RSET

RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY

COURSE HAND-OUT

B.TECH. - SEMESTER I & II

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

RSET AUTONOMOUS

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING (EC), RSET

VISION

TO EVOLVE INTO A CENTRE OF EXCELLENCE IN ELECTRONICS AND COMMUNICATION ENGINEERING, MOULDING PROFESSIONALS HAVING INQUISITIVE, INNOVATIVE AND CREATIVE MINDS WITH SOUND PRACTICAL SKILLS WHO CAN STRIVE FOR THE BETTERMENT OF MANKIND

MISSION

TO IMPART STATE-OF-THE-ART KNOWLEDGE TO STUDENTS IN ELECTRONICS AND COMMUNICATION ENGINEERING AND TO INCULCATE IN THEM A HIGH DEGREE OF SOCIAL CONSCIOUSNESS AND A SENSE OF HUMAN VALUES, THEREBY ENABLING THEM TO FACE CHALLENGES WITH COURAGE AND CONVICTION

B.TECH PROGRAMME

Program Outcomes (POs)

Engineering students will be able to

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, Engineering fundamentals, and Electronics and Communication Engineering to the solution of complex Engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and Engineering sciences.
3. **Design/development of solutions:** Design solutions for complex Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex Engineering activities with an understanding of the limitations.
6. **The Engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional Engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional Engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable developments.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex Engineering activities with the Engineering Community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the Engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life -long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life- long learning in the broadest context of technological change.

Program-Specific Outcomes (PSOs)

Engineering students will be able to:

1. Demonstrate their skills in designing, implementing and testing analogue and digital electronic circuits, including microprocessor systems, for signal processing, communication, networking, VLSI and embedded systems applications;

2. Apply their knowledge and skills to conduct experiments and develop applications using electronic design automation (EDA) tools;

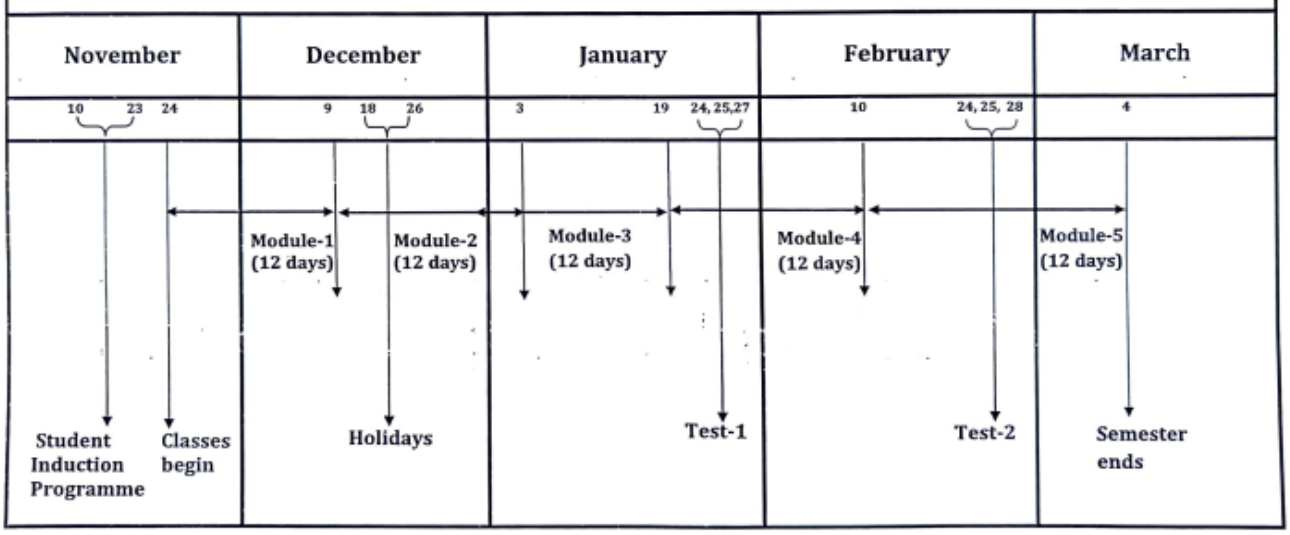
3. Demonstrate a sense of professional ethics, recognize the importance of continued learning, and be able to carry out their professional and entrepreneurial responsibilities in electronics engineering field giving due consideration to environment protection and sustainability.

