types, application and Importance.	
UNIT 4	

Introduction to object editing, types in editing the drawing with different command trim, extend, stretch, erase delete, introduction to viewing, types of viewing – zoom, pan, holstering utility and its advantages and important, hatch boundary, hatch, editing, introduction to layers, types of layer creation and uses.	
UNIT 5	
Introduction to creation of solid, wireframe, objects, basic rendering skills, use of viewport command, different options of view command. Working on model space, paper space, setting the scale for drawings, different types, its application and importance	

COURSE OUTCOME

- Able to use CAD 2D software in digital drafting.
- Digitally draft various interior details and spaces using CAD softwares.

REFERENCES

i. Gopalakrishna, K. R., Sudhir, "A Text Book of Computer Aided Engineering Drawing", Subhas Stores, Bangalore, 2013.
ii. Jin Feng, "Basic AutoCAD for Interior Designers", Peachpit Press, 1999.
iii. Joseph A. Fiorello, "CAD for Interiors: Beyond the Basics", John Wiley & Sons, 2010.
iv. Sham Tickoo, "Autocad2013 for Engineers and Designers", Dreamtech Press, 2012.
v. Strock, Cheryl R., "Advance AutoCAD", BPB Publications, 2010.

SUBJECT CODE	YEAR: 2	SEMESTER 3	DSC	COMPUTER AIDED DESIGN (CAD) PRACTICAL	CREDITS: 2

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 25	PRACTICAL MARKS: 25	DURATION OF EXAM: 3 HRS

Unit-1
Exercises on creating objects with types of lines, composition of lines, exercise on modifying tools

Unit-2
Creating and editing the layer objects, hatching the objects, creating a text style, dimension styles, blocks

Unit-3
Drafting the plan and elevations of a structural components (Foundation, Frames and trusses)

Unit-4

Drafting the plan and elevation of the projects, working drawings with paper space, model space, printing with different plot styles (any three)

SUBJECT CODE	YEAR: 2	SEMESTER 3	DSE	BUILDING MATERIALS II (THEORY)	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- Acquire Knowledge required for specifying appropriate materials for various spaces in buildings
- Explain the components and materials within the building.
- Analyze the properties of various building materials.

UNIT 1	Hrs
Paints Introduction, types and application. Characteristics of good paint – its ingredients. Method of proper application of paint and polishes – painting process. Types of paints –oil and water-based paints. Polishes, Different types of plasters	
UNIT 2	
Glass Introduction, types and application Glass – different types of glasses, and its uses in construction, Glass and glass products – Composition and fabrication of glass, classification, types of glass- wired glass, fiber glass, rock wool, laminated glass, glass concrete blocks - their properties and uses in buildings.	
UNIT 3	
Flooring Introduction, Different types of flooring and its usage in interiors. Natural Flooring: Different of Stone flooring, Advantages, Disadvantages and application. Cement and brick flooring, wooden flooring. Artificial Flooring and application. Resilient flooring. Ceramic tile flooring, Vitrified, Terrazzo flooring, and soft flooring.	
UNIT 4	
Plastics and miscellaneous Materials Introduction and Properties Types of plastics, use of plastics in construction, fiber plastic, silicon and its usage. Adhesives – Natural and Synthetic, their varieties, thermoplastic and thermosetting adhesives, epoxy resin. Method of application, bond strength etc.	

Rubber – Natural rubber, Latex, Coagulation, Vulcunizing and synthetic rubber Properties and application 3D Concreting – Forms and application, Advanced façade materials, Curtain Wall systems	
UNIT 5	
Damp proofing and termite treatment Introduction, causes of dampness, causes of dampness, Techniques and methods damp prevention. Integral damp proofing, Damp proofing materials and its characteristics. Termite proofing, methods of termite proofing and materials used.	

COURSE OUTCOME

- Develop spaces with suitable construction materials
- To impart knowledge on the various materials while highlighting the current trends and innovations in the usage of materials in construction.

REFERENCES

i. Chakraborti “Civil Engineering Drawing.” Bhaktivedanta Book Trust, Kolkata. 2015.
ii. Gurucharn Singh, “Building Materials.” Standard Publishers and Distributers, Delhi, 2014.
iii. Sanjay Mahajan “Building Construction I and II”. Satya Prakashan, New Delhi, 2014.
iv. Sucheta Singh, Veena Gandotra and Promila Sharma, “Organic Building Materials in Residential constructions.” Concept Publishing Company, New Delhi., 2009.
v. Sushil Kumar, “Building Construction.” Standard Publishers and Distributers, Delhi, 2018.

SUBJECT CODE	YEAR: 2	SEMESTER 4	DSC	DESIGN STUDIO II (PRACTICAL)	CREDITS: 5

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 50	PRACTICAL MARKS: 100	DURATION OF EXAM: 3 HRS

OBJECTIVES

- To understand Site, Contours, Natural Features.
- To adapt lessons learnt from fundamentals in design development.
- To develop models and results of the given design

Projects shall be dealt through collecting information, critical evaluation, and representation through literary and visual resources. There shall be at least two design problems during this course to achieve the objectives stated here above.

The suggestive design topics may include 3 to 4 spaces viz.
Design of a single story residential building, Low cost grain storage structures, Design of new invention structures like under water constructions, metro structures, glass structures, plastic roads, Survey of construction materials in our surrounding places

Deliverable shall be in the form of Portfolio/Sheets/Models/Reports/Multimedia Presentation, etc.

SUBJECT CODE	YEAR: 2	SEMESTER 4	DSC	STRENGTH OF MATERIALS (THEORY)	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- To understand the basic concepts of the stresses and strains for different materials and strength of structural elements.
- To know the development of internal forces and resistance mechanism for one dimensional and two dimensional structural elements.
- To analyze and understand different internal forces and stresses induced due to representative loads on structural elements.

UNIT 1	Hrs
Simple Stresses and Strains: Concept of stress and strain, types of stresses, types of strains, Elasticity, Hooke's law, Elastic Modulus, stress-strain diagrams for ductile and brittle materials, principle of superposition, bars of varying cross section, Saint Venant's principle, tapering bars of circular cross section, tapering bars of rectangular cross section of uniform thickness, compound bars. **Elastic constants:** Poisson's ratio, Volumetric strain, Volumetric strain of rectangular block and circular rod, Bulk Modulus, relation between E and K, Rigidity modulus, relation between E and C, relation among E, C and K. Temperature stresses – temperature stresses in composite sections	
UNIT 2	

Shear force and bending moment in beams: Shear force, Bending moment, relation among loading, SF and BM, SFDs and BMDs for simply supported beam, cantilever beams and overhanging beams subjected to concentrated, uniformly distributed load, uniformly varying loads, moment and couple. Loading pattern and BMD form SFD	
UNIT 3	
Deflection of Beams: Differential equation of deflected beam, slope and deflection of simply supported beam, cantilever beams and overhanging beams by double integration method and Macaulay's method. **Torsion of Shafts:** Theory of Torsion, Torsion equation – assumptions and derivation, torsional rigidity, polar modulus transmission of power, strength and stiffness of solid and hollow circular shafts	
UNIT 4	
Elastic stability of columns: Ideal column, slenderness ratio, short column and long column, critical load, effective length, Euler's formula for different end conditions, Rankine's formula	
UNIT 5	
Thin and Thick Cylinders: Introduction, stresses and strains in thin cylinders subjected to internal fluid pressure, stresses in thick cylinders. Lame's equation.	

COURSE OUTCOME

- To understand the basics of material properties, stress and strain
- To provide the basic concepts and principles of *strength of materials*

REFERENCES

i. Strength of Materials – S S Bhavikatti, New Age Intenational (P) Ltd.,
ii. Strength of Materials – R K Bansal, Laxmi Publications (P) Ltd.,
iii. Strength of Materials – S Ramamrutham, Dhanpat Rai Publishing Company (P) Ltd.,
iv. Strength of Materials – M A Jayaram, Sapna Book House.

