Dr V S KRISHNA GOVERNMENT DEGREE COLLEGE(A)
VISAKHAPATNAM

MAJOR Courses offered w.e.f. AY 2023-24

SEMESTER-II COURSE CODE:23ELEM21

COURSE 3: FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

Theory hrs/week | Credits: 4 | 5

Objectives

The students will learn:

1) basics of electrostatics, Gauss theorem and its applications, concept of a capacitor, various types of capacitors and dielectric constant, magnetic effects of current, cells and the measuring instruments like ammeter andvoltmeter,

2) basics of p-n junction, rectifying action of a diode, regulated power supplies andwave shaping circuits, and

3) transistor and its three modes of operation, h-parameter model of a transistor andthe frequency response of an amplifier.

UNIT-I

Electrostatics: Electric charges - Coulomb's law - Electric field - Electric intensity and electric potential - Relation between electric potential and intensity - Electric intensity and potential due to a uniform charged conducting sphere at a point outside, on, andinside the conductor.

Electric dipole - Dipole moment - Intensity and potential due to a dipole - Statementand proof of Gauss law - Application of Gauss law to uniformly charged solid sphere.

UNIT-II

Capacitors: Definition and unit of capacity - Capacitance of a parallel plate capacitor - Effect of dielectric on capacity - Capacitors in series and parallel - Energy stored in acharged capacitors - Loss of energy on sharing of charges between two capacitors - Force of attraction between plates of charged parallel plate capacitor - Kelvin's attracted disc electrometer - Measurement of potential and dielectric constant.

Type of capacitors - Mica capacitor, Electrolytic capacitors, Variable air capacitor - Uses of capacitors.

UNIT-III

Electrical Measurements: Carey-Foster bridge - Determination of specific resistance - Potentiometer - Calibration of low and high range voltmeters - Calibration of Low range ammeter.

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Magnetic Effect of Current: Biot-Savart's law [Force on a conductor carrying currentplaced in a magnetic field - Principle, construction and theory of a moving coil ballistic galvanometer - Measurement of figure of merit of B.G. - Comparison of capacitors using B.G.

UNIT-IV

Diode circuits and power Supplies: Junction diode characteristics - Half and full wave rectifiers - Expression for efficiency and ripple factor - Construction of low range power peak using diodes - Bridge rectifier - Filter circuits - Zener Diode - Characteristics - Regulated power supply using Zener diode - Clipper and Clamper using diodes. Differentiator and integrator using resistor and capacitor.

UNIT-V

Transistor circuits: Characteristics of a transistor in CB, CE modes - Relatively merits Graphical analysis in CE configuration - Transistor as a amplifier - RC coupled

Single stage amplifier - Frequency response - Thevenin's and Norton's theorems - h parameters.

Basis logic gates AND, OR, and NOT - Construction of basic logic gates using diodesand transistors.

Text Books

Electricity and Magnetism - *M. Narayanamoorthi and Others*, National PublishingCo., Chennai. Electricity and Magnetism - *R. Murugeshan*, S. Chand & Co. Ltd., New Delhi,Revised Edition, 2006.

Principles of Electronics - *V.K. Mehta*, S. Chand & Co., 4/e, 2001.

Basic Electronics - *B.L. Theraja*, S. Chand & Co., 4/e, 2001.

Reference Books

Electricity and Magnetism - *Brijlal & Subrahmanyam*, Ratan Prakashan Mandir,Agra.

Fundamentals of Electricity and Magnetism - *B.D. Duggal & C.L. Chhabra*, Shoban Lal Nagin Chand & Co., Jallundur.

Physics, Vol. II - *Resnick, Halliday & Krane*, 5/e, John Wiley & Sons,

Inc.,. Basic Electronics - *B. Grob*, McGraw - hill, 6/e, NY, 1989.