INDEX

1. SEMESTER PLAN

RSET
RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

SEMESTER PLAN – S1
November 2021 – March 2022



November: 15 December: 18 January: 20 February: 20 March: 3

Total no of working days:76

Total no of instructional days: 60

25/11/21

2. SCHEME

SL NO	Code	Subject	Hours/Week			Marks		End-Sem duration - hours	Credits
			L	T	P	Inter-nal	End-Sem		
B.TECH 1st SEMESTER									
1	101908/CO900F	BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING	3	1	0	50	50	3	4
B.TECH 2nd SEMESTER									
2	101908/CO922U	ELECTRICAL & ELECTRONICS WORKSHOP	0	0	2	50	50	2	2

101908/CO900F

BASICS OF ELECTRICAL ELECTRONICS ENGINEERING

COURSE INFORMATION SHEET

PROGRAMME: **ELECTRONICS AND COMMUNICATION ENGINEERING**	DEGREE: **B. TECH** UNIVERSITY: RSET Autonomous
COURSE: **BASICS OF ELECTRICAL &ELECTRONICS ENGINEERING**	SEMESTER: **S2** CREDITS: **4**
COURSE CODE: **100908/CO900F** REGULATION: **2021**	COURSE TYPE: **CORE**
COURSE AREA/DOMAIN: **ELECTRICAL AND ELECTRONICS**	CONTACT HOURS: **4 hours/week**
CORRESPONDING LAB COURSE CODE (IF ANY): **ESL130**	LAB COURSE NAME: **ELECTRICAL AND ELECTRONICS WORKSHOP**

SYLLABUS:

Module	Topic	Hours
4	**Introduction to Semiconductor devices**	
4.1	**Evolution of electronics** – Vacuum tubes to nano electronics (in evolutional perspective only)	**1**
4.2	**Resistors, Capacitors and Inductors:** Types, Specifications, Standard Values, Color coding (No constructional features)	**2**
4.3	**PN Junction diode:** Principles of operation, V-I characteristics, Principle of Avalanche breakdown	**2**
4.4	**Bipolar Junction Transistors:** PNP and NPN structures, Principle of operation, Relation between current gains in CE, CB and CC, input and output characteristics of common emitter configuration	**3**
5	**Basic Electronic Circuits and Instrumentation**	
5.1	**Rectifiers and power supplies:** Block diagram of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), Working of simple Zener voltage regulator	**3**
5.2	**Amplifiers:** Block diagram of public address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response, Concept of voltage divider biasing	**4**
5.3	**Electronic Instrumentation:** Block diagram of an electronic instrumentation system	**2**
6	**Introduction to Communication Systems**	
6.1	**Evolution of communication systems –** Telegraphy to 5G	**1**
6.2	**Radio communication-** Principles of AM and FM, frequency bands for various communication systems, block diagram of super heterodyne receiver, principle of an antenna – radiation from accelerated charge	**4**

6.3	**Mobile Communication –** Basic principle of cellular communications, principles and block diagram of GSM	**2**

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T1	S. Chinmoy Saha, Arindham Halder and Debarati Ganguly, Basic Electronics - Principles and Applications, Cambridge University Press, 2018
T2	Wayne Tomasi and Neil Storey, A Textbook On Basic Communication and Information Engineering, Pearson, 2010
R1	Anant Agarwal, Jeffrey Lang, Foundations of Analog and Digital Electronic Circuits, Morgan Kaufmann Publishers, 2005.
R2	Bernard Grob, Ba sic Electronics, McGraw Hill
R3	A. Bruce Carlson, Paul B. Crilly, Communication Systems: An Introduction to Signals and Noise in Electrical Communication, Tata McGraw Hill, 5th Edition

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
NIL			

COURSE OBJECTIVES:

1	To get basic idea about types, specification and common values of passive and active components.
2	To familiarize the working of diodes and transistors
3	To understand the working of rectifiers and amplifiers
4	To get a basic idea about measuring instruments
5	To get a fundamental idea of basic communication systems and entertainment electronics

COURSE OUTCOMES:

SL. NO.	DESCRIPTION	Blooms' Taxonomy Level
C0.4	To identify the different passive components used in electronic industry for common application and to ***familiarize*** with the working of PN junction diode & BJT and to ***describe*** working of a voltage amplifier	Remember and Understand (level 1, 2)
C0.5	To ***analyze*** simple circuits using diodes like rectifiers and voltage regulators and to ***understand*** the working principle electronic instrumentation systems.	Remember and