SUBJECT CODE	YEAR: 2	SEMESTER 4	DSC	STRENGTH OF MATERIALS (PRACTICAL)	CREDITS: 2

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 25	PRACTICAL MARKS: 25	DURATION OF EXAM: 3 HRS

Unit-1
Tension test on Mild steel and HYSD bars. Compression test on HYSD, Cast iron

Unit-2
Compressive strength tests on building blocks (brick, solid blocks and hollow blocks)

Unit-3
Dimensionality of bricks, Water absorption, Initial rate of absorption

Unit-4
Specific gravity of coarse and fine aggregate. Fineness modulus of Fine and Coarse aggregate

SUBJECT CODE	YEAR: 2	SEMESTER 4	DSE	STRUCTURAL ANALYSIS (THEORY)	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- To determine slope and deflections in beams and trusses.
- To analyse arches and cable structures.
- To analyse different structural systems and interpret data using determinate method

UNIT 1	Hrs
Deflection of Beams: Moment area method – Derivation, Mohr's theorems, Sign convention; Application of moment area method to determinate prismatic beams, beams of varying cross section; Use of moment diagram by parts; Conjugate beam method – Real beam and conjugate beam, conjugate beam theorems; Application of conjugate beam method to determinate beams of varying cross sections.	
UNIT 2	
Energy Principles and Energy Theorems: Principle of virtual displacements; Principle of virtual forces, Strain energy and complementary energy; Strain energy due to axial force, bending shear and torsion; Deflection of determinate beams and trusses using total strain energy;	

Deflection at the point of application of single point load; Castigliano's theorems, application of Castigliano's theorems to calculate deflection of trusses, frames; Special application – Dummy unit load method	
UNIT 3	
Compound stresses: Transformation of stresses in two dimension, principle · stress, maximum shear stress and construction of Mohr's circle for stresses.	
UNIT 4	
Arches and Cables: Three-hinged circular and parabolic arches with supports at the same and different levels; Determination of normal thrust, radial shear and bending moment; Analysis of cables under point loads and UDL; Length of cables with supports at the same and different levels; Stiffening trusses for suspension cables.	
UNIT 5	
Introduction and Analysis of Plane Trusses: Structural forms, Conditions of equilibrium, Compatibility conditions, Degree of freedom, Linear and non linear analysis, Static and kinematic indeterminacies of structural systems. Influence Lines: Concepts of influence lines-ILD for reactions, SF and BM for determinate beams-ILD for axial forces in determinate trusses and numerical problems.	

COURSE OUTCOME

- Apply equations of equilibrium to structures and compute the reactions.
- Determine deflections in trusses and frames using energy principles.
- Analyse arches and cables for stress resultants.
- Apply slope defection method in analysing indeterminate structures and construct bending moment diagram

REFERENCES

i. Reddy, C.S., Basic Structural Analysis, 3rd ed., Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2011. Hibbeler, R.C., Structural Analysis, 9th edition., Pearson publications., New Delhi, 2012.
ii. Thandavamoorthy, T.S., Structural Analysis, 6th edition., Oxford University press., New Delhi,2015.
iii. Bhavikatti, Structual Analysis, Vikas Publishing House Pvt. Ltd, New Delhi,2002.
iv. Charles Head Norris, John Benson Wilbur and Senol Utku., Elementary Structural Analysis, 4th edition., Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2003.
v. Hall, A. and Kabaila, A.P., Basic Concepts of Structural Analysis, Pitman Publishing, London, John Wiley & Sons, New York, 1977.
vi. Wang, C.K., Intermediate Structural Analysis, McGraw-Hill International Book Co., 1985.

SUBJECT CODE	YEAR: 3	SEMESTER 5	DSC	CAD STRUCTURAL ANALYSIS I (PRACTICAL)	CREDITS: 5

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 50	PRACTICAL MARKS: 100	DURATION OF EXAM: 3 HRS

OBJECTIVES

- Identify, formulate and solve problems in structural analysis.
- Analyze structural system and interpret data.
- use the techniques, such as stiffness and flexibility methods to solve engineering problems
- Communicate effectively in design of structural elements

UNIT 1	Hrs
Slope Deflection Method: Introduction, sign convention, development of slope deflection equation, analysis of continuous beams including settlements, Analysis of orthogonal rigid plane frames including sway frames with kinematic indeterminacy≤3. **Moment Distribution Method:** Introduction, Definition of terms, Development of method, Analysis of continuous beams with support yielding, Analysis of orthogonal rigid plane frames including sway frames with kinematic indeterminacy ≤3.	
UNIT 2	
Kani's Method: Introduction, Concept, Relationships between bending moment and deformations, Analysis of continuous beams with and without settlements, Analysis of frames with and without sway. **Matrix Method of Analysis (Flexibility Method) :** Introduction, Axes and coordinates, Flexibility matrix, Analysis of continuous beams and plane trusses using system approach, Analysis of simple orthogonal rigid frames using system approach with static indeterminacy ≤3.	
UNIT 3	
Matrix Method of Analysis (Stiffness Method): Introduction, Stiffness matrix, Analysis of continuous beams and plane trusses using system approach, Analysis of simple orthogonal rigid frames using system approach with kinematic indeterminacy ≤3.	
UNIT 4	
Staad Pro	

Modeling 2D and 3D skeletal structures (truss and frame) in software: Node coordinates, member connectivity, supports. Representing slabs using rigid diaphragms and/or master and slave nodes. Nodal loads and element loads, Independent load cases, Load combinations, self weight of structural elements, calculation and verification of gravity loads including self weight	
UNIT 5	
Analysis and interpretation of results by studying support reactions, bending moment and shear force diagrams of elements. Identifying critical cross-sections for design of beam and column elements, grouping of elements based on structural behaviour and similarity of geometry and member design forces	

COURSE OUTCOME

- Determine the moment in indeterminate beams and frames having variable moment of inertia and subsidence using slope defection method
- Determine the moment in indeterminate beams and frames of no sway and sway using moment distribution method, kanis method, Flexibility and stiffness method
- Modelling and analysis of trusses adopting codal provisions
- Analysis and design of multi-storied structures

REFERENCES

i. Hibbeler R C, " Structural Analysis", Pearson Publication
ii. L S Negi and R S Jangid, "Structural Analysis", Tata McGraw-Hill Publishing Company Ltd.
iii. D S PrakashRao, "Structural Analysis: A Unified Approach" , Universities Press
iv. K.U. Muthu, H. Narendraetal, "Indeterminate Structural Analysis", IK International Publishing Pvt. Ltd.
v. Reddy C S, "Basic Structural Analysis",Tata McGraw-Hill Publishing Company Ltd.
vi. Gupta S P, G S Pundit and R Gupta, "Theory of Structures", Vol II, Tata McGraw Hill Publications company Ltd.
vii. V N Vazirani and M MRatwani, "Analysis Of Structures ", Vol. 2, Khanna Publishers 4. Wang C K, "Intermediate Structural Analysis", McGraw Hill, International Students Edition

SUBJECT CODE	YEAR: 3	SEMESTER 5	DSC	CONCRETE TECHNOLOGY (PRACTICAL)	CREDITS: 5

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 50	PRACTICAL MARKS: 100	DURATION OF EXAM: 3 HRS

OBJECTIVES

- To recognize material characterization of ingredients of concrete and its influence on properties of concrete
- Proportion ingredients of Concrete to arrive at most desirable mechanical properties of Concrete.
- Ascertain and measure engineering properties of concrete in fresh and hardened state which meet the requirement of real time structures.

UNIT 1	Hrs
Cement And Aggregates Cement, Chemical composition, Physical and chemical properties, Other Cementitious materials and composition -GGBS, Fly ash rice Husk ash, Silica fume, Hydration of cement, Factors influencing and affecting Hydration of cement, **Types of cement.** Fine aggregate - grading, analysis, Specify gravity, bulking, moisture content, deleterious materials. Coarse aggregate – Importance of size, shape and texture. Grading of aggregates - Sieve analysis, specific gravity, Flakiness and elongation index, crushing, impact and abrasion tests. Codal Provisions.	
UNIT 2	
Fresh Properties Of Concrete Workability - Process of manufactures of concrete: Batching, Mixing, Assessment of Workability of Concrete, Factors affecting workability, **Measurement of workability** – slump test, flow test, Compaction factor test and Vee-Bee Consistometer tests, Segregation and bleeding, Transporting, Placing, Compaction, Curing, need and Types of curing, accelerated curing.	
UNIT 3	
Admixtures: Classification, effect on fresh and hardened concrete, retention time, Dosage ant their effects, Influence on properties of paste, mortar, and concrete Types of concrete (in brief). **Mix Design Procedure:** Concept of Concrete Mix design, variables in proportioning, exposure conditions, Procedure of mix design as per IS 10262-2019, Numerical examples of Mix Design. Highlights of Other methods of Mix Design as per other codes.	
UNIT 4	
Hardened Concrete: Factors affecting strength, w/c ratio, gel/space ratio, maturity concept, Effect of aggregate properties, assessment of compressive strength, flexural strength, tensile strength, bond strength and modulus of elasticity, aggregate - cement bond strength, factors influencing strength and codal provisions, Relation between	

modulus of elasticity and strength, factors affecting modulus of elasticity, Poisson Ratio	
UNIT 5	
Tests on Cement: a. Normal Consistency b. Setting time c. Compressive strength d. specific gravity Design of concrete mix as perIS-10262 Tests on fresh concrete: i. slump, ii. compaction factor and iii. Vee Bee test c. Tests on hardened concrete: i. compressive strength test, ii. split tensile strength test, iii. flexural strength test	

