MAHAMAYA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCE, NUAPADA

BRANCH: ELETRICAL ENGINEERIG

LESSON PLAN

SEMESTER: 4TH SUBJECT: ELECTRICAL MEASUREMENT & INSTRUMENTATION ASSIGNED FACULTY: ER. JHASKETAN SAHU

| SL.NO. | CHAPTER | SUBJECT | PERIOD | DATE | SIGN | REMARKS |
|---|---|---|---|---|---|---|
| 1 | | MEASURING INSTRUMENTS | 7 | | | |
| | 1.1 | Define Accuracy, precision, Errors, Resolutions Sensitivity and tolerance. | 2 | | | |
| | 1.2 | Classification of measuring instruments | 2 | | | |
| | 1.3 | Explain Deflecting, controlling and damping arrangements in indicating type of instruments. | 2 | | | |
| | 1.4 | Calibration of instruments. | 1 | | | |
| 2 | | ANALOG AMMETERS AND VOLTMETERS | 10 | | | |
| | 2.1 | Moving iron type instruments. | 2 | | | |
| | 2.2 | Permanent