		Understand (Level 1, 2)
C0.6	To ***understand*** the basic principle of radio and cellular communication systems.	Understand (level 2)

CO-PO AND CO-PSO MAPPING

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO4	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO6	3	-	-	1	-	-	-	-	-	-	-	-	3	-	-
100908/CO900F	**3**	**2**	-	**1**	-	-	-	-	-	-	-	-	**3**	-	-

JUSTIFATIONS FOR CO-PO MAPPING

MAPPING	**LOW/MEDIUM/ HIGH**	**JUSTIFICATION**
CO.4-PO1	H	Students will learn passive electronic components, working of PN junction diode and Bipolar Junction Transistor.
CO.5-PO1	H	Students will learn working of different diode circuits and the basic principle of electronic instrumentation system
CO.5-PO2	M	Students will analyze different amplifier and diode circuits using BJT
CO.6-PO1	H	Students will get a fundamental idea of basic communication systems.
CO.6-PO4	L	Students will learn how to design experimental setups and analyze data using measuring instruments.
CO.4-PSO1	H	Students will learn passive electronic components, diode and working of different types of Transistors.
CO.5-PSO1	H	Students will learn working of different diode circuits and electronic instrumentation system.
CO.6-PSO1	H	Students will learn working of radio and mobile communication system

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:

SL NO	DESCRIPTION	PROPOSED ACTIONS	RELEVANCE WITH POs	RELEVANCE WITH PSOs
1	Half wave rectifier	Lecture	1,2	1

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

SL NO	DESCRIPTION	PROPOSED ACTIONS	RELEVANCE WITH POs	RELEVANCE WITH PSOs
1	FET biasing circuits and amplifiers	1,2	1	FET biasing circuits and amplifiers

WEB SOURCE REFERENCES:

1	http://nptel.ac.in/courses/117106087/38
2	http://www.electronics-tutorials.ws/design

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

☑ CHALK & TALK	☑ STUD. ASSIGNMENTS	☑ WEB RESOURCES	☑ ONLINE CLASSES
☑ LCD/SMART BOARDS	☐ STUD. SEMINARS	☐ ADD-ON COURSES	

ASSESSMENT METHODOLOGIES-DIRECT

☑ASSIGNMENTS	☐ STUD. SEMINARS	☑ TESTS/MODEL EXAMS	☑ UNIV. EXAMINATION
☐ STUD. LAB PRACTICES	☐ STUD. VIVA	☐ MINI/MAJOR PROJECTS	☐ CERTIFICATIONS
☐ ADD-ON COURSES	☐ OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

☑ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	☑ STUDENT FEEDBACK ON FACULTY (TWICE)
☐ ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	☐ OTHERS

Prepared by

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Ms. Shyama Sreekumar
Ms. Jaison Jacob
(Faculties in Charge)

Approved by

Dr. Rithu James
(HOD, DEC)

COURSE PLAN

101908/CO900F BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING

Course Contents and Lecture Schedule

No	Topic	No. of Lectures
1	**Module 1 Elementary Concepts of Electric Circuits (8 hours)**	
1.1	Elementary concepts of DC electric circuits	
	Basic Terminology including voltage, current, power, resistance, emf; Resistances in series and parallel; Current and Voltage Division Rules; Capacitors & Inductors: V-I relations and energy stored.	1
	Ohms Law and Kirchhoff's laws-Problems;	2
	Star-delta conversion (resistive networks only-derivation not required)-problems.	1
1.2	Analysis of DC electric circuits	
	Mesh current method - Matrix representation - Solution of network equations.	2
	Node voltage methods-matrix representation-solution of network equations by matrix methods.	1
	Numerical problems.	1
2	**Module 1 Elementary Concepts of Magnetic circuits, Electromagnetic Induction and AC fundamentals (8 hours)**	
2.1	Magnetic Circuits	
	Basic Terminology: MMF, field strength, flux density, reluctance - comparison between electric and magnetic circuits-	1
	Series and parallel magnetic circuits with composite materials, numerical problems.	2