COURSE OUTCOME

- Relate material characteristics and their influence on microstructure of concrete.
- Distinguish concrete behavior based on its fresh and hardened properties.
- Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes.
- Adopt suitable concreting methods to place the concrete based on requirement

REFERENCES

i. Neville A.M. “Properties of Concrete”-4th Ed., Longman.
ii. M.S. Shetty, Concrete Technology - Theory and Practice Published by S. Chand and Company, New Delhi.
iii. Kumar Mehta. P and Paulo J.M. Monteiro “Concrete-Microstructure, Property and Materials”, 4th Edition, McGraw Hill Education, 2014
iv. A.R. Santha Kumar, “Concrete Technology”, Oxford Un iversity Press, New Delhi (NewEdition)

SUBJECT CODE	YEAR: 3	SEMESTER 5	DSE	BUILDING ESTIMATION AND EVALUATION (THEORY)	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- To enable the students to understand the concept of estimation and costing for interiors
- To analyze various components based on specification

UNIT 1	Hrs
Specifications Definition, importance, and types. Use of Indian standard specification handbooks like PWD, CPWD, etc., Methods of specification writing and its influence on cost, Writing Standard clauses and instructions.	
UNIT 2	
Rate Analysis And Costing Introduction to Schedule of Rates and Market Rates. Rate analysis, overhead costs, cost of materials and labour for various items of work, measurement of work for interim and final certificates for payment to contractors, Preparing BOQs	
UNIT 3	
Estimation Terminologies and types, Methods of Estimation, Calculations for basic building materials like Concrete works, Brick works, Earthworks, etc., Quantity Surveying for various items.	
UNIT 4	
Reports & Tenders Estimation Reports, Administrative Approval, Expenditure Sanction, Technical sanction, Competent authority, etc., Issue rates, Payment on accounts, Suspense account, Security Deposit, Earnest Money Deposit, Performance Guarantee, Muster Roll, Measurement Book, etc.	
UNIT 5	
Valuation Terminologies and Types, Gross income, Net income, Depreciation Value, Capitalized value, Scrap Value, Salvage value, etc., Methods of Valuation and Valuation Reports, Rent Fixation, Mortgage, Lease, etc.	

COURSE OUTCOME

- Taking out quantities and work out the cost and preparation of abstract for the estimated cost for various civil works.
- Prepare the specifications and analyze the rates for various items of work.
- Assess contract and tender documents for various construction works.
- Prepare valuation reports of buildings.

REFERENCES

i. Chakraborti, M. (1987). Estimating, Costing and Specification in Civil Engineering.
ii. Dutta, B. N., & Dutta, S. (1991). Estimating and Costing in Civil Engineering: Theory and Practice: including Specifications and Valuation. UBS.
iii. Rangwala, C. (2015). Estimating, Costing and Valuation.
iv. Singh, G. (2002). Estimating Costing and Valuation. Delhi: Standard Distributors.

SUBJECT CODE	YEAR: 3	SEMESTER 5	DSE	BUILDING ESTIMATION AND EVALUATION (PRACTICAL)	CREDITS: 2

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 25	PRACTICAL MARKS: 25	DURATION OF EXAM: 3 HRS

Unit-1
Write specifications for a building (civil works -Foundation, RCC, brick works,etc)

Unit-2
Prepare rate analysis of civil works for residential and commercial buildings

Unit-3
Preparation of estimation of given plans using center line and long wall short wall method

Unit-4
Preparation of estimation for the complete project (residential /commercial)

SUBJECT CODE	YEAR: 3	SEMESTER 5	DSE	DESIGN OF RCC STRUCTURAL ELEMENTS (THEORY)	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- Identify, formulate and solve engineering problems of RC elements subjected to different kinds of loading.
- Follow a procedural knowledge in designing various structural RC elements.
- Impart the usage of codes for strength, serviceability and durability.

- Acquire knowledge in analysis and design of RC elements

UNIT 1	Hrs
Introduction to working stress and limit State Design: Introduction to working stress method, Difference between Working stress and Limit State Method of design, Modular Ratio and Factor of Safety and evaluation of design constants for working stress method. Limiting deflection, short term deflection, long term deflection, Calculation of deflection of singly reinforced beam only. Cracking in reinforced concrete members, calculation of crack width of singly reinforced beam. Side face reinforcement, slender limits of beams for stability.	
UNIT 2	
Limit State Analysis of Beams: Analysis of singly reinforced, doubly reinforced and flanged beams for flexure and shear Limit State Design of Beams: Design of singly and doubly reinforced beams, Design of flanged beams, design for combined bending, shear and torsion as per IS-456.	
UNIT 3	
Limit State Design of Slabs and Stairs: Introduction to one way and two way slabs, Design of cantilever, simply supported and one way continuous slab. Design of two way slabs for different boundary conditions. Design of dog legged and open well staircases. Importance of bond, anchorage length and lap length.	
UNIT 4	
Limit State Deign of Columns and Footings: Analysis and design of short axially loaded RC column. Design of columns with uniaxial and biaxial moments, Design concepts of the footings. Design of Rectangular and square column footings with axial load and also for axial load & moment.	
UNIT 5	
Design Of Reinforced Concrete Deep Beams & Corbels: Design of Deep Beams by IS 456, Checking for Local Failures, Detailing of Deep Beams, Analysis of Forces in a Corbels, Design of Procedure of Corbels.	

COURSE OUTCOME

- Understand the design philosophy and principles.
- Solve engineering problems of RC elements subjected to flexure, shear and torsion.
- Demonstrate the procedural knowledge in designs of RC structural elements such as slabs, columns and footings.
- Owns professional and ethical responsibility.

REFERENCES

i. Unnikrishnan Pillai and Devdas Menon, " Reinforced Concrete Design" , McGraw Hill, New Delhi
ii. N Subramanian, " Design of Concrete Structures" , Oxford university Press
iii. H J Shah, "Reinforced Concrete Vol. 1 (Elementary Reinforced Concrete)" , Charotar Publishing House Pvt. Ltd.
iv. P C Varghese, "Limit State design of reinforced concrete", PHI, New Delhi.

SUBJECT CODE	YEAR: 3	SEMESTER 5	DSE	DESIGN OF RCC STRUCTURAL ELEMENTS (PRACTICAL)	CREDITS: 2

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 25	PRACTICAL MARKS: 25	DURATION OF EXAM: 3 HRS

Unit-1
Drawing and detailing of beam design (Singly reinforced, doubly reinforced and deep beams)

Unit-2
Drawing and detailing of slab design (1 way slabs, 2 way slabs)

Unit-3
Drawing and detailing of staircases (any two)

Unit-4
Drawing and detailing of foundations (any two)

SUBJECT CODE	YEAR: 3	SEMESTER 6	DSC	CAD STRUCTURAL ANALYSIS II (PRACTICAL)	CREDITS: 5

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 50	PRACTICAL MARKS: 100	DURATION OF EXAM: 3 HRS

OBJECTIVES

- Discuss the different types of Structures, to assess their degrees of freedom and indeterminacy.
- Retrieving the design of form work of buildings

- Illustrate the Plate Theory and Navier's solution for Plates
- Elaborate the concepts of Shells.

UNIT 1	Hrs
Lateral load Analysis: Cantilever Method, Portal frame Method Comparison of classical, matrix and approximate methods, Solution techniques including numerical problems for simultaneous equations, Gauss elimination and Cholesky method. Band width consideration.	
UNIT 2	
Analysis Of Three Dimensional Space Truss & Grid Structures: Principles of analysis of three dimensional space truss, grid structures using direct stiffness method- development of structure stiffness matrix. Numerical problems restricted to three degrees of freedom.	
UNIT 3	
Loads and Pressures in Form Design, Vertical Loads, Lateral Loads and Other Pressures in Form Design. Design Consideration for the Design of the Formwork for Walls, Slabs, Beams, Columns.	
UNIT 4	
Introduction to plate theory, Small deflection of laterally loaded thin rectangular plates of pure bending. Navier‟s solution for various lateral loading (No derivations), Numerical examples. Introduction to curved surfaces and classification of shells, membrane theory of spherical shells, Cylindrical shell, Hyperbolic paraboloid, Elliptic paraboloid and Conoids.	
UNIT 5	
ETABS: Overview of Structural Analysis and Design, Modeling, Assigning Properties, Static & Dynamic Analysis, Design.	