Elements of Electronics - *Bagde & Singh*, S. Chand

Dr. V. S. Krishna Govt. Degree College (Autonomous)

Visakhapatnam-13

(Affiliated To Andhra University, Visakhapatnam)

BLUE PRINT FOR SEMESTER END EXAMINATIONS PAPER SETTING

Learning level wise Weightage				
Bloom's Taxonomy level	**Weightage**	**marks**	**Essay type**	**Short answer type**
Knowledge/ Remember	33%	20	2	1(one out of two)
Understanding/ Comprehension	27%	16	2	
Application/	20%	12	1	1(one out of two)
Analysis	13%	8		2(two out of four)
Synthesis/ Evaluate	7%	4		1(one out of two)
Total	100	60		5 out of 10 questions

Chapter wise Weightage				
Sl. No.	**Module/ Chapter**	**Name of the chapter**	**8 Marks**	**4 Marks**
1	UNIT-I		2(one out of two)	2
2	UNIT-II		2(one out of two)	2
3	UNIT-III		2(one out of two)	2
4	UNIT-IV		2(one out of two)	2
5	UNIT-V		2(one out of two)	2

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SEMESTER END EXAMINATIONS MODEL PAPER

SEMESTER- (__)

(Programme)_____ **Course title**_____. **Course code**_____

Time: 3 hours Maximum Marks: 60

PART- A

Answer any **five** of the following questions. Each question carries **Four** marks. 5 X 4 = 20 Marks

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

PART- B

Answer **all the following** questions. Each carries **Eight** marks 5 X 8 = 40 Marks

11. (A).

(Or)

(b)

12. (A)

(Or)

(b)

13. (A)

(Or)

(b)

14. (A)

(Or)

(b)

15. (a).

(Or)

(b)

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VISAKHAPATNAM

MAJOR Courses offered w.e.f. AY 2023-24

SEMESTER-III COURSE CODE :23ELEP21P

COURSE 3: FUNDAMENTALS OF ELECTRICITY AND ELECTRONICS

Practical | Credits: 1 | 2 hrs/week

List of Experiments

1. To determine the specific resistance of a wire using Carey Foster Bridge/ Meter Bridge.
2. To Calibrate Voltmeter using Potentiometer.
3. To measure magnetic field at the Centre of a current carrying coil(Stewart- Gees apparatus)
4. To convert a galvanometer into ammeter/voltmeter
5. To Study the characteristics of a PN Junction Diode.
6. To Study the Characteristics of Zeneer Diode
7. To Study the working Zener Diode voltage Regulator
8. To draw the transistor characteristic curves(CE configuration)
9. To study the working of basic logic gates

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District Resource Centre and Centre for Research Studies
Maddilapalem, Visakhapatnam 530013, Andhra Pradesh

Programme: B.Sc. Honours in Electronics (Major)

w.e.f. AY 2023-24

SEMESTER-II COURSE CODE 23ELEM22: CIRCUIT THEORY AND ELECTRONIC DEVICES

Theory Credits: 3 3 hrs/week

Objectives

The students will learn:

1) basics of electrostatics, Gauss theorem and its applications, concept of a capacitor, various types of capacitors and dielectric constant, magnetic effects of current, cells and the measuring instruments like ammeter and voltmeter,

2) basics of p-n junction, rectifying action of a diode, regulated power supplies and wave shaping circuits, and

3) transistor and its three modes of operation, h-parameter model of a transistor and the frequency response of an amplifier.

