

## 5th SEMESTER

### DISCIPLINE SPECIFIC ELECTIVE (DSEs)

#### OPTION - I

#### EEM516DA: ELECTRONIC EQUIPMENT MAINTENANCE & DESIGN (EEM) – TRANSDUCERS

CREDITS: THEORY = 4, PRACTICAL =2

##### Unit I

Calibration methods, Static calibration and Generalized Measurement System, Sensor vs Transducer, Basic requirements of a transducer, Classifications of transducer. Statistical methods, Odds and uncertainty, Choice of transducer, factor influencing choice of transducer. (15 Lectures)

##### Unit II

Static characteristics of transducer, Accuracy, Precision, Sensitivity, Linearity, Hysteresis, Threshold, Resolution, Dead time, Dead zone, Scale range, Scale span & dynamic characteristics. Speed of response, Measuring lag, Fidelity, Dynamic error, mathematical model of transducer, Zero, I, II, order transducer-Response to step, ramp, impulse inputs. (15 Lectures)

##### Unit III

Principle of operation, construction, Characteristics and applications of potentiometer, loading effects, Strain gauge: theory, types, temperature compensation, applications of RTD, Thermistors, Hotwire anemometer, piezo-resistive sensor, load cell, LDR, Humidity sensor, Photo conductive cell. (15 lectures)

##### Unit IV

Self-inductance/Mutual inductance transducer, Induction potentiometer, Variable reluctance transducers, LVDT Capacitive transducers, Variable air gap type, Variable area type, Variable permittivity type, Capacitor displacement transducer, Capacitor microphone, Applications(Measurement of level, pressure, thickness, sound). (15 Lectures)

##### Recommended Books:

1. Doebelin E.A., "Measurement Systems-Applications and Design", Tata McGraw Hill, New York
2. Sawhney A.K., "A course in Electrical & Electronic Measurement and Instrumentation", Dhanpat Rai and Co (P) Ltd, reprint 2013.
3. Patranabis D, "Sensors and Transducers", PHI, 2003.
4. Murthy, D.V.S., "Transducers and Instrumentation", PHI, 2011
5. Renganathan.S. "Transducer Engineering", Allied Publisher, Chennai, 1999.

##### DSE-1A) List of Practical's (EEM)

*Practical work includes the detail explanation of all the circuit components and blocks of the system are included. A full demonstration of all the systems is a must before proceeding with the hands on experimentation. At least 10 experiments from the following:*

1. Measurement of displacement using LVDT
2. Measurement of LVDT Sensitivity and Characteristics
3. Measurement of displacement and force using Strain Gauge.
4. Measurement of force and gauge factor using Strain Gauge.
5. Measurement of Resistance using Thermistor
6. Thermocouple For measurement of temperature and resistance.
7. Measurements of Force using Load Cell arrangement
8. Working of Solar Panel.
9. Measurement of Humidity using Hygroscopic Sensors
10. Photo-sensor for measurement of speed of a stepper motor.

## 5th SEMESTER

### DISCIPLINE SPECIFIC ELECTIVE (DSEs)

#### OPTION - II

#### EEM516DB: EEM – AUDIO VIDEO AND OFFICE EQUIPMENT-I

CREDITS: THEORY = 4, PRACTICAL =2

##### Unit I

Construction, working and applications of Multimedia Data projector, LCD and DLP projectors, Large screen and Rolling display, Slide projector and Overhead projector. (15 Lectures)

##### Unit II

Construction, working principle and applications of: Desktop PC, CPU, connectors on the CPU, motherboard, latest processors and peripherals. Block diagram of Laptop computer. Peripherals for use in Laptop computer. Use PC peripherals such as keyboard, different types of mouse. (15 lectures)

##### Unit III

Dot matrix printer, Inkjet laser printer. Concept of barcode- printers and different types of barcodes and readers, Video adapters and color displays and standards. Different types of scanners, FAX machine, Photocopying machine, EPABX system. (15 Lectures)

##### Unit IV

CCTV and CATV, Application areas for HDTV such as Education, Research Finger touch machine, Iris scanner, Automatic door opening system, and biomedical instruments. (15Lectures)

#### Recommended Books:

1. Consumer Electronics by S P Bali, Pearson 2008.
2. CCTV Student Handbook “Introduction to Closed Circuit Television” by Kristina Ireland and J. Ehlers.
3. Computer Peripherals by Leo F. Doyle.
4. Computer Hardware Installation, Interfacing, Troubleshooting and Maintenance by K. L. Jmaes.
5. Printer: Introduction, Servicing and Troubleshooting By Manahar Lotia.