COURSE OUTCOME

- Interpret the different types of Structures, to assess their degrees of freedom and indeterminacy.
- Explanation of Design for Formwork for Walls, Slabs, Beams, Columns.
- Summarize the Plate Theory and Implement Navier's solution for Plates
- Outline the concepts of Shells

REFERENCES

i. Timoshenko, S. and Woinowsky-Krieger, W., "Theory of Plates and Shells" 2nd Edition, McGraw-Hill Co., New York, 1959

ii. Ramaswamy G.S. – "Design and Constructions of Concrete Shell Roofs" – CBS Publishers and Distributors – New Delhi – 1986.
iii. Robert L. Peurifoy and Garold D. Oberlender, "Formwork for Concrete Structures", Third Edition McGraw- ill, 1996.
iv. Hurd, M.K., "Formwork for Concrete", Special Publication No. 4 Sixth Edition, American Concrete Institute, Detroit, 1995.
v. S.Rajasekaran, G. Sankarasubramanian "Computational Structural Mechanics", Prentice-Hall of India Pvt Ltd, 7th Edition, 2015, NewDelhi-110092.ISBN-13: 978-8120317345, ISBN-10:8120317343.
vi. Damodar Maity, "Computer Analysis of Framed Structures" I K International Publishing House Pvt. Ltd., 2007, ISBN-13: 978-8189866198

SUBJECT CODE	YEAR: 3	SEMESTER 6	DSC	ADVANCED CAD IN DESIGN (PRACTICAL)	CREDITS: 5

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 50	PRACTICAL MARKS: 100	DURATION OF EXAM: 3 HRS

OBJECTIVES

- To develop and train students to use computers and digital media as tools to explore, develop, evaluate and present 3D modelling and design

UNIT 1	Hrs
Introduction To Fundamentals Key concepts of BIM – reading and manipulating the software interface -navigating with views -selection methods -the importance of levels and grids -creating walls ,doors, windows & components -working with essential modification commands & load family . Creating floors ,ceiling & stairs – working with type & instance parameters -imported cad drawings – understanding the project browser & type properties palettes -adding sheets -inserting views on sheets – adding dimension and text to mode & plotting .	
UNIT 2	
Advanced Modelling – Family Types & Toposurface Modelling	

Creating curtain walls, schedules, details, a cushion family, and family types –"flex" a family with family type & works with reference planes -creating rooms & an area plan -tag components -customize existing wall styles .create & edit a topo surface ,add site & parking components -draw label contours -work with phasing -understand groups & links -works with stacked walls & learn the basic of rendering & create a project template .	
UNIT 3	
Structural Modelling Adding Structural Grids Placing Structural Columns, Modeling Structural Framing Modifying Structural Framing, Modeling Structural Slabs Creating Shaft Openings, Structural Reinforcement Adding Rebar Modifying Rebar Reinforcing Walls, Floors, and Slabs, Preparing Projects for Structural Analysis Viewing Analytical Models Adjusting Analytical Models Placing Loads and analysis.	
UNIT 4	
Sketchup Toolbars, Camera controls – Pan, Zoom, orbit Basic tools- Rectangle ,Circle, Select, pencil, push /pull, Groups , Components, Move, Rotate, Copy , Array, Offset, Paint bucket Edit materials- Scale, Rotate, Edit Warehouse- Download models, Edit models, Groups vs components, Scale	
UNIT 5	
Introducing Rendering software for 3D spaces, software used: Lumion/V Ray /Enscape	

COURSE OUTCOME

- To understand the skill of computer aided drafting and learn about REVIT and designing methods with application of rendering software

REFERENCES

i. Autodesk Revit 2021 Structure Fundamentals, By ASCENT Published August 10, 2020
ii. Exploring Autodesk Revit 2021 for Structure, 11th Edition, **Prof. Sham Tickoo,** Purdue University Northwest, USA
iii. SketchUp for Site Design: A Guide to Modeling Site Plans, Terrain, and Architecture 2nd Edition by Daniel Tal Google SketchUp Cookbook: Practical Recipes and Essential Techniques by Bonnie Roskes
iv. SketchUp for Builders: A Comprehensive Guide for Creating 3D Building Models Using SketchUp by John Brock

SUBJECT CODE	YEAR: 3	SEMESTER 6	DSE	DESIGN AND DRAWING OF STEEL STRUCTURES (THEORY)	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- Understand advantages and disadvantages of steel structures, steel code provisions, and plastic behaviour of structural steel.
- Learn Bolted connections and Welded connections.
- Design of compression members, built-up columns and columns splices.
- Design of tension members, simple slab base and gusseted base.
- Design of laterally supported and un-supported steel beams.

UNIT 1	Hrs
Introduction: Advantages and Disadvantages of Steel Structures, Limit state method Limit State of Strength, Structural Stability, Serviceability Limit states, Failure Criteria of steel, Design Consideration, Loading and load combinations, IS code provisions, Specification and Section classification. Plastic Behavior of Structural Steel: Introduction, Plastic theory, Plastic Hinge Concept, Plastic collapse load, load factor, Shape factor, Theorem of plastic collapse, Methods of Plastic analysis, Plastic analysis of Continuous Beams.	
UNIT 2	
Bolted Connections: Introduction, Types of Bolts, Behavior of bolted joints, Design of High Strength friction Grip (HSFG) bolts, Design of Simple bolted Connections (Lap and Butt joints)and bracket connections. Welded Connections: Introduction, Types and properties of welds, Effective areas of welds, Weld Defects, Simple welded joints for truss member and bracket connections, Advantages and Disadvantages of Bolted and Welded Connections.	
UNIT 3	
Design of Compression Members: Introduction, Failure modes, Behavior of compression members, Sections used for compression members, Effective length of compression members, Design of compression members and built up Compression members, Design of Laced and Battened Systems.	
UNIT 4	

Design of Tension Members: Introduction, Types of Tension members, Slenderness ratio, Modes of Failure, Factors affecting the strength of tension members, Design of Tension members and Lug angles, Splices, Gussets. Design of Column Bases: Design of Simple Slab Base and Gusseted Base.	
UNIT 5	
Design of Beams: Introduction, Beam types, Lateral Stability of beams, factors affecting lateral stability, Behavior of Beams in Bending, Design strength of laterally supported beams in Bending, Design of Laterally unsupported Beams [No Numerical Problems], Shear Strength of Steel Beams. Beam to Beam Connections, Beam to Column Connection and Column Splices [No Numerical Problems].	

COURSE OUTCOME

- Possess knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behaviour of structural steel.
- Understand the Concept of Bolted and Welded connections.
- Understand the Concept of Design of compression members, built-up columns and columns splices.
- Understand the Concept of Design of tension members, simple slab base and gusseted base. 5. Understand the Concept of Design of laterally supported and un-supported steel beams.

REFERENCES

i. N Subramanian., “Design of Steel Structures” (2016), Oxford University Press, New Delhi.
ii. Duggal S K., “Limit State Method of Design of Steel Structures”, Tata McGraw Hill, New Delhi.
iii. Dayarathnam P, “Design of Steel Structures”, Scientific International Pvt. Ltd.
iv. Kazim S M A and Jindal R S, “Design of Steel Structures”, Prentice Hall of India, New Delhi.
v. IS 800-2007: General Construction in Steel Code Practice (Third revision), Bureau of Indian Standards, New Delhi.

SUBJECT CODE	YEAR: 3	SEMESTER 6	DSE	DESIGN AND DRAWING OF STEEL STRUCTURES (PRACTICAL)	CREDITS: 2

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 25	PRACTICAL MARKS: 25	DURATION OF EXAM: 3 HRS

Unit-1

a) Standard Structural Steel Section & Sketch of bolt showing details of bolt.

b) Simple connections (Lap and Butt connection)
(i) Bolted Joints (chain and staggered bolting)
(ii) Welded Joints

Unit-2
a) Beam to beam connection - Framed Connection
b) Beam to column (Flange and web) connection - Framed and Seated (unstiffened and stiffened)
c) Connection
Both Connections by Bolted and welded joints

Unit-3
Compression Members - both axial & eccentric loads.
(a) Built up columns (with lacing & Battening) –welded Joints
(b) Column base (Slab base & Gusseted base) – welded Joints

Unit-4
Welded Plate Girder with Stiffeners
5. Roof truss - Angles and Tubular section (welded joints)

SUBJECT CODE	YEAR: 3	SEMESTER 6	DSE	SOIL MECHANICS (THEORY)	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- Appreciate basic concepts of soil mechanics as an integral part in the knowledge of civil engineering.
- Comprehend basic engineering and mechanical properties of different types of soil.
- Become broadly familiar with geotechnical engineering problems such as, flow of water through soil medium and terminologies associated with geotechnical engineering.
- Assess the improvement in mechanical behavior by densification of soil deposits using compaction.
- Model and measure strength-deformation characteristics and bearing capacity of soils

UNIT 1	Hrs
Introduction : Phase Diagram, phase relationships, definitions and their inter relationships. Determination of Index properties: Specific gravity, water content, in-situ density, relative density, particle size analysis, Atterberg's Limits, consistency indices. Activity of clay, Field identification of soils, Plasticity chart, BIS soil classification.	
UNIT 2	

