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UNIVERSITY OF MYSORE

Estd. 1916

VishwavidyanilayaKaryasoudha
Crawford Hall, Mysuru- 570 005

No.AC2(S)/55/2024-25

Dated: 20.07.2024

Notification

Sub:-Syllabus and Scheme of Examinations of Electronics (UG) programme (I & II Semester) from the Academic year 2024-25.

Ref:-1. Decision of Board of Studies in Electronics (UG) meeting held on 05-06-2024.
2. Decision of the Faculty of Science & Technology meeting held on 19-06-2024.
3. Decision of the Academic Council meeting held on 28.06.2024.

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The Board of Studies in Electronics (UG) which met on 05-06-2024 has resolved to recommend & approved the Syllabus and Scheme of examinations of Electronics (UG) programme (I & II Semester) with effect from the Academic year 2024-25.

The Faculty of Science & Technology and Academic Council at their meetings held on 19-06-2024 and 29-06-2024 respectively has also approved the above said Syllabus and Scheme of examinations hence it is hereby notified.

The Syllabus and Scheme of Examinations content may be downloaded from the University Website i.e., www.uni-mysore.ac.in.

Registrar

Registrar
University of Mysore
Mysore

To;

1. All the Principal of affiliated Colleges of University of Mysore, Mysore.
2. The Registrar (Evaluation), University of Mysore, Mysuru.
3. The Chairman, BOS/DOS in Electronics, Manasagangothri, Mysore.
4. The Dean, Faculty of Science & Technology, DOS in Mathematics, MGM.
5. The Director, Distance Education Programme, Moulya Bhavan, Manasagangotri, Mysuru.
6. The Director, PMEB, Manasagangothri, Mysore.
7. Director, College Development Council , Manasagangothri, Mysore.
8. The Deputy Registrar/Assistant Registrar/Superintendent, Administrative Branch and Examination Branch, University of Mysore, Mysuru.
9. The PA to Vice-Chancellor/ Registrar/ Registrar (Evaluation), University of Mysore, Mysuru.
10. Office Copy.

University of Mysore

Curriculum for I and II Semester B.Sc. Degree with

Electronics

From the Academic Year 2024-25

(Based on UoM Letter with No.AC2(S)/07/2024-25, dated, 23-05-2024)

Subject: Electronics

Submitted to

University of Mysore

Mysuru, Karnataka.

Preamble

The proposed curriculum content for B.Sc. Degree in Electronics as per GoK and University of Mysore Guidelines 2024 is intended to enable the graduates to respond to the current needs of the Industry and equip them with skills relevant for National and Global standards. The framework encourages innovation in teaching-learning process and appropriate assessment of student learning levels.

Introduction

B.Sc. Degree in Electronics is a program that develops a specialized skill set among the graduates to cater to the need of Academia and Industries . The curriculum is designed to help learners to analyze, appreciate, understand, and critically engage in learning the courses and to provide better learning experience to the graduates. Apart from imparting disciplinary knowledge, the curriculum is aimed to equip the graduates with competencies like problem solving and analytical thinking which provide them professional competencies. To achieve the Course and Program Outcomes, the University encourages its faculties to make suitable pedagogical innovations, in addition to teaching/learning processes suggested in the curriculum.

Significance of Electronics

In recent years, Electronics has made unprecedented growth in terms of new technologies, new ideas, and principles. The research organizations and industries that work in the frontier area of Electronics are in need of highly skilled and scientifically oriented manpower. This is addressed by flexible, adaptive, and progressive training programs and a cohesive interaction among the Institutions, Universities, and Industries. The key areas of study and hands on training within the subject area of Electronics comprising of Semiconductor Devices, Circuit Analysis, Analog and Digital Circuit Design, Microprocessors and Microcontrollers, Embedded Systems, Knowledge on Coding/Programming in High Level Languages, Basic and Advanced Communication Systems like IoT, 4G, 5G, Satellite and Optical communication, Signal Processing, VLSI Technology, Basics of Control Systems and Robotics, etc.

Eligibility Criteria

A candidate who has passed two year Pre-University Examination with Science Courses conducted by the Pre-University Board of Education, Government of Karnataka or any other examination considered equivalent by the University is eligible for admission to the first Semester of the UG program.

Programme Objectives

- To impart quality education to the students so that they acquire knowledge in Electronics.
- To provide students with the fundamental skills of different domains in Electronics to enhance the knowledge and understanding of key concepts of Electronics.
- To equip students with advanced Scientific and Technological capabilities for analyzing and tackling the issues and problems in the field of Electronics.
- To build mathematical and numerical background for the design and analysis of Electronic Circuits..
- To develop self and continuous learning and practice professional ethics for societal benefits.
- To provide students with skills that enables them to get employment in Industries or pursue higher studies or research assignments or turn as entrepreneurs.