2.2	Electromagnetic Induction	
	Faraday's laws, problems, Lenz's law- statically induced and dynamically induced emfs -	1
	Self-inductance and mutual inductance, coefficient of coupling	2
2.3	Alternating Current fundamentals	
	Generation of alternating voltages- Representation of sinusoidal waveforms: frequency, period, Average, RMS values and form factor of waveforms-Numerical Problems.	2
3	**AC Circuits (8 hours)**	
3.1	AC Circuits	
	Phasor representation of sinusoidal quantities. Trigonometric, Rectangular, Polar and complex forms.	1
	Analysis of simple AC circuits: Purely resistive, inductive & capacitive circuits; Inductive and capacitive reactance, concept of impedance. Average Power, Power factor.	2
	Analysis of RL, RC and RLC series circuits-active, reactive and apparent power.	1
	Simple numerical problems.	2
3.2	Three Phase AC Systems	
	Generation of three phase voltages; advantages of three phase systems, star and delta connections (balanced only), relation between line and phase voltages, line and phase currents- Numerical problems.	2
4	**Introduction to Electronic Components (8 hours)**	
4.1	Evolution of electronics – Vacuum tubes to nano electronics (In evolutionary perspective only).	1
4.2	Resistors, Capacitors and Inductors: types, specifications, standard values, color coding (No constructional features).	2
4.3	PN Junction diode – Principle of operation, V-I characteristics, principle of avalanche breakdown.	2

4.4	Bipolar Junction Transistors – PNP and NPN structures, Principle of operation, relation between current gains in CE, CB and CC, input and output characteristics of common emitter configuration	3
5	**Basic electronic circuits and instrumentation (9 hours)**	
5.1	Rectifiers and power supplies – Block diagram description of a dc power supply. Working of half wave rectifier, full wave bridge rectifier, capacitor filter (no analysis). Working of simple zener voltage regulator	3
5.2	Amplifiers – Block diagram of Public Address system. Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response, Concept of voltage divider biasing.	4
5.3	Electronic Instrumentation – Block diagram of an electronic instrumentation system.	2
6	**Introduction to Communication Systems (7 hours)**	
6.1	Evolution of communication systems – Telegraphy to 5G.	1
6.2	Radio communication – Principle of AM & FM, frequency bands used for various communication systems, block diagram of superheterodyne receiver.	4
6.3	Mobile communication – Basic principles of cellular communications, principle and block diagram of GSM.	2

SAMPLE QUESTION

Module 4

PART A

1. Give the specifications of a resistor. The colour bands marked on a resistor are Blue, Gray, Yellow and Gold. What are the minimum and maximum resistance values expected from that resistance?
2. What is meant by avalanche breakdown?
3. Explain the working of a full-wave bridge rectifier.
4. Discuss the role of coupling and bypass capacitors in a single stage RC coupled amplifier.
5. Differentiate AM and FM communication systems.

PART B

6. (a) Explain with diagram the principle of operation of an NPN transistor. (5 marks)

   (b) Sketch and explain the typical input-output characteristics of a BJT when connected in common emitter configuration. (5 marks)

7. (a) Explain the formation of a potential barrier in a P-N junction diode. (5 Marks)
(b) What do you understand about Avalanche breakdown? Draw and explain the V-I characteristics of a P-N junction and Zener diode. (5 Marks)

Module 5

8. (a) With a neat circuit diagram, explain the working of an RC coupled amplifier.

   (6 Marks)

   (b) Draw the frequency response characteristics of an RC coupled amplifier and state the reasons for the reduction of gain at lower and higher frequencies. (4 Marks)

9. With the help of a block diagram, explain how an electronic instrumentation system.

   (10 Marks)

Module 6

10. With the help of a block diagram, explain the working of Superheterodyne receiver.

    (10 Marks)

11. (a) With neat sketches explain a cellular communication system. (5 Marks)
12. (b) Explain GSM communication with the help of a block diagram. (5 Marks)

101908/CO922U
ELECTRICAL & ELECTRONICS WORKSHOP

COURSE INFORMATION SHEET

PROGRAMME: BTech in ECE	DEGREE: B. Tech
COURSE: Electronics Workshop	SEMESTER: 1 CREDITS: 1
COURSE CODE: 100908/CO922U REGULATION: 2019	COURSE TYPE: CORE
COURSE AREA/DOMAIN: Basics of Electrical and Electronics Engineering	CONTACT HOURS: 2 hours /Week.
CORRESPONDING LAB COURSE CODE (IF ANY): N.A	LAB COURSE NAME: N.A

SYLLABUS:

UNIT	DETAILS
1.	Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol, cost etc. [Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.)
2.	Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools (such as Dia or XCircuit), Interpret data sheets of discrete components and IC's, Estimation and costing.
3.	Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, DSO etc.] [Soldering iron, Desoldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de- soldering station etc.]
4.	Testing of electronic components [Resistor, Capacitor, Diode, Transistor and JFET using multimeter.]
5.	Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general-purpose PCB, Crimping.]
6.	Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]
7.	Assembling of electronic circuits using SMT (Surface Mount Technology) stations.