Permeability: Darcy‟s law- assumption, coefficient of permeability and its determination in laboratory, factors affecting permeability, permeability of stratified soils, Seepage velocity, Superficial velocity and coefficient of percolation Effective Stress Geostatic stresses, Effective stress concept-total stress, effective stress and Neutral stress and impact of the effective stress in construction of structures, quick sand phenomena	
UNIT 3	
Compaction:Principle of compaction, Standard and Modified proctor's compaction tests ,factors affecting compaction, effect of compaction on soil properties. Consolidation: Definition, Mass-spring analogy, Terzaghi's one dimensional consolidation theory-assumption, Consolidation characteristics of soil (Cc, av, mv and Cv). Laboratory one dimensional consolidation test, characteristics of e-log (σ') curve, Pre-consolidation pressure and its determination by Casagrande's method. Over consolidation ratio.	
UNIT 4	
Shear Strength: Concept of shear strength, Mohr–Coulomb Failure Criterion, Total and effective shear strength parameters, factors affecting shear strength of soils. Thixotrophy and sensitivity, Measurement of shear strength parameters - Direct shear test, unconfined compression test, triaxial compression test, Tests under different drainage conditions.	
UNIT 5	
Bearing Capacity of Soil: D e t e r m i n a t i o n of bearing capacity by Terzaghi's and BIS method(IS:6403),Modes of shear failure, Factors affecting Bearing capacity of soil. Effects of water table and eccentricity on bearing capacity of soil. Foundation Settlement: Types of settlements and importance, Computation of Immediate, consolidation and creep settlements, permissible, differential and total settlements	

COURSE OUTCOME

- Determine the index properties of soil and hence classify the soil
- Assess the compaction and consolidation characteristics of soil
- Determine the permeability of soils and assess the seepage in hydraulic structures
- Evaluate shear parameters of the soil using shear tests
- Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure

REFERENCES

i. PunmiaB.C.,"SoilMechanics and FoundationEngineering,LaxmiPublicationsCo.,India.
ii. Braja,M.Das,"Principles of Geotechnical Engineering",Cengage Learning,India
iii. MurthyV.N.S.,"Geotechnical Engineering:Principles and Practices of Soil Mechanics and Foundation Engineering",CRCPress, NewYork
iv. BowlesJ.E.,"Foundation Analysis and Design",McGrawHillPub.Co.NewYork.
v. SwamiSaran,"Analysis and Design of Substructures",Oxford&IBHPub.Co.Pvt.Ltd.,India.

SUBJECT CODE	YEAR: 3	SEMESTER 6	DSE	SOIL MECHANICS (PRACTICAL)	CREDITS: 2

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 25	PRACTICAL MARKS: 25	DURATION OF EXAM: 3 HRS

Unit-1

Specific gravity test(pycnometer and density bottle method).Water content determination by oven drying method

Unit-2

Grain Size Analysis Sieve Analysis, In-situ density tests Core-cutter method Sand replacement method

Unit-3

Consistency limits Liquid limit test (by casagrande's and cone penetration method) Plastic limit test

Unit-4

Field identification of soil, Shrinkage limit test, Standard compaction test(light and heavy compaction)

SUBJECT CODE	YEAR: 4	SEMESTER 7	DSC	FINITE ELEMENT METHODS (THEORY)	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- Develop analytical skills.
- Learn principles of analysis of stress and strain.
- Develop problem solving skills.
- Understand the principles of FEM for one and two dimensional problems.

UNIT 1	Hrs
Theory of elasticity concepts, Energy principles, Rayleigh - Ritz Method, Galerkin method and finite element method, steps in finite element analysis, displacement approach, stiffness matrix and boundary conditions.	
UNIT 2	
Discretization; finite representation of infinite bodies and discretization of very large bodies, Natural Coordinates, Shape functions; polynomial, LaGrange and Serendipity , one dimensional formulations; beam and truss with numerical examples.	
UNIT 3	

2D formulations; Constant Strain Triangle, Linear Strain Triangle, 4 and 8 noded quadrilateral elements, Numerical Evaluation of Element Stiffness -Computation of Stresses, Static Condensation of nodes, degradation technique, Axis metric Element.	
UNIT 4	
Isopara metric concepts; is opera metric, sub parametric and super parametric elements, Jacobian transformation matrix, Stiffness Matrix of Isopara metric Elements, Numerical integration by Gaussian quadrature rule for one, two and three dimensional problems.	
UNIT 5	
Techniques to solve nonlinearities in structural systems; material, geometric and combined non linearity, incremental and iterative techniques. Structure of computer program for FEM analysis, description of different modules, exposure to FEM 2 softwares	

COURSE OUTCOME

- The student will have the knowledge on advanced methods of analysis of structures.

REFERENCES

i. Krishnamoorthy C.S., “Finite Element analysis” -Tata McGraw Hill
ii. Desai C &Abel J F.," Introduction to Finite element Method" , East West Press Pvt. Ltd.,
iii. Cook R D et.al. “Concepts and applications of Finite Element analysis”, John Wiley.

SUBJECT CODE	YEAR: 3	SEMESTER 7	DSC	FINITE ELEMENT METHODS (PRACTICAL)	CREDITS: 2

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 25	PRACTICAL MARKS: 25	DURATION OF EXAM: 3 HRS

Unit-1
Simple beam models using FEA software (ANSYS) Preprocessing of model

Unit-2
ANSYS Workbench Meshing and ANSYS Workbench Solving for beam problems

Unit-3
Stress and Strain analysis in the beams considering General Assumptions and Limitations

Unit-4
Post-Processing (Interpretation Of Results) ANSYS Workbench Post-Processing

SUBJECT CODE	YEAR: 4	SEMESTER 7	DSC	HYDRAULIC STRUCTURES AND IRRIGATION DESIGN (THEORY)	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- Analyse and design gravity dam
- Design earth dam and estimate the seepage loss
- Design spillway and apron fror diversion works
- Design CD works and can regulation works
- Design canals and canal network based on the water requirement of various crops.
- Determine the reservoir capacity.

UNIT 1	Hrs
Gravity Dam: Introduction, forces acting on dam section, causes of failure, design principles, Principal and Shear stresses, Elementary and practical profile of gravity dam, Drainage gallaries. Earth Dam: Introduction, Causes of failure, Design criteria, Preliminary section, Determination of phreatic line, Estimation of seepage loss.	
UNIT 2	
Spillway: Types, Design of Ogee spillway, Upstream and Downstream profile, Energy dissipation below spillway. Diversion Headwork: Design of weir on permeable soil, Design of impervious foundation using Bligh's and Khosla's theory, Simple problems on floor design.	
UNIT 3	
Cross Drainage Works: Introduction, Types, Design considerations, Transition formula, Design of Aqueduct. **Canal Regulation Works:** Introduction, Functions of Head and Cross regulations, Longitudinal section and their component parts	
UNIT 4	
Irrigation:	

Definition. Benefits and ill effects of irrigation. System of irrigation: surface and ground water, flow irrigation, lift irrigation, Bandhara irrigation. Water Requirements of Crops: Duty, delta and base period, relationship between them, factors affecting duty of water crops and crop seasons in India, irrigation efficiency, frequency of irrigation	
UNIT 5	
Canals: Types of canals. Alignment of canals. Definition of gross command area, cultural command area, intensity of irrigation, time factor, crop factor. Unlined and lined canals. Standard sections. Design of canals by Lacey's and Kennedy's method. Reservoirs: Definition, investigation for reservoir site, storage zones determination of storage capacity using mass curves, economical height of dam	

COURSE OUTCOME

- Design the gravity dam section and also check its stability.
- Do preliminary design of earth dam and estimate seepage loss
- Design spillway profile and floor of weir on permeable foundation.
- Identify type of regulator for a can system/network
- Find the benefits and ill-effects of irrigation.
- Find the quantity of irrigation water and frequency of irrigation for various crops.
- Find the canal capacity, design the canal and compute the reservoir capacity.

REFERENCES

i. S. K. Garg, “Irrigation Engineering and Hydraulic Structures”, Khanna Publishers, New Delhi Jayarami Reddy, “A Text Book of Hydrology”, Lakshmi Publications, New Delhi.

ii. Punmia and Lal Pandey, “Irrigation and Water Power Engineering” Lakshmi Publications, New Delhi.

iii. K. R. Arora, “ Irrigation, Water Power and Water Resources Engineering”, Standard Publishers, New Delhi

SUBJECT CODE	YEAR: 3	SEMESTER 7	DSC	HYDRAULIC STRUCTURES AND IRRIGATION DESIGN (PRACTICAL)	CREDITS: 2

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 25	PRACTICAL MARKS: 25	DURATION OF EXAM: 3 HRS

Unit-1

Drawing of earthen embankment dam-homogeneous and non-homogeneous.