Learning outcomes:

On Completion of the course, the students will be able to		Knowledge level (Bloom's Taxonomy)
CO 1	Apply concepts of electric network topology, nodes, branches, loops to solve circuit problems including the use of computer simulation	Level 3 (Applying)
CO 2	Apply time and frequency concepts of analysis.	Level 4 (Analysing)
CO 3	Synthesize the network using passive elements	Level 6 (Creation)
CO 4	Know about amplifier circuits, switching circuits and oscillator circuits their design and use in electronics	Level 1 (Knowledge) Level 3 (Applying)
CO 5	Design and construction of a power supply	Level 6 (Creation)

UNIT- 1:

SINUSOIDAL ALTERNATING WAVEFORMS:

Definition of current and voltage. The sine wave, general format of sine wave for voltage or current, phase relations, average value, effective (R.M.S) values. Differences between A.C and D.C. Phase relation of R, L and C, phasor diagrams-concept of impedance

UNIT-II:

PASSIVE NETWORKS AND NETWORKS THEOREMS (D.C):

Branch current method, Nodal Analysis, star to delta & delta to star conversions, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power, Millman and Reciprocity theorems.

UNIT-III:

RC, RL AND RLC CIRCUITS:

Frequency response of RC and RL circuits, their action as low pass and high pass filters. Passive differentiating and integrating circuits. Series resonance and parallel resonance circuits, Q – Factor, bandwidth, selectivity. Comparisons of series and parallel resonance,

UNIT-IV:

BJT, FET and UJT:

BJT: Construction, working, and characteristics of CE Configurations. Hybrid parameters and hybrid equivalent circuit of CE Transistor.

FET: Construction, working and characteristics of JFET and MOSFET. Advantages of FET over BJT.

UJT: Construction, working and characteristics of UJT. UJT as a Relaxation oscillator.

UNIT-V:

POWER SUPPLIES & PHOTO ELECTRIC DEVICES

Rectifiers: Half wave, full wave rectifiers-Efficiency-ripple factor- Filters- L- section&π-section filters. Three terminal fixed voltage I.C. regulators (78XX and &79XX). Light Emitting Diode – Photo diode and LDR.

Course with focus on Employability/ Entrepreneurship /Skill development modules					
Skill development		Employability		Entrepreneurship	

Topics added under Autonomous category

S.No	Title of the topic added	Justification
1	Phasor diagrams-concept of impedance	Including Phasor Diagrams and the concept of Impedance in the UG syllabus empowers students with the skills and knowledge needed to effectively analyze AC circuits and understand the behavior of electrical systems.This knowledge is foundational for a wide range of careers in engineering, physics, and technology-related fields
2	Bandwidth, selectivity. Comparisons of series and parallel resonance,	

TEXT BOOKS:

1. Introductory circuit Analysis (UBS Publications) ----- Robert L. Boylestad.
2. Electronic Devices and Circuit Theory --- Robert L. Boylestad & Louisashelsky.
3. Circuit Analysis by P.Gnanasivam- Pearson Education
4. Electronic Devices and Circuit Theory ---- Robert L. Boylestad & Louis Nashelsky.
5. Electronic Devices and Circuits I – T.L.Floyd- PHI Fifth Edition

REFERENCE BOOKS:

1.Engineering Circuit Analysis By: Hayt & Kemmerly - MG.

2.Networks and Systems – D.Roy Chowdary.

3.Unified Electronics (Circuit Analysis and Electronic Devices) by Agarwal- Arora

4.Electric Circuit Analysis- S.R. Paranjothi- New Age International.

5.Integrated Electronics – Millmam & Halkias.
6.Electronic Devices & Circuits – Bogart.
7.Sedha R.S., A Text Book Of Applied Electronics, S.Chand & Company

CO-PO Mapping
1- Low, 2- Moderate, 3- High, '-' No Correlation

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO 1									
CO 2									
CO 3									
CO 4									
CO 5									

CO-PSO Mapping
1- Low, 2- Moderate, 3- High, '-' No Correlation

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1					
CO 2					
CO 3					
CO 4					
CO 5					

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w.e.f. AY 2023-24

SEMESTER II COURSE CODE 23ELEM22P: CIRCUIT THEORY AND ELECTRONIC DEVICES

Practical | Credits: 1 | 2hrs/week

COURSE OBJECTIVE:

To develop practical skills in the use of laboratory equipment and experimental techniques for design and applications of circuits and electronic devices.