8.	Assembling of electronic circuit/system on general purpose PCB, test and show the functioning (Any Two circuits). 1. Fixed voltage power supply with transformer, rectifier diode, capacitor filter, zener/IC regulator. 2. Square wave generation using IC 555 timer in IC base. 3. Sine wave generation using IC 741 OP-AMP in IC base. 4. RC coupled amplifier with transistor BC107.

TEXT/REFERENCE BOOKS:

T/R	AUTHORS "BOOK TITLE", PUBLICATION
1.	Bell. D. A , "Electronic Devices and Circuits", Oxford University Press
2.	Boylested, R.L Nashelsky, "Electronic Devices and Circuit Theory", Pearson Education
3.	Kal. S "Basic Electronic Devices, Circuits and Fundamentals", PHI Learning
4.	Millman J, Hawkins C and Parikhu C D "Integrated Electronics", Tata McGraw Hill
5.	Neeman D.A "Electronics Circuit Analysis and Design", Tata McGraw Hill
6.	S M Dhir "Electronic Components and Materials", Tata McGraw Hills publishing company Ltd.
7.	Charles A. Harper, "Handbook of Components for Electronics", Laxmi Enterprise

COURSE PRE-REQUISITES: NIL

COURSE OBJECTIVES:

1	To identify various electronic components
2	To get hands-on assembling, dismantling, testing, fabrication and repairing systems by utilizing the tools available in the workshop
3	Familiarization with software tools for drawing circuits

COURSE OUTCOMES:

Sl. No.	DESCRIPTION
CO 1	Identify and test various electronics components
CO 2	Draw schematics with EDA tools
CO 3	Assemble and test electronic circuits on boards
CO 4	Work in a team with good interpersonal skills

CO-PO-PSO MAPPING:

	Programme Outcomes (POs)												Programme-specific Outcomes (PSOs)		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO 1	3	-	-	-	-	-	-	-	-	-	-	2	2		2
CO 2	3	-	-	-	2	-	-	-	-	-	-	2	1	3	
CO 3	3	-	-	-	2	-	-	-	-	-	-	1	3		
CO 4	-	-	-	-	-	-	-	-	3	2	-	1			3
ESL 130	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**3**	**2**	**-**	**1.5**	**2**	**3**	**3**

JUSTIFICATION FOR CO-PO-PSO CORRELATION:

	PO1	PO5	PO9	PO10	PO12	PSO1	PSO2	PSO3
CO 1	Application of knowledge of basic passive and active components				Basics of components and connection and understanding DSO will help in life-long learning	Understand the fundamentals of passive and active components		Understanding of basic components can lead to the development of innovative products.
CO 2	Application of knowledge of basic passive and active components	Familiarization with latest EDA tools			Team work can be a mandate for life-long learning	Application of basic knowledge of electronic components	Application of knowledge of EDA tools	
CO 3	Application of knowledge of basic passive and active	Usage of DSO and other testing instruments			Motivate the students to further explore their knowledge in	Knowledge and application of various fundamental laws in electronics		

	components	are involved in analyzing and testing circuits			conducting independent experiments			
CO4			Carrying out experiments require coordinating as a group	Interpersonal skills can be improved by working together as a team	Working as groups motivates the students to further explore their knowledge	Group work is essential for all the activities	Group work is essential for all the activities	Group work is essential for all the activities

GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:

SNO	DESCRIPTION	PROPOSED ACTIONS
1	Diode characteristic	Theory

PROPOSED ACTIONS: TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/GUEST LECTURER/NPTEL ETC

TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

1	Transistor common emitter configuration.
2	Hobby circuits to practice “https://www.circuitstoday.com/simple-electronics-projects-and-circuits”

WEB SOURCE REFERENCES:

1.	*https://www.instructables.com/The-Ultimate-Guide-to-Desoldering/*
2.	*www.electronics-tutorials.ws › RC Networks*

DELIVERY/INSTRUCTIONAL METHODOLOGIES:

☐ CHALK & TALK	☐ STUD. ASSIGNMENT	☐ WEB RESOURCES	
☐ LCD/SMART BOARDS	☐ STUD. SEMINARS	☐ ADD-ON COURSES	

ASSESSMENT METHODOLOGIES-DIRECT

☐ ~~ASSIGNMENTS~~	☐ ~~STUD. SEMINARS~~	☐ TESTS/MODEL EXAMS	☐ ~~UNIV. EXAMINATION~~
☐ STUD. LAB PRACTICES	☐ STUD. VIVA	☐ ~~MINI/MAJOR PROJECTS~~	☐ ~~CERTIFICATIONS~~
☐ ~~ADD-ON COURSES~~	☐ ~~OTHERS~~		