Unit-2

Drawing of concrete gravity dam-overflow and non-overflow section

Unit-3

Drawing of Plug sluice, surplus weir-stepped apron,

Unit-4
Design and drawing of aqueduct.

SUBJECT CODE	YEAR: 3	SEMESTER 7	DSE	ELEMENTS OF TRANSPORTATION DESIGN (THEORY)	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- Gain knowledge of different modes of transportation systems, history, development of highways and the organizations associated with research and development of the same in INDIA.
- Understand Highway planning and development considering the essential criteria's (engineering and financial aspects, regulations and policies, socio economic impact).
- Get insight to different aspects of geometric elements and train them to design geometric elements of a highway network.

UNIT 1	Hrs
Highway Development and Planning: Road types and classification, road patterns, planning surveys, master plan – saturation system of road planning, phasing road development in India, problems on best alignment among alternate proposals Salient Features of 3rd and 4thtwenty year road development plans and Policies, Present scenario of road development in India (NHDP & PMGSY) and in Karnataka (KSHIP & KRDCL) Road development plan - vision 2021.	
UNIT 2	
Highway Geometric Design of horizontal alignment elements: Cross sectional elements–width, surface, camber, Sight distances–SSD, OSD, ISD, HSD, Radius of curve, Transition curve, Design of horizontal and vertical alignment–curves, super-elevation, widening, gradients, summit and valley curves.	
UNIT 3	
Pavement Materials: Sub grade soil - desirable properties-HRB soil classification-determination of CBR and modulus of sub grade reaction with Problems Aggregates- Desirable properties and tests, Bituminous materials- Explanation on Tar, bitumen, cutback and emulsion-tests on bituminous material Pavement	

Design: Pavement types, component parts of flexible and rigid pavements and their functions, ESWL and its determination (Graphical method only)-Examples.	
UNIT 4	
Pavement Construction: Design of soil aggregate mixes by Rothfuch's method. Uses and properties of bituminous mixes and cement concrete in pavement construction. Earthwork; cutting and Filling, Preparation of subgrade, Specification and construction of i) Granular Sub base, ii) WBM Base iii) WMM base,iv) Bituminous Macadam v) Dense Bituminous Macadam vi) Bituminous Concrete,vii) Dry Lean Concrete sub base and PQC viii) concrete roads.	
UNIT 5	
Highway Drainage: Significance and requirements, Surface drainage system and design-Examples, sub surface drainage system, design of filter materials, Types of cross drainage structures, their choice and location. Highway Economics: Highway user benefits, VOC using charts only-Examples, Economic analysis - annual cost method-Benefit Cost Ratio method-NPV-IRR methods	

COURSE OUTCOME

- Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data.
- Evaluate the engineering properties of the materials and suggest the suitability of the same for pavement construction.
- Design road geometrics, structural components of pavement and drainage.

REFERENCES

i. S K Khanna and C E G Justo, "Highway Engineering", Nem Chand Bros, Roorkee.
ii. L R Kadiyali, "Highway Engineering", Khanna Publishers, New Delhi.
iii. R Srinivasa Kumar, "Highway Engineering", University Press.
iv. K. P.Subramanium, "Transportation Engineering", SciTech Publications, Chennai.

SUBJECT CODE	YEAR: 3	SEMESTER 7	DSE	INTERNSHIP	CREDITS: 6

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 100	EXAM MARKS: 200	DURATION OF EXAM: 3 HRS

Objectives: This course will enable students to get the field exposure and experience

Note: Internship:
1. This shall be carried out by students in industry set-up related to the construction/ materials testing laboratories/research organizations/project management consulting firms/QS and QA organizations/ planning and design offices/Professional organizations like ACCE/ICI/INSTRUCT/RMCMA/QCI, PMI, CIDC

etc. and other avenues related to the civil engineering domain in consultation and approval of internship guide/HOD /internship committees of the institutions.

2. The professional certification programs like ACCE(I)- SMP, ICI-BMTPC certifications, NSTRUCT certifications, CIDC certifications, RMC-QCI's RMCPCS Certification Programs, RMCMA-NRMCA'S Concrete Technologist India(CTI) programs and such similar programs by professional bodies with adequate industry exposures at sites/RMC plants can be considered as Internship /Professional Practice with due approvals from the guide/HOD /internship committees of the institutions

3. The industry/organization should issue certificates of internship offer and its completion. The offer letter should clearly have the nature of work to be done by the student and the supervisor's name and duration of internship.

4. The student shall make a midterm and final presentation of the activities undertaken during the first 6 weeks and at the end of 12th week of internship respectively, to a panel comprising internship guide, a senior faculty from the department and head of the department. Each student should submit the internship report at the end of semester with internship certificate.

5. Viva-Voce examination shall be conducted by a panel of examiners consisting of internship supervisor from industry or industry professional approved by university and internship guide from the institute.

6. The College shall facilitate and monitor the student internship program.

7. The internship should be completed during vacation after VI and VII semesters.

SUBJECT CODE	YEAR: 4	SEMESTER 8	DSC	DESIGN OF PRESTRESSED ELEMENTS (THEORY)	CREDITS: 3

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- This course will enable students to learn Design of Pre Stressed Concrete Elements.

UNIT 1	Hrs
Introduction and Analysis of Members: Concept of Pre stressing - Types of Pre stressing - Advantages - Limitations –Pre stressing systems - Anchoring devices - Materials - Mechanical Properties of high strength concrete - high strength steel - Stress-Strain curve for High strength concrete. Analysis of members at transfer - Stress concept - Comparison of behavior of reinforced concrete – pre stressed concrete - Force concept - Load balancing concept - Kern point -Pressure line.	
UNIT 2	
Losses in Pre stress: Loss of Pre stress due to Elastic shortening, Friction, Anchorage slip, Creep of concrete, Shrinkage of concrete and Relaxation of steel - Total Loss. Deflection and Crack Width Calculations of Deflection due to gravity loads - Deflection due to prestressing force -Total deflection - Limits of deflection - Limits of span-to-effective depth ratio -Calculation of Crack Width - Limits of crack width.	
UNIT 3	
Design of Sections for Flexure: Analysis of members at ultimate strength - Preliminary Design - Final Design for Type 1members.	
UNIT 4	
Design for Shear: Analysis for shear - Components of shear resistance - Modes of Failure - Limit State of collapse for shear - Design of transverse reinforcement.	
UNIT 5	
Different anchorage system and design of end block by latest IS codes	

COURSE OUTCOME

- Understand the requirement of PSC members for present scenario.
- Analyse the stresses encountered in PSC element during transfer and at working.
- Understand the effectiveness of the design of PSC after studying losses
- Capable of analyzing the PSC element and finding its efficiency.
- Design PSC beam for different requirements.

REFERENCES

i. Krishna Raju, N. “Pre stressed Concrete”, Tata McGraw Hill Publishing Company, New Delhi 2006
ii. Rajagopalan N, “Pre - stressed Concrete”, Narosa Publishing House, New Delhi
iii. Praveen Nagarajan, “Advanced Concrete Design”, Person Publishers
iv. P. Dayaratnam, “Pre stressed Concrete Structures”, Scientific International Pvt. Ltd.
v. Lin T Y and Burns N H, ‘Design of Pre - stressed Concrete Structures’ , John Wiley and Sons, New York

SUBJECT CODE	YEAR: 3	SEMESTER 8	DSC	DESIGN OF PRESTRESSED ELEMENTS (PRACTICAL)	CREDITS: 2

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 25	PRACTICAL MARKS: 25	DURATION OF EXAM: 3 HRS

Unit-1

Introduction: Basic concepts of presenting, historical development, advantages and disadvantages of pre-stressed concrete, Terminology, Introduction to IS 1343

Unit-2

Materials of pre-stressed concrete, stress – strain characteristics and properties of high strength concrete and high tensile steel.

Unit-3

Presenting system: Introduction, tensioning devices, different systems of pre-stressing and their application, tendon splices.

Unit-4

Losses of Pre-stress: Nature of losses of pre-stress in pre-tensioned and Post-tensioned Methods.

