RSET
RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY (Autonomous)

RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

B.TECH. DEGREE PROGRAMME

SECOND SEMESTER

(2020 ADMISSIONS)

100908/CO900F	BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING

SYLLABUS

Rajagiri Valley, Kakkanad,
Kochi 682 039, Kerala, INDIA
www.rajagiritech.ac.in

COURSE CODE	COURSE NAME	L	T	P	CREDIT	YEAR OF INTRODUCTION
100908/CO900F	BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING	3	1	0	4	2021

1. **Preamble:** This course aims to (1) equip the students with an understanding of the fundamental principles of electrical engineering (2) provide an overview of evolution of electronics, and introduce the working principle and examples of fundamental electronic devices and circuits (3) provide an overview of evolution of communication systems, and introduce the basic concepts in radio communication.

2. **Prerequisite:** Physics and Mathematics (Pre-university level).

3. **Syllabus**

Section 1: Basic Electrical Engineering (Modules 1, 2 and 3)

Module 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. Ohms Law and Kirchhoff's laws-Problems; Star-delta conversion (resistive networks only-derivation not required)-problems.

Analysis of DC electric circuits: Mesh current method - Matrix representation - Solution of network equations. Node voltage methods-matrix representation-solution of network equations by matrix methods. Numerical problems.

Module 2

Magnetic Circuits: Basic Terminology: MMF, field strength, flux density, reluctance - comparison between electric and magnetic circuits- Series and parallel magnetic circuits with composite materials, numerical problems.

Electromagnetic Induction: Faraday's laws, problems, Lenz's law- statically induced and dynamically induced emfs - Self-inductance and mutual inductance, coefficient of coupling.

Alternating Current Fundamentals: Generation of alternating voltages-Representation of sinusoidal waveforms: frequency, period, Average, RMS values and form factor of waveforms-Numerical Problems.

Module 3

AC Circuits: Phasor representation of sinusoidal quantities. Trignometric, rectangular, polar and complex forms. Analysis of simple AC circuits: Purely resistive, inductive & capacitive circuits; Inductive and capacitive reactance, concept of impedance. Average Power, power factor. Analysis of RL, RC and RLC series circuits-active, reactive and apparent power. Simple numerical problems.

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

Section 2: Basic Electronics Engineering (Modules 4,5 and 6)

Module 4

Evolution of electronics – Vacuum tubes to nano electronics. Resistors, Capacitors and Inductors (constructional features not required): types, specifications. Standard values, color coding. PN Junction diode: Principle of operation, V-I characteristics, principle of avalanche breakdown. 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.

Module 5

Rectifiers and power supplies: Block diagram description of a dc power supply, Working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. 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. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

Module 6

Evolution of communication systems – Telegraphy to 5G. Radio communication: principle of AM & FM, frequency bands used for various communication systems,

block diagram of super heterodyne receiver, Principle of antenna – radiation from accelerated charge. Mobile communication: basic principles of cellular communications, principle and block diagram of GSM.).

4. Text Books

1. D P Kothari and I J Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D C Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
3. ChinmoySaha, ArindhamHalder and DebaratiGanguly, Basic Electronics - Principles and Applications, Cambridge University Press, 2018.
4. M.S.Sukhija and T.K.Nagsarkar, Basic Electrical and Electronics Engineering, Oxford University Press, 2012.
5. Wayne Tomasi and Neil Storey, A Textbook On Basic Communication and Information Engineering, Pearson, 2010.

5. Reference Books

1. Del Toro V, "Electrical Engineering Fundamentals", Pearson Education.
2. T. K. Nagsarkar, M. S. Sukhija, "Basic Electrical Engineering", Oxford Higher Education.
3. Hayt W H, Kemmerly J E, and Durbin S M, "Engineering Circuit Analysis", Tata McGraw-Hill
4. Hughes, "Electrical and Electronic Technology", Pearson Education.
5. V. N. Mittle and Arvind Mittal, "Basic Electrical Engineering," Second Edition, McGraw Hill.
6. Parker and Smith, "Problems in Electrical Engineering", CBS Publishers and Distributors.
7. S. B. Lal Seksena and KaustuvDasgupta, "Fundamentals of Electrical Engineering", Cambridge University Press.
8. Anant Agarwal, Jeffrey Lang, Foundations of Analog and Digital Electronic Circuits, Morgan Kaufmann Publishers, 2005.
9. Bernard Grob, Basic Electronics, McGraw Hill.
10. A. Bruce Carlson, Paul B. Crilly, Communication Systems: An Introduction to Signals and Noise in Electrical Communication, Tata McGraw Hill, 5th Edition

6. Course Outcomes: After the completion of the course the student will be able to

CO1: Apply fundamental concepts and circuit laws to solve simple DC electric circuits.

CO2: Develop and solve models of magnetic circuits.

CO3: Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state.
CO4: Describe working of a voltage amplifier.
CO5: Outline the principle of an electronic instrumentation system.
CO6: Explain the principle of radio and cellular communication.

7. Mapping Of Course Outcomes With Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1										2
CO2	3	1										2
CO3	3	1										2
CO4	2											
CO5	2											2
CO6	2											2

8. Assessment Pattern (marginal changes can be done according to question paper pattern):

Learning Objectives	Basic Electrical Engineering			Basic Electronics Engineering		
	Continuous Internal Evaluation (CIE)		End Semester Examination (ESE out of 50)	Continuous Internal Evaluation (CIE)		End Semester Examination (ESE out of 50)
	Internal Examination 1 (25)	Internal Examination 2 (25)		Internal Examination 1 (25)	Internal Examination 2 (25)	
Remember	0	0	10	10	10	20
Understand	12.5	12.5	20	15	15	30
Apply	12.5	12.5	20			
Analyze						
Evaluate						

9. Mark Distribution

(For Section 1)

Total	CIE				ESE
	Attendance	Internal Examination	Assignment/Quiz/Course Project	Total	
75	5	12.5	7.5	25	50

(For Section 2)

Total	CIE				ESE
	Attendance	Internal Examination	Assignment/Quiz/Course Project	Total	
75	5	12.5	7.5	25	50

10. End Semester Examination Pattern

There will be two parts; Section 1 – Basic Electrical Engineering and Section 2 – Basic Electronics Engineering. Section 1 and Section 2 carries 50 marks each. For the end semester examination, Section 1 contain 2 parts - Part A and Part B. Part A contain 5 questions carrying 4 marks each (not exceeding 2 questions from each module). Part B contains 2 questions from each module out of which one to be answered. Each question carries 10 mark and can have maximum 2 sub- divisions. The pattern for end semester examination for Section 1 is same as that of Section 2. **However, student should answer both Section 1 and Section 2 in separate answer booklets.**