ASSESSMENT METHODOLOGIES-INDIRECT

☐ ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	☐ STUDENT FEEDBACK ON FACULTY (TWICE)
☐ ~~ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS~~	☐ ~~OTHERS~~

Prepared by **Approved by HoD**

(ECE)

Ms. Gopika M
Dr. Simi Zerine Sleeba
Ms. Anila Kuriakose
Mr. Nitheesh Kurian
Ms. Mariya Vincent

COURSE PLAN

Day	Lab Cycle
Day 1	Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol, cost etc. Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.)
Day 2	Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools, Interpret data sheets of discrete components and IC's, Estimation and costing.
Day 3	Testing of electronic components [Resistor, Capacitor, Diode, Transistor using multimeter].
Day 4	Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping.]
Day 5	Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]
Day 6	Assembling electronic circuits using SMT (Surface Mount Technology) stations.
Day 7	Assembling an electronic circuit/system on general purpose PCB, test and show the functioning (Any Two circuits). a. Fixed voltage power supply with transformer, rectifier diode, capacitor filter, zener/IC regulator. b. Square wave generation using IC 555 timer in IC base. c. Sine wave generation using IC 741 OP-AMP in IC base. d. RC coupled amplifier with transistor BC107.

SAMPLE QUESTION

1. It is preferable to connect bulbs in series or in parallel?
   a) Series
   b) Parallel
   c) Both series and parallel
   d) Neither series nor parallel

2. A capacitor is charged by a constant current of 2 mA and results in a voltage increase of 12 V in a 10 sec interval. The value of capacitance is _____
   a) 0.75 mF
   b) 1.33 mF
   c) 0.6 mF
   d) 1.67 mF

3. The purpose of using flux in soldering is to.....
   a) Increase fluidity of solder metal
   b) Feel up gaps left in a bad joint
   c) Carbon steel
   d) Prevent oxides forming
   e) Wash away surplus solder

4. In a _____ circuit, the total resistance is greater than the largest resistance in the circuit.
   a) Series
   b) Parallel
   c) Either series or parallel
   d) Neither series nor parallel

5. Digital multimeter is used to _____ .
   a) measure AC and DC current, voltage and resistance.
   b) measure AC current and voltage
   c) measure DC. current and resistance
   d) measure DC. voltage and resistance

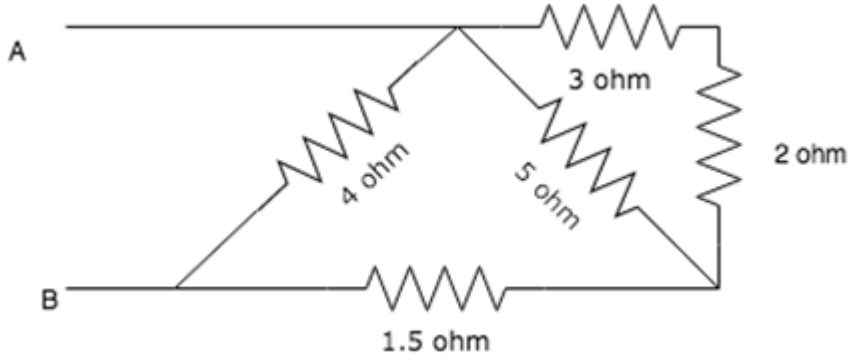
6. PCB stands for _____ .

7. Which of the following is true for a bridge rectifier?

   a) The peak inverse voltage or PIV for the bridge rectifier is lower when compared to an identical center tapped rectifier
   b) The output voltage for the center tapped rectifier is lower than the identical bridge rectifier

c) A transistor of higher number of coil is required for center tapped rectifier than the identical bridge rectifier
d) All of the mentioned