SUBJECT CODE	YEAR: 4	SEMESTER 8	DSE	EARTHQUAKE RESISTANT DESIGN OF STRUCTURES (THEORY)	CREDITS: 5

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- Understand the philosophy of Earthquake Resistant Design,
- Learn behavior of structure during earthquake
- Understand the concept of Seismic-resistant building architecture
- Apply the concept of ductile detailing in RC structures.
- Analyse and earthquake resistant design of multi story RCC building

UNIT 1	Hrs
Design philosophy: Philosophy of earthquake resistant design, earthquake proof v/s earthquake resistant design, four virtues of earthquake resistant structures(strength, stiffness, ductility and configuration), seismic structural	

configuration, Introduction to IS: 1893 (Part I), IS: 875 (Part V), and IS code provisions	
UNIT 2	
Behavior of Structures During Earthquake and Earthquake Resistant Features of Structure: Inertia forces in structures, Behavior of Brick and stone Masonry Structures: Behavior of Brick and stone Masonry Walls, Box Action, Different types of Bands, Earthquake Resistant Features of Stone Masonry Structures. Behavior of RC Structures: Load Transfer Path, Strength Hierarchy, Reversal of Stresses, Importance of Beam Column Joints, Importance of Stiffness and Ductility (Capacity Design Concept) in Structures, Effect of Short Column, Effect of Soft Storey, Improper Detailing, Effect of Masonry Infill Walls, Effect of Eccentricity	
UNIT 3	
Seismic-resistant building architecture: Introduction; Lateral load resisting systems- moment resisting frame, Building with shear wall or bearing wall system, building with dual system; Building configuration – Problems and solutions; Building characteristics – Mode shape and fundamental period, building frequency and ground period, damping, ductility, seismic weight, hyperstaticity /redundancy, non-structural elements.	
UNIT 4	
Ductility considerations in earthquake resistant design of RCC buildings: Introduction; Impact of ductility; Requirements for ductility; Assessment of ductility–Member/element ductility, Structural ductility; Factor affecting ductility; Ductility factors; Ductility considerations as per IS13920	
UNIT 5	
Earthquake resistant design of a multi-storey RCC building: Determination of lateral forces on an intermediate plane frame using Equivalent static method and Model analysis using response spectrum; Analysis of the intermediate frame for various load combinations as per IS1893(Part 1); Identification of design forces and moments in the members; Design and detailing of typical flexural member ,typical column, footing and detailing of a exterior joint as per IS13920	

COURSE OUTCOME

- Apply the concept of earthquake engineering in seismic analysis and design of structures

REFERENCES

i. Earthquake resistance design of structure by Duggal- Oxford University Press.
ii. Earthquake – Resistant Design of Building Structures-Dr. Vinod Hosur-- Wiley India
iii. Earthquake resistant design of structures- Agarwal, Shrikhande, PHI learning. Reference
iv. Dynamics of structure by Clough R.W. and Penzin J. McGraw Hill Civil Engineering Series.

v. Dynamics of structure by Anil Chopra, Prentice Hall India Publication.

SUBJECT CODE	YEAR: 4	SEMESTER 8	CC	RESEARCH PROJECT	CREDITS: 6

CONTACT PERIOD	INTERNAL ASSESSMENT MARKS(IA): 60	EXAM MARKS: 140	DURATION OF EXAM: 3 HRS

Course objectives:

- To support independent learning.
- To develop interactive, communication, organization, time management, and presentation skills.
- To impart flexibility and adaptability.
- To inspire independent and team working.
- To expand intellectual capacity, credibility, judgment, intuition.
- To adhere to punctuality, setting and meeting deadlines.
- To instill responsibilities to oneself and others.
- To train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas

Project Work :

Each student of the project batch shall involve in carrying out the project work jointly in constant consultation with internal guide, co-guide, and external guide and prepare the project report as per the norms avoiding plagiarism.

Course outcomes: At the end of the course the student will be able to:

- Describe the project and be able to defend it.
- Develop critical thinking and problem solving skills.
- Learn to use modern tools and techniques.
- Communicate effectively and to present ideas clearly and coherently both in written and oral forms.
- Develop skills to work in a team to achieve common goal.
- Develop skills of project management and finance.
- Develop skills of self learning, evaluate their learning and take appropriate actions to improve it.
- Prepare them for life-long learning to face the challenges and support the technological changes to meet the societal needs.

SUBJECT CODE	YEAR: 1	SEMESTER I	OE 1	BASIC STRUCTURAL ELEMENTS (THEORY)	CREDITS: 3

CONTACT PEROID	INTERNAL ASSESMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

Students will be able to understand the basic principles of mechanics and behavior of elements and ability to analyze the standard members in structures

UNIT 1	Hrs
Introduction to build elements – Study of built elements in construction with respect to materials used. Basic construction methods and general specifications. General types and classification of different types of buildings.	
UNIT 2	
Structural element Beams-their functions and behavior, types -simply supported, cantilever and overhanging beams **Structural element Columns**-their functions and behavior, types -short column, long column	
UNIT 3	
Structural element Slabs-their functions and behavior, types -based on length, based on materials **Structural element lintel, chajjas**-their functions and behavior, types -based on materials	
UNIT 4	
Structural element Staircase-their functions and behavior, types -straight, turning and geometrical. **Structural element Foundation**-their functions and behavior, types -shallow and deep. Structural element retaining walls-their functions and behavior.	
UNIT 5	
Primary and secondary forces acting on the structures, Characteristic requirements of structural design – stress and strains, strength, stiffness and stability. Structural properties of basic materials like masonry, timber, concrete and steel etc.	

COURSE OUTCOME

- The course provides an in-depth understanding the concepts associated with framed structures.
- This course provides knowledge of the different forces, force systems and structural behavior of different members due to applied forces.

REFERENCE

i. Rowland J. Mainstone : Development of Structural Form
ii. Rangwala : Engineering Materials

iii. S.P.Bindra, S.P.Arora, Building Construction
iv. B.C. Punmia : Strength of Materials vol - I

SUBJECT CODE	YEAR: 1	SEMESTER II	OE 2	SOLID WASTE MANAGEMENT (THEORY)	CREDITS: 3

CONTACT PEROID	INTERNAL ASSESMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- To provide detailed knowledge and skills in the management, treatment, disposal and recycling options for solid wastes, while focusing on technical aspects involved. Understanding of the basic principles of waste and resource management will be supplemented.

UNIT 1	Hrs
Introduction : Functional elements of municipal solid waste (MSW) management system, Sources: Sources of Solid waste, Types of solid waste, Physical and Chemical composition of municipal solid waste. Generation rate, Environmental implications of open dumping of MSW, Construction debris – management & handling. Rag pickers and their role.	
UNIT 2	
Collection: Collection of solid waste- services and systems Haul and stationary container system, equipments, Transportation: Need of transfer operation, transfer station, transport means and methods, route optimization.	
UNIT 3	
Treatment / Processing Techniques: Components separation, volume reduction, size reduction, chemical reduction and biological processing problems. **Composting**: Aerobic and anaerobic composting, factors affecting composting, Indore and Bangalore processes, mechanical and semi mechanical composting processes. Vermicomposting.	
UNIT 4	
Anitary Land Filling: Different types, trench area, Ramp and pit method, site selection, basic steps involved, cell design, prevention of site pollution, leachate & gas collection and control methods, geosynthetic fabrics in sanitary land fills. **Incineration:** Process – 3 T's, factors affecting incineration process, incinerators – types, prevention of air pollution, pyrolsis, design criteria for incineration.	
UNIT 5	

Sources, collection, treatment and disposal:- Biomedical waste and E-waste, RECYCLE AND REUSE: Material and energy recovery operations, reusein other industries, plastic wastes, environmental significance and reuse.	

COURSE OUTCOME

- Identify improper practices of solid waste disposal and their environmental implications. Know the basic engineering principles of solid waste management
- Describe the need for economics in collection and transportation of solid waste and clearly discuss various types of collection systems and analyse system dynamics
- Understand the management concepts, define 4 R approach, apply PPP model and community involvement for effective management of solid waste

REFERENCE

i. Tchobanoglous G., Theissen H., and Eliassen R., "Solid Waste Engineering Principles and Management Issues", McGraw Hill, New York. Pavoni J.L., "Handbook of Solid Waste Disposal".
ii. Peavy, Rowe and Tchobanoglous, "Environmental Engineering", McGraw Hill.
iii. Mantell C.L., (1975), "Solid Waste Management", John Wiley

SUBJECT CODE	YEAR: 2	SEMESTER III	OE 3	ALTERNATE FAÇADE TREATMENT (THEORY)	CREDITS: 3

CONTACT PEROID	INTERNAL ASSESMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- Design of façade can be met by various ways of building and building materials the real challenge is to combine these functions in an aesthetic and authentic design that will capture the imagination of the public.

UNIT 1	Hrs
Introduction Definition, Basic principles, different functions, elements of façade, types and application	
UNIT 2	
Façade Materials	

Basic materials and alternative advanced materials - Importance, properties and design consideration based on climatic condition, rainscreen cladding, ceramic cladding, Exterior compact (HPL)cladding.	
UNIT 3	
Facade Impact on Energy Use, Daylight and Visual Comfort, Thermal Comfort Energy Codes and Rating Systems, Current Trends in The Design on façade building materials.	
UNIT 4	
Future façade Introduction, scope in design, Types of future façade- Facades generating Power, Thermally Dynamic Facades, Biomimicry in Facades, Facades Enhancing Outdoor Environment, Facades Enhancing Indoor Environment.	
UNIT 5	
Literature study on façade system, case study on façade system and site visits and report preparation.	