#### DSE-2A) List of Practical's (EEM)

*Practical work includes the detail explanation of all the circuit components and blocks of the system are included. A full demonstration of all the systems is a must before proceeding with the hands on experimentation. At least 10 experiments from the following:*

1. Study of practical arrangement of CCTV in public places, cameras used, range, coverage, area etc.
2. Identification of functional blocks/sections, preventive maintenance and minor repairs. 11 Multimedia Projector
3. Method of Data/Multimedia Projector: Setting up and connections to PC.
4. Study of EPABX and its programming.
5. Study of Mobile Phone – identification of parts, dismantling and reassembling of latest smart phones.
6. Identification of functional blocks/sections, preventive maintenance and minor repairs. 7. Study of motherboards with latest processor including Intel, CMOS setup
8. Troubleshooting of a PC.
9. Identification of functional blocks/sections, electrical interconnections, preventive maintenance and installation of drivers.
10. Study and inspect the hardware components of Scanner , FAX/Multifunction machine, Dot Matrix Printer
11. Study and inspect the hardware components of Inkjet Printer, Laser Printers.

## 5th SEMESTER

### DISCIPLINE SPECIFIC ELECTIVE (DSEs)

#### OPTION - III

#### EEM516DC: EEM – MAINTENANCE CONCEPTS, INSTRUMENTS AND APPLIANCES-I

CREDITS: THEORY = 4, PRACTICAL =2

##### Unit I

Electronic Equipment, Potential Problems, Quality, Terminology and definitions of : Reliability, Failure, Failure Rate, Mean Time between Failures (MTBF), Mean Time to Fail (MTF), Mean Time To Repair (MTR), Maintainability, Availability, Redundancy. **(15 Lectures)**

##### Unit II

Construction of DC and AC generator , Equation for Generator Emf , Working of Dynamo , Construction of DC generator , Concept of Rotor and Stator .Study of tachogenerators. **(15 Lectures)**

##### Unit III

Study of dc motor, construction and principle of operation, Study of motor windings, Introduction to transformers, autotransformer, dc to ac converter, chopper circuits. **(15 Lectures)**

##### Unit IV

Analog to digital converters, Schmitt Trigger, Instrumentation Amplifiers, 555 Timer, Monostable and Bistable Multivibrators, Sweep generator and Square wave generator **(15 Lectures)**

#### Recommended Books:

1. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting by R. G. Gupta Tata McGraw Hill Edition 2001.
2. Student Reference Manual for Electronic Instrumentation Laboratories by Stanley Wolf, and Richard F.M. Smith, Prentice Hall of India Pvt. Ltd. New Delhi.
3. Electronic Instrumentation and Measurement Techniques by WD Cooper, AD Helfrick, Prentice Hall of India Pvt. Ltd. New Delhi.
4. Digital Instrumentation A. J. Bouwens, Tata McGraw Hill.
5. Electrical Machines by Nagrath Kothari.

#### DSE-3A) List of Practical's (EEM)

*Practical work includes the detail explanation of all the circuit components and blocks of the system are included. A full demonstration of all the systems is a must before proceeding with the hands on experimentation. At least 10 experiments from the following:*

1. Experiments on Rheostat, Potentiometer and Switches, EM Relay, Transformer, Autotransformer (Dimmerstat), Fuses.
2. Study and inspect all the parts of DC and AC generator circuit.
3. Working of DC and AC generator.
4. Working operation of Dynamo.
5. Study and inspect all the different type of Motor Circuits (Induction, synchronous etc.)
6. Study the operation of Chopper circuit using proper waveforms
7. Design of a stable and monostable multivibrators using 555 Timer.
8. Working of Instrumentation Amplifiers
9. Study of transformer action.
10. Analyze the output waveform for a square wave and sawtooth wave generators.