8. Calculate the equivalent resistance between A and B.

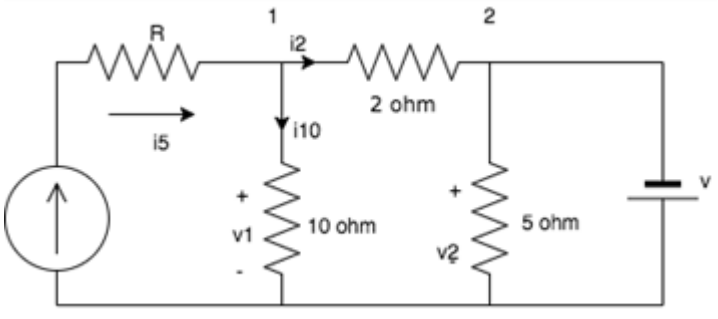


a) 2 ohm
b) 4 ohm
c) 6 ohm
d) 8 ohm

9. The chemical compound used for the etching of PCB is:
   a) Ferrous sulphate
   b) Ferric chloride
   c) Copper sulphate
   d) None of the above

10. N capacitors having capacitance C are connected in series, calculate the equivalent capacitance.
    a) C/N
    b) C
    c) CN
    d) N/C

11. Find the value of v if v1=20V and value of current source is 6A.

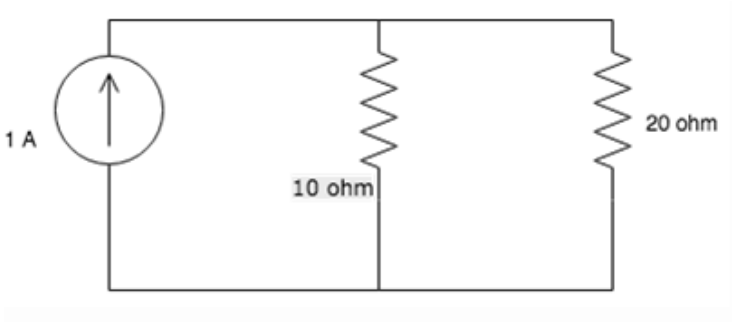


a) 10V
b) 12V

c) 14V
d) 16V

12. Relation between α and ß is
    a) α = ß / (ß + 1)
    b) ß = α / (1 – α)
    c) α = ß / (ß – 1)
    d) Both a and b
    e) Both b and c

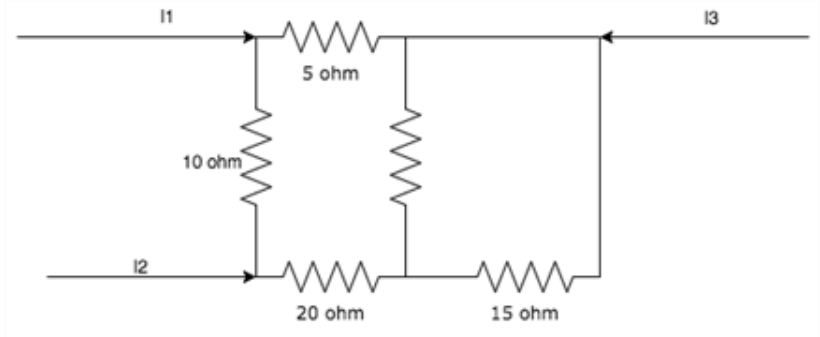
13. Calculate the current across the 20 ohm resistor.



a) 20A
b) 1A
c) 0.67A
d) 0.33A

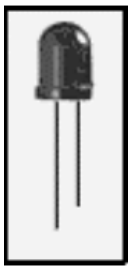
14. In a centre tapped full wave rectifier, the input sine wave is 250sin100t. The output ripple frequency will be _____
    a) 50Hz
    b) 100Hz
    c) 25Hz
    d) 200Hz

15. Calculate the value of I3, if I1= 2A and I2=3A.



a) -5A
b) 5A
c) 1A
d) -1A

16. Identify the correct statement for the component given below:



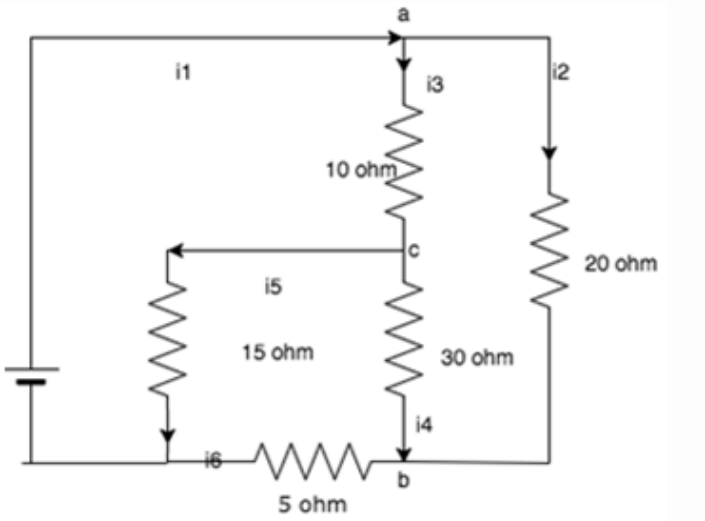
a) The cathode lead is longer. It goes to the negative rail.
b) The cathode lead is shorter. It goes to the negative rail.
c) The cathode lead is shorter. It goes to the positive rail.
d) The cathode is lead is longer. It goes to the positive rail.

