



DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015-2016 onwards

ELECTRICAL CIRCUITS AND INSTRUMENTATION

CURRICULAM DEVELOPMENT CENTRE

M-SCHEME

(Implemented from the Academic year 2015-2016 onwards)

Course Name : Electronics and Communication Engineering
Subject Code : 34032
Semester : III Semester
Subject Title : ELECTRICAL CIRCUITS AND INSTRUMENTATION

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester : 15 weeks

Subject	Instruction		Examination			
			Marks			
	Hrs Week	Hrs Semester	Internal Assessment	Board Examination	Total	Duration
Electrical Circuits and Instrumentation	6	90	25	75	100	3 Hrs

TOPICS AND ALLOCATION:

UNIT	TOPIC	TIME(HRS)
I	DC Circuits and Theorems	16
II	AC Circuits and Resonance	16
III	Transformers and Machines	16
IV	Measuring Instruments and CRO	15
V	Transducers, Sensors & Test Instruments	15
Revision – Test		12
TOTAL		90

RATIONALE:

This subject enables the students with concepts of DC, AC circuits and fundamentals of Electrical Machines. The subject also deals with concepts, principles and working of analog and digital electronic measuring instruments. The introduction of this subject will enable the students to be well exposed to a wide area of various electronic measuring instruments and a thorough knowledge of the fundamentals of electrical circuits.

OBJECTIVES:

- To study ohm's law and Kirchhoff's laws.
- To study the circuit theorems
- To learn about series and parallel Circuits.
- To learn various terms related to AC circuits.
- To understand concept of AC circuits
- To learn about series and parallel resonance circuits.
- To study about transformer and its working.
- To understand the working of DC machine.
- To know about Induction motors and stepper motor.
- To understand the basic measuring instruments.
- To learn about bridge circuits.
- To discuss about CRO and its types.
- To learn about transducers and its various types.
- To study about sensors.
- To know about test instruments.

34032 ELECTRICAL CIRCUITS AND INSTRUMENTATION

DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HOURS
1	<u>D.C. CIRCUITS AND THEOREMS</u> Definition and unit for voltage, current, power, resistance, conductance, resistivity- Ohm's law – only simple problems in ohm's law- Kirchoff's current law and voltage law. Series circuits –parallel circuits, series parallel circuits. Mesh Method (simple problems) Thevenin's - Norton's theorems, Super position and Maximum power transfer theorem – Statement and Explanation (simple problems)	8
		8
2	<u>A.C. CIRCUITS AND RESONANCE</u> A.C. CIRCUITS AC through single pure resistance, pure inductance, pure capacitance - voltage and current relationship and (to mention only) the equation for power and power factor in each case (only simple problems). Definition for impedance, reactance, admittance, conductance, impedance, Phase angle, power factor and power. AC circuits – Derivation for impedance and admittance, power and power factor in Series and Parallel R-L ,R-C ,R-L-C circuits. Analysis of Parallel R-L circuit, R-C circuit, R-LC circuit (qualitative treatment only). RESONANCE Resonance- series resonance – parallel resonance - condition for resonance- resonant frequency-Q factor - resonance curve-bandwidth (only simple problems).	11
		5
3	<u>TRANSFORMERS AND MACHINES</u> TRANSFORMERS Transformer – Ideal transformer – construction - working principle –EMF equation Losses in transformer- core loss, copper loss- Efficiency- Regulation OC, SC test on transformer -List of applications (qualitative treatment only) MACHINES D.C. Machines - DC–Generator –Working principle - Types- Applications DC motor- working principle - types- applications (qualitative treatment only) Single phase induction motor- types- construction and principle of operation of capacitor start induction motor- Applications - stepper motor-working principle-uses	8
		8

	(qualitative treatment only)- Universal Motor (qualitative treatment only) Difference between single phase and three phase supply.	
4	<p><u>MEASURING INSTRUMENTS AND CRO</u></p> <p>MEASURING INSTRUMENTS Definition for Measurement, Instrument- Errors in Measurement - Calibration- Indicating instruments – Basic forces for indicating instruments - construction and operation of permanent magnet moving coil Instrument -Advantages – Disadvantages of PMMC - Shunts and Multipliers - DC ammeter-DC voltmeter-voltmeter sensitivity. Bridges- Types - Wheat stone bridge - applications -Universal impedance bridge arrangements to measure R, L,C</p> <p>CRO CRO- Block diagram and principle of operation of CRO- operation of CRT Electrostatic focusing- Electrostatic deflection (no derivation) - Block diagram of vertical deflection system- Applications of CRO - Types of CRO- Block diagram and operation of dual trace CRO- Dual beam CRO - Comparison between dual trace and dual beam CRO – Digital storage Oscilloscope - Block diagram- advantage. Block diagram-working principle of Function Generator</p>	8 7
5	<p><u>TRANSDUCERS , SENSORS & TEST INSTRUMENTS</u></p> <p>TRANSDUCERS Transducers –Classification of transducers Strain gauge - Types-uses. Construction, operation and applications of photo electric transducer, LVDT, RVDT and Load cell. Principle of working of Thermocouple- Temperature measurement using thermocouple - list of applications- Principle of working of Thermistor –Temperature measurement using thermistors - Types (NTC, PTC) – List of applications.</p> <p>SENSORS IR range sensor – IR proximity sensor- Ultrasonic range sensor- Touch Sensor.</p> <p>TEST INSTRUMENTS Digital voltmeter –Types (to list only) - Basic block diagram of DVM - Block diagram of Digital multimeter- Advantages over analog instruments - Block diagram of Digital frequency counter– Simple PC based Data Acquisition system – Block diagram.</p>	8 7
	Revision – Tests	12

REFERENCE BOOKS:

SL.No	Title	Author	Publisher with Edition
1.	Electrical Technology	B.L. Theraja	Division of Nirja constructions and development co. (P) Ltd., - 1994.
2.	Electric Circuit Theory	Dr. M. Arumugam, N. Premkumaran	Kanna Publisher, Delhi -1997
3.	Electronic Measurements and Instrumentation	R.K.Rajput	S. Chand (Third Edition)- 2009
4.	Electronic Measurements and Instrumentation	Sanjay Talbar & Akhilesh Upadhyaya.	Dhanpat Rai Publications (p) Ltd-2004
5.	Modern Electronic Instrumentation and Measurement Techniques	Albert D.Hel frick and Willam David cooper	Prentice Hall of India Pvt. Ltd., 1996
6.	Electrical and Electronic- Measurements and Instrumentation	A.K.Sawheney	Dhanpat rai and Sons -1993.
7.	Electronic Instrumentation	Kalsi	Kalsi H S. Tata McGraw-Hill Education, 2004
8.	Measurement systems- Application and Design	Ernest O. Doebelin	McGraw hill -2004
9.	Transducers and Instrumentation	D.V.S.Murty	McGraw hill -2004
10.	Electrical & Electronics Measurements and instrumentation	Umesh Sinha	Satyaprakashan Tech,1992