Programme Outcomes

- Understand comprehensively the entire range of Electronic Devices and Circuits with the state-of art knowledge on advanced electronic systems.
- Identify, formulate, and solve problems in the area of Electronics.
- Design and manage Electronic Systems or Processes that conforms to a given specification within ethical and economic constraints
- Ability to use Modern Tools/Techniques in solving problems in the field of Electronics.
- Function effectively as an individual and as a member in diverse teams and in multidisciplinary settings
- Excel in their professional endeavors through self-education.

Scheme of Evaluation

The Scheme of Examination, Evaluation, Passing Criteria, etc., are as per the Regulations of University of Mysore. The performance of the candidate in Theory, Practical, and Project Work are assessed based on three discrete components identified as C1, C2, and C3. The components C1 and C2 are the Continuous Internal Assessments (CIA) and C3 is the Semester End Examination (SEE). The CIA C1 and C2 are to be conducted during 8^{th} and 15^{th} weeks of the Semester. The SEE for C3 is conducted during 18^{th} to 20^{th} week based on University notification.

C1 and C2 for Theory Courses

The C1 and C2 components of each Courses are evaluated for 10 marks. The C3 component is evaluated for 80 marks through SEE. The duration of semester end Examination is 3 Hours. The scheme of evaluation of C1 and C2 is given in Table 1.

Table 1. Scheme of Evaluation for C1 and C2 in Theory courses

Activity	Marks Allotted	
	C1	**C2**
Test (Best of Two Tests)	05	05
Assignment	05	---
Seminar/Mini Project Work/Case Study/ Report on Industry Visit, etc.,	----	05
Total Marks	10	10

Scheme of Evaluation for Practical Courses

In the practical courses, students are evaluated on the basis of skill, comprehension, and recording the results. The C1 and C2 components in practicals are evaluated for 05 marks. The C3 component which is the S EE is evaluated for 40 marks. The scheme of evaluation of C1 and C2 components is given in Table 2.

Table 2. Scheme of Evaluation for C1 and C2 for Practical Courses

Activity	Marks Allotted	
	C1	**C2**
Test, Regularity and Performance in the Practical Sessions, etc.	05	----
Laboratory Record	---	05
Total Marks	05	05

The scheme of evaluation of C3 component of practical courses is given below.

- A candidate appearing for the Practical examination should submit a duly signed and certified practical record
- Each candidate has to perform given experiment in the specified duration for forty marks. The evaluation scheme is given in Table 3.

Table 3. Scheme of evaluation for C3 component in Practical Examination

Division	Marks
Write up (Circuit Diagram/Program/Formula/ Tabular Column/Expected Results, etc.)	20
Conducting of experiments/Programme Execution/Recording of Results, etc.	15
Viva	05
Total	**40**

Question Paper Pattern

Time: 3 Hours Max. Marks: 80

PART-A

1. Answer any **TEN** questions. 10 x 2 = 20

Short Answer questions of 2 marks each. Four questions from each unit.

PART-B

Answer any **THREE** questions. (Question No. 2 to 5) 3 x 20 = 60

Each main question of 20 marks with a split of questions carrying six, five, four, and three marks.

One question from each unit and the last question shall be from all three units.

UNIVERSITY OF MYSORE

Course Structure and Syllabus for B.Sc. (Electronics) from the Academic Year 2024-25

Sl. No.	Semester	Course Code	Course Title	Teaching Hours/Week			Examination				Total Credits
				L	T	P	Examination Hours	CIA Marks	SEE Marks	Total	
1.	I	DSC-ELE1	Fundamentals of Electronics	3	0	0	3	20	80	100	3
		DSC-ELE1P	Fundamentals of Electronics Practical	0	0	4	3	10	40	50	2
2.	II	DSC-ELE2	Analog Electronic Circuits	3	0	0	3	20	80	100	3
		DSC-ELE2P	Analog Electronic Circuits Practical	0	0	4	3	10	40	50	2

I Semester

Program Name	**BSc with Electronics**	Semester	**First Semester**
Course Title	**Fundamentals of Electronics**		
Course Code	DSC-ELE1	No. of Credits	**3**
Contact Hours	**45 Hours**	Duration of Exam	**3 Hours**
CIA Marks	**20**	SEE Marks	**80**

Course Objectives:

- To acquire the knowledge of working principles of Electronic components
- To understand Network theorems with examples
- To know the classification and characteristics of semiconductor diodes
- Deliberate in detail the application of semiconductor diodes

Course Outcomes:

- Analyze basic networks using network theorems.
- Demonstrate the working of analog circuits as per the specifications.
- Explain the principles and behavior of basic semiconductor devices
- Build simple electronic circuits

Contents	**45 Hrs**
Unit 1	15 Hrs

Resistors: Ohm's law, concept of resistance, classification of resistors, fixed – carbon composition, metal film & SMD resistors, Variable – Carbon composition and preset, color code, equivalent resistors in series and parallel combination, applications. **Capacitors:** Classification, types, fixed– Ceramic, polystyrene Electrolytic, and SMD capacitors, Variable – ganged and trimmer capacitors, equivalent capacitors in series and parallel combination and its applications. **Inductors:** Classification, types, equivalent inductors in series and parallel combination and its applications. **Transformers:** Principle and Types: step-up, step-down, Isolation, Center taped. **DC analysis of RC Circuit:** Charging and discharging of Capacitor through Resistor and time constant, energy stored in Capacitor. **DC analysis of RL Circuit:** Growth and decay of current in series RL Circuit, time constant, and energy stored in Inductor. **AC Fundamentals:** Instantaneous voltage, peak voltage, RMS voltage, frequency, time period, with reference to sinusoidal waveform.

Unit 2	15 Hrs
AC Analysis: AC analysis of RC, RL circuits. Series and parallel resonant RLC circuits- Condition for resonance, Resonant frequency, Half power frequencies, BW, Quality factor. Kirchhoff's current law and Kirchhoff's voltage law, current and voltage divider rule. **Network theorems:** Super position theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, and Reciprocity theorem.	
Unit 3	15 Hrs
PN-junction Diode: Introduction, ideal and practical diodes, construction of PN-Junction, V-I characteristics**. Rectifiers:** Half-wave and Full-wave bridge rectifier, PIV, Ripple factor and efficiency. **Filters** - Operation of full wave rectifier with shunt capacitor filter. **Zener diode**: Introduction, construction of Zener diode, V-I Characteristics, Zener, and avalanche breakdown. Zener voltage regulator - load and line regulation. **Fixed voltage regulators:** 78xx and 79xx series. Block diagram of regulated DC power supply. **Wave shaping circuits-** Clippers and Clampers - Positive and Negative type.	

Reference Books	
1	Robert L Boylestad, and Louis Nashelsky, "Electronic Devices & Circuit Theory," 11th Edition, Pearson Education India, 2018.
2	Ravish R Singh, "Network Analysis and Synthesis," 1st Edition, MGH, 2018.
3	Robert L Boylestad, "Introductory Circuit Analysis," 15th edition, Pearson, 2015.
4	R. S. Sedha, "A Text book of Applied Electronics," 7th edition., S. Chand and Company Ltd., 2011.
5	A. P. Malvino, and, David J Bates, "Electronics Principles," 7th Edition, TMH, 2011.
6	David A. Bell, "Electronic Devices and Circuits," 5th Edition, Oxford Uni. Press, 2015.

I Semester

Program Name	**BSc with Electronics**		Semester	**First Semester**
Course Title	**Fundamentals of Electronics Practical**			
Course Code	DSC-ELE1P		No. of Credits	**2**
	CIA Marks	**10**	SEE Marks	**40**
Note: Minimum of 8 Experiments to be completed				

Course Objectives:

- To gain practical knowledge in the field of electronic circuits through experiment
- Analyze Electronic circuits by applying Network theorems
- Understand the V-I characteristics of Diodes
- Build simple electronic circuits

Course Outcomes:

- Understand the working of Electronic Instruments
- Understand circuit reduction using Network theorems
- Understand the behavior of semiconductor devices
- Able to design a simple power supply

1. Study of charging and discharging of a capacitor - determination of time constant
2. Study of series and parallel LCR resonant circuits – determination of resonant frequency, bandwidth, and Q- factor.
3. Verification of Thevenin's and Norton's Theorem
4. Verification of Maximum Power Transfer Theorem
5. Study the V-I Characteristics of p-n junction diode- determination of resistances and knee voltage.
6. Study the V-I Characteristics Zener diode – determination of zener break down voltage.
7. Zener diode as a voltage regulator (line and load regulation)
8. Half wave rectifier – determination of ripple factor with and without filter.
9. Full wave Bridge rectifier – determination of ripple factor with and without filter.
10. Study of clipping and clamping circuits.
11. Design of DC regulated power supply.
12. Design of fixed voltage regulator circuits

II Semester

Program Name	**B.Sc. with Electronics**		Semester	**Second Semester**
Course Title	**Analog Electronic Circuits**			
Course Code	DSC-ELE2		No. of Credits	**3**
Contact hours	**45 Hours**		Duration of Exam	**3 Hours**
	CIA Marks	**20**	SEE Marks	**80**

Course Objectives:

- Understand the operation and applications of transistors
- Understand and analyze the design of transistor Amplifiers and Oscillators
- Understand the characteristics and applications of operational amplifiers
- Design of electronic circuits using op-amp

Course Outcomes:

- Analyze biasing techniques to operate a transistor.
- Understand and demonstrate the working of transistor amplifier circuits
- Understand and demonstrate the working of transistor oscillator circuits
- Design and build the circuits using op-amp

Contents	**45 Hrs**
Unit 1	15 Hrs

Bipolar Junction Transistor: Introduction to transistors- types, construction and working of NPN transistor, CE, CB and CC configurations, input and output characteristics of a transistor in CE configuration. Regions of operation (active, cut off, and saturation), Current gains α and β. Relations between α and β. **Transistor biasing:** Need for biasing, DC load line and Q point, Thermal runaway, need for Stabilization - stability and stability factor, Types of biasing - Fixed Bias, and Voltage Divider Bias.

Unit 2	15 Hrs

Amplifiers: Definition and classification of amplifiers, single stage CE amplifier- construction, working, and frequency response. Application of transistor as switch. **Multistage amplifiers**: Introduction, Types of coupling, Two-stage RC Coupled Amplifier and its frequency Response **Power amplifiers:** Class A, Class B, and Class C power amplifiers. **Feedback in Amplifiers:**

Concept of feedback, negative and positive feedback, and advantages of negative feedback. **Oscillators:** Introduction, Type of oscillators, Barkhausen criterion for sustained oscillations. Phase shift oscillator, Colpitt's oscillator, Hartley Oscillator, and crystal oscillator.	
Unit 3	15 Hrs
OP-AMP: Introduction, Basics of Differential Amplifier, Block diagram of Op-Amp, Characteristics of an Ideal and Practical Op-Amp, Open and closed loop inverting and non-inverting amplifiers. **Op-amp parameters** – input and output impedance, off-set voltage, CMRR, Slew Rate. Concept of Virtual Ground. **Applications of Op-Amps: A**dder, subtractor, Integrator, Differentiator and voltage follower. Comparator and Zero-crossing detector. Phase shift and Wein bridge oscillator, Astable multivibrator using Op-amp, Square wave &Triangular Wave Generators. **Filters**- Introduction to Active and passive filters, First Order active low pass and high pass Butterworth filter. Second Order active low pass and high pass Butterworth filter.	

Reference Books	
1	Robert L Boylestad, and Louis Nashelsky, "Electronic Devices & Circuit Theory," 11th Edition, Pearson Education India, 2018.
2	R. S. Sedha, "A Text book of Applied Electronics," 7th edition., S. Chand and Company Ltd., 2011.
3	David A. Bell, "Electronic Devices and Circuits," 5th Edition, Oxford Uni. Press, 2015.
4	R. A. Gayakwad, "Op-Amps and Linear Integrated Circuit," 4th Edition, Pearson Education, 2000.
5	David A. Bell, "Operational Amplifiers and Linear ICs," 3rd Edition, Oxford University Press, 2011.
6	Robert L Boylestad, "Introductory Circuit Analysis," 15th edition, Pearson, 2015.

II Semester

Program Name	**BSc in Electronics**		Semester	**Second Semester**
Course Title	**Analog Electronic Circuits Practical**			
Course Code	DSC-ELE2 P		No. of Credits	**2**
	CIA Marks	**10**	SEE Marks	**40**
Note: Minimum of 8 Experiments to be completed				

Course Objectives:

- Study the characteristics of transistor in CE mode
- Understand the working of amplifiers
- Understand different applications of op-amp.
- Design different signal conditioning circuits like filters.

Course Outcomes:

- Analyze practical behavior of BJT
- Design simple circuits using op-amp
- Understand the concept and working of Filters

1. Input, output characteristics of transistor in CE configuration – determination of transistor parameters.
2. Single-Stage CE amplifier with and without bypass capacitor– frequency response and determination of bandwidth
3. Colpitt's oscillator using Transistor – determination of output frequency
4. Phase shift oscillator using Transistor – determination of output frequency.
5. Feedback amplifiers- determination of gain and bandwidth with and out feedback.
6. Op-amp Inverting, and Non-inverting amplifier (D.C)- determination of output voltage and voltage gain.
7. Op-amp Adder and subtractor – determination of output voltage.
8. To study the zero-crossing detector and comparator.
9. To study op-amp Integrator and Differentiator.
10. To design a Wien bridge oscillator using an op-amp.
11. To design a Phase shift oscillator using an op-amp.
12. To design Butterworth Low Pass and plot frequency response.
13. To design a Butterworth High Pass active Filter and plot frequency response.