COURSE OUTCOME

- Changes and advances in *facades* will ultimately enhance fundamental aspects of exterior building and enriching the daily living.

REFERENCES

- **Contemporary Facades (Commercial)** by IAG (Author), I A Group
- Facades: Design, Construction & Technology by Lara Menze
-

SUBJECT CODE	YEAR:2	SEMESTER IV	OE 4	TOWN PLANNING (THEORY)	CREDITS: 3

CONTACT PEROID	INTERNAL ASSESMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- To understand the concept of balanced town by ensuring that new and existing facilities are complimentary to each other.
- To provide sustainable buildings by considering the environmental, social and economic conditions.
- To provide diversity of accommodation

UNIT 1	Hrs
Introduction: Objects of town planning, principles of town planning, Origin and growth of towns – development of towns, Modern town planning in India, Socio – Economic aspects of town planning. Selection of site for an ideal town.	
UNIT 2	
Surveys & Planning: Various types of surveys to be conducted for town planning project. Data's to be collected in different types of town planning survey. Types of planning, -a brief note on urban, rural and regional planning **Zoning:** Definition – Objects and principles of zoning. Advantages of zoning, Special Economic Zone (SEZ), Maps for zoning.	
UNIT 3	
Housing: Classification of residential building as per HUDCO norms, Housing in villages, Low Cost Housing, Housing policy, different types of housing agencies involved in housing, investment in Housing, Housing Problems in India **Slums:** Causes, growth, characteristics, effects, slum clearance and re-housing, prevention of slum formation, financial assistance for slum clearance. **Public buildings & Industries:** Classification – location, Design Principles of public building, Grouping of public buildings. Effects of Industries on towns and cities, classification of industries, regulation of their location.	
UNIT 4	
Recreation measures: Parks- park ways, Playgrounds, Theme parks, boulevards and their space standards, knowledge of Landscape sketches for a) Residential Building, b) Public Buildings and c) Industrial Buildings.	
UNIT 5	
Urban Roads: Objects, requirements, classification, types of street systems, through and bypass roads, outer and inner ring roads, expressways, freeways. **Traffic Management:** Objects, traffic surveys, traffic congestion, traffic control, road junctions and intersections, parking, road accidents, traffic capacity of roads, traffic islands, roundabouts, traffic signals, road signs, road markings, street lighting in a town.	

COURSE OUTCOME

- Analyse the data collected and apply suitable methods of planning.
- Assess the infrastructure requirements of towns and to distinguish between rural and urban planning methods.
- Solve the real time problems by keeping in view of social, environmental and health issues in a sustainable way.

REFERENCES

i. Town Planning by Rangwala.
ii. Fundamentals of Town Planning by G.K Hiraskar.
iii. Town Planning by Abir Bandyopadhyay.
iv. www.moud.gov.in/
v. www.uddkar.gov.in
vi. https://www.karnatakahousing.com/

SUBJECT CODE	YEAR: 1 & 2	SEMESTER I,II,III,IV	OE 5	BUILDING MATERIALS AND METHODS (THEORY)	CREDITS: 3

CONTACT PEROID	INTERNAL ASSESMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- Study the alternative building materials in the present context.
- Understand the alternative building technologies which are followed in present construction field.

UNIT 1	Hrs
Alternate Building Materials: Lime, Pozzolana cements, Raw materials, Manufacturing process, Properties and uses. Fibers- metal and synthetic, Properties and applications. Fiber reinforced plastics, Matrix materials, Fibers organic and synthetic, Properties and applications.	
UNIT 2	
Elements of Structural Masonry: Elements of Structural Masonry, Masonry materials, clay blocks, concrete blocks, stone boulders, laterite Blocks, Fal- G blocks and Stabilized mud block. Manufacture of stabilized blocks. **Structural Masonry Mortars:**	

Mortars, cementations materials, sand, natural & manufactured, types of mortars, classification of mortars as per BIS, characteristics and requirements of mortar, selection of mortar.	
UNIT 3	
Reusable materials: Building materials from agro and industrial wastes, Types of agro wastes, Types of industrial and mine wastes, Properties and applications. Masonry blocks using industrial wastes. Construction and demolition wastes.	
UNIT 4	
Alternate Building Technologies: Use of arches in foundation, alternatives for wall constructions, composite masonry, confined masonry, cavity walls, rammed earth, Ferro cement and ferroconcrete building components, Materials and specifications, Properties, Construction methods, Applications. Top down construction, Mivan Construction Technique. **Alternate Roofing Systems:** Concepts, Filler slabs, Composite beam panel roofs, Masonry vaults and domes.	
UNIT 5	
Equipment for Production of Alternate Materials: Equipments for production of stabilized blocks, Moulds and methods of production of precast elements, Cost concepts in buildings, Cost saving techniques in planning, design and construction, Cost analysis: Case studies using alternatives.	

COURSE OUTCOME

- Analyse different alternative building materials which will be suitable for specific climate and in an environmentally sustainable manner. Also capable of suggesting suitable agro and industrial wastes as a building material.
- Recommend various types of alternative building materials and technologies and design a energy efficient building by considering local climatic condition and building material.

REFERENCES

i. KS Jagadish, B V Venkatarama Reddy and K S Nanjunda Rao, “Alternative Building Materials and Technologies”, New Age International pub.
ii. Arnold W Hendry, “Structural Masonry”, Macmillan Publishers.
iii. RJS Spence and DJ Cook, “Building Materials in Developing Countries”, Wiley pub.
iv. LEED India, Green Building Rating System, IGBC pub. 3. IGBC Green Homes Rating System, CII pub.
v. Relevant IS Codes.

SUBJECT CODE	YEAR: 1 & 2	SEMESTER I,II,III,IV	OE 6	APPLIED GEOLOGY (THEORY)	CREDITS: 3

CONTACT PEROID	INTERNAL ASSESMENT MARKS(IA): 40	THEORY MARKS: 60	DURATION OF EXAM: 2.5 HRS

OBJECTIVES

- To inculcate the importance of earth's interior and application of Geology. Attempts are made to highlight the industrial applications of minerals.
- To provide knowledge on dynamic Geology and its importance in modifying the physical character of rocks

UNIT 1	Hrs
Introduction: Application of Geology, Understanding the earth, internal structure and composition. **Mineralogy:** Mineral properties, composition and their use in the manufacture of construction materials – Quartz Group (Glass); Feldspar Group (Ceramic wares and Flooring tiles); Kaolin (Paper, paint and textile); Asbestos (AC sheets); Carbonate Group (Cement); Gypsum (POP, gypsum sheets, cement); Mica Group (Electrical industries); Ore minerals - Iron ores (Steel); Chro mite (Alloy); Bauxite (aluminum); Chalcopyrite (copper).	
UNIT 2	
Structural Geology & Rock Mechanics: Structural aspects of rocks like Outcrop, Dip and strike, Folds, Faults, Joints, Unconformities and their influence on Projects/structures like dam, tunnels, slope treatment; ground improvement, recognition of the structures in field and their types/classification. Rock Quality Determination (RQD) & Rock Structure Rating (RSR).	
UNIT 3	
Hydrogeology: Hydrological cycle, Aquifers and its types. Occurrence of ground water in different rock types. Ground water recharge and management Geological and Geophysical methods of Ground water exploration	
UNIT 4	
Geomatics And Environmental Geology: Study of Toposheets, Remote Sensing Techniques. Application of GIS and Study of Toposheets, Remote Sensing Techniques. Application of GIS and GPS (Global Positioning System)	
UNIT 5	

Geomorphology Soil formation and soil profile. The apprehension of Index properties of rocks: Porosity, Density, Permeability, and Durability. Selection of rocks as materials for construction, as a foundation, Decorative, Flooring, and Roofing, Concrete Aggregate, Road Metal, Railway Ballast with examples.	

COURSE OUTCOME

- Students will acquire knowledge on durability and competence of foundation rocks, and confidence enough to use the best building materials.

REFERENCE

i. P.K. Mukerjee, “A Text Book of Geology”, World Press Pvt., Ltd.Kolkatta.
ii. Parbin Singh, “Text Book of Engineering and General Geology”, Published by S.K.Kataria and Sons, New Dehli.
iii. K V G K Gokhale, “Principles of Engineering Geology”, B S Publications, Hyderabad.
iv. M Anji Reddy, “Text book of Remote Sensing and Geographical Information System”, BS Publications, Hyderabad.