17. The current leads the supply voltage in a series RLC circuit has its frequency _____ the resonant frequency.
a) Above
b) Below
c) Equal to
d) Cannot be determined

18. The ripple factor of a power supply is a measure of:
a) Its filter efficiency
b) Its voltage regulation
c) Diode rating
d) Purity of power output

19. The common collector amplifier is also known as _____ .

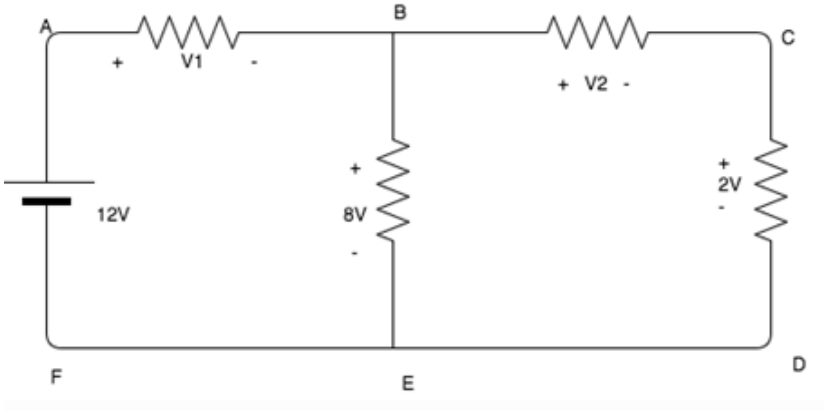
20. Find the value of i2, i4 and i5 if i1=3A, i3=1A and i6=1A.



a) 2,-1,2
b) 4,-2,4
c) 2,1,2
d) 4,2,4

21. In the saturated region, the transistor acts like a_____
    a) poor transistor
    b) amplifier
    c) open switch
    d) closed switch

22. Calculate the value of V1 and V2.

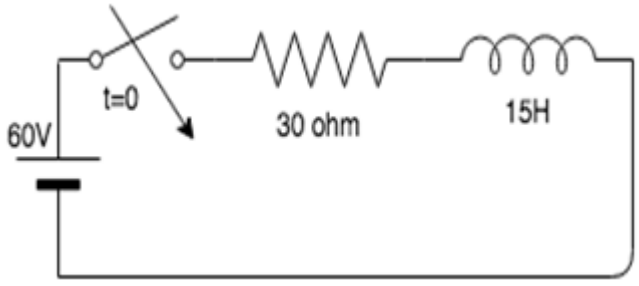


    a) 4V, 6V
    b) 5V, 6V
    c) 6V, 7V
    d) 7V, 8V

23. 6. A current of 5A flows in a resistor of 2 ohms. Calculate the energy dissipated in 300 seconds in the resistor.
    a) 15kJ
    b) 15000kJ
    c) 1500J
    d) 15J

24. In a shunt capacitor filter, the mechanism that helps the removal of ripples is_____
    a) The current passing through the capacitor
    b) The property of capacitor to store electrical energy
    c) The voltage variations produced by shunting the capacitor
    d) Uniform charge flow through the rectifier

25. What is the expression for current in the given circuit?



a) $i=2(e^{-2t})A$
b) $i=2(1-e^{-2t})A$
c) $i=2(e^{2t})A$
d) $i=2(1+e^{-2t})A$

26. A coil has a resistance of 4 ohms and an inductance of 2H. It is connected to a 20V dc supply. Calculate the final value of the voltage across the inductor.
a) 5V
b) 10V
c) 0 V
d) 20V

27. High value capacitors are of type:
a) Ceramic
b) Paper
c) Electrolytic
d) Plastic

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28. Forward bias voltage of Germanium diode is:
a) 0.7 V
b) 0.05 V
c) 0.3 V
d) 1 V

29. 223 on a capacitor represents:
a) .022 μF
b) 22 nF
c) 22000 Pf
d) All of the above