ETM205N ELECTRONIC COMPONENTS AND DEVICES

Teaching Scheme	**:** 02L+00T, Total: 02 hours/week	**Credits:**	02
Evaluation Scheme	**:** 10 ISA + 30 MSE + 60 ESE	**Total Marks:**	100
ESE Duration	**:** 03 Hrs		

COURSE DESCRIPTION

This course introduces different types of components such as resistors, capacitors, inductors relays and printed circuit boards. It also focuses on operating principles of semiconductor devices like diodes and transistors and their applications in regulated power supply and amplifiers.

DESIRABLE AWARENESS/SKILLS

Knowledge of engineering physics, basic electronics engineering and their concepts

COURSE OUTCOMES

On the successful completion of this course; student shall be able to -

1. demonstrate the knowledge of electronic components.
2. discuss the concepts and manufacturing of printed circuit board.
3. explain operating principles of basic semiconductor diodes and regulated power supply.
4. explain operating principles of transistors and its application as an amplifier.

MAPPING OF COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) (WITH STRENGTH OF CO-RELATION)

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3		2									
2	2		3	1								
3	1		2									
4	1		2	1								

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENT

Electronic Components **[5 Hrs]**

Passive Components: Resistors, Capacitors, Transformers, Inductors, Relays

Printed Circuit Boards (PCB) **[5 Hrs]**

PCB and its types, types of laminates, properties of copper clad laminates, PCB manufacturing process, manufacturing of single sided and double sided boards, soldering and de-soldering techniques

Diode Circuits **[5 Hrs]**

p-n junction diode and Zener diode, regulated power supply-introduction, block diagram and parameters, rectifiers- operation and comparative study of rectifier parameters for half-wave, full-wave and bridge rectifier, Filters - necessity, types, voltage regulators using zener diode

Transistor **[7 Hrs]**

Bipolar Junction Transistors (BJT): Basic concept, working, Transistor configurations and their V-I characteristics (CB, CE and CC), alpha, beta and gamma and their inter-relation, DC load line analysis, Q-point and its significance, Transistor biasing - voltage divider bias. Field Effect Transistor (FET) - Construction, working, parameters of FET, drain characteristics and transfer characteristics of FET.

Amplifiers **[04 Hrs]**

Concept and parameters of amplifier, transistor as an amplifier, Single stage CE amplifier and Single stage CS amplifier

Text Books

1. Electronic Components and Materials, Dr. Madhuri A. Joshi, 3rd edition, Shroff Publishers, 2004
2. Electronic Principles, A. Malvino, D. J. Bates, 7th edition, Tata McGraw Hill Education Private Limited, 13th reprint, 2012.

Reference Books

1. Basic Electronics Solid State, B. L. Therja, 2nd edition, S. Chand and Company ltd, New Delhi, 2006
2. Printed Circuit Boards: Design and Technology, W. C. Bosshart, 37th edition, Tata McGraw Hill, 2012.
3. Millman's Integrated Electronics, Jacob Millman, Christos Halkias, Chetan Parikh, 2nd edition, McGraw Hill Education, 2017

ETM255N Electronic Measurement Techniques

Teaching Scheme	**:** 02L+00T, Total: 02 hours/week	**Credits:**	02
Evaluation Scheme	**:** 10 ISA + 30 MSE + 60 ESE	**Total Marks:**	100
ESE Duration	**:** 03 Hrs		

COURSE DESCRIPTION

This course focuses on the principles and techniques (analog and digital) used to measure electrical and electronic parameters. It covers a wide range of measurement tools and methodologies, ensuring that students understand both the theoretical and practical aspects of electronic measurements.

COURSE OUTCOMES

On the successful completion of this course, students shall able to -

1. describe fundamental principles and techniques of electronic measurements and instruments.
2. use variety of analog and digital measurement instruments, such as multi-meters, oscilloscopes, and function generators.
3. integrate suitable sensor / transducer for practical applications.

RELEVANCE OF COURSE OUTCOMES (COs) WITH POs AND PSOs (WITH STRENGTH OF CO-RELATION)

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	2			3							
2		3	2	1	3							
3		3	2		3							

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

COURSE CONTENT

Fundamentals **[03 Hrs]**

Measurement System, parameters of measurement, international system of units

Analog Electronic Instruments **[05 Hrs]**

Galvanometer, DC- AC ammeters, voltmeters and multimeters, electronic multimeters, LCR meter, Q meter

Digital Electronic Instruments **[05 Hrs]**

Digital ammeter, voltmeter and multimeter, digital frequency meter, LCR meter, Q meter, digital tachometer, automation in digital instruments

Cathode Ray Oscilloscope (CRO) **[05 Hrs]**

Introduction, Block schematic of CRO, front panel of CRO, CRO operating precautions, dual beams CRO, dual trace CRO, digital storage oscilloscope, measurement of basic parameters using CRO

Function Generator **[04 Hrs]**

Introduction and block schematic, sine wave, square wave, triangular wave, sweep and pulse generator

Transducers **[04 Hrs]**

Transducers - classification of transducers, selection criteria for transducers, study of various transducers: thermistor, thermocouple, strain gauge, LVDT, photoelectric, photo-Voltaic cell, photo-diode, photo-transistor, transducers used in home-automation and agricultural IoT-based applications

Text books

1. Electronic Instrumentation and Measurement Techniques, W. D. Cooper and A. D. Helfrick, Pearson Education, 3rd edition 2014
2. Electronic Instrumentation, H. S. Kalsi, 4th edition, McGraw-Hill, 2019

Reference Books

1. A course in Electrical & Electronics Measurements & Instrumentation , A. K. Sawhney, 19th edition, Dhanpat Rai & Sons, 2014
2. Elements of Electronic Instrumentation and Measurement, Joseph J. Carr, Pearson Education , 4th impression 2011