Minimum of 6 experiments to be done and recorded

1. Thevenin's Theorem-verification
2. Norton's Theorem-verification
3. Maximum Power Transfer Theorem-verification
4. LCR series resonance circuit.
5. BJT input and output characteristics 6.FET Output and transfer characteristics
7. UJT VI characteristics
8. LDR characteristics
9. IC regulated power supply (IC-7805)

Lab experiments are to be done on breadboard and simulation software (using multisim) and output values are to be compared and justified for variation

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SEMESTER II COURSE CODE 23ELEM22: CIRCUIT THEORY AND ELECTRONIC DEVICES

Theory | Credits: 3 | 3 hrs/week

Blue Print for Semester End Theory Examinations

S.No	Type of question	No of questions given			No of questions to be answered		
		No of questions	Marks allotted to each question	Total marks	No of questions	Marks allotted to each question	Total marks
1	Section A Short answer questions	10 (Two questions from each unit)	4	40	5 (Any five out of 10 questions)	4	20
2	Section B Long answer questions	10 (Two questions from each unit with only internal choice)	8	80	5 (Answer one question from each unit)	8	40
Total				120			60

Percentage of choice given $= \frac{(120-60)}{120} \times 100 = 50\%$

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SEMESTER II COURSE CODE 23ELEM22: CIRCUIT THEORY AND ELECTRONIC DEVICES

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Learning level wise Weightage				
Bloom's Taxonomy level	Weightage	Marks	Essay type	Short answer type
Knowledge/ Remember	33%	20	2(two out of four)	I (one out of two)
Understanding/ Comprehension	27%	16	2(two out of four)	
Application	20%	12	I (one out of two)	I (one out of two)
Analysis	13%	8		2(two out of four)
Synthesis/ Evaluate	7%	4		I (one out of two)
Total	IOO	60	5(each question has internal choice)	5 out of 10 questions

Chapter wise Weightage				
Sl. No.	Module/ Chapter	Name of the chapter	8 Marks	4 Marks
1	I	Sinusoidal alternating waveforms	2(one out of two)	2
2	II	Passive networks and networks theorems (D.C):	2(one out of two)	2
3	III	RC, RL AND RLC CIRCUITS	2(one out of two)	2
4	IV	BJT, FET and UJT	2(one out of two)	2
5	V	Power supplies & photo electric devices	2(one out of two)	2
			5(each question has internal choice)	5 out of given 10

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SEMESTER II COURSE CODE 23ELEM22: CIRCUIT THEORY AND ELECTRONIC DEVICES

Theory | Credits: 3 | 3 hrs/week

Model Question Paper

Duration: 3Hrs **Max Marks: 60**

Section A

Answer any five questions from the following (4M× 5 = 20*M*)

1. **Write differences between Ac and DC?**
2. **Write definitions of current and voltage?**
3. **Explain superposition theorem?**
4. **Explain star to delta conversion?**
5. **Write a short note on Q factor?**
6. **Explain the frequency response of LCR series resonance circuit and write its resonance frequency?**
7. **What are hybrid parameters explain?**
8. **Write advantages of FET over BJT?**
9. **Explain the terms efficiency and ripple factors for half wave and full wave rectifiers?**
10. **Write a short note on LED?**

Section B

Answer all the questions (8M× 5 = 50*M*)

11. **(a) Define average value and RMS value, derive expression for RMS value of AC**

(OR)

(b) Obtain phase relations for R, L, C

12. **(a) State and prove maximum power transfer theorem?**

(OR)

(b) State and prove Thevenin's theorem?

13. **(a) Explain frequency response of RL circuit??**

(OR)

(b) Discuss RC high pass filter working and explain its frequency response?

14. **(a) Explain construction and working of BJT**

(OR)

(b) Explain construction, working and characterises of MOSFET

15. **(a) Explain construction and working of half wave rectifier?**

(OR)

(b) Write a short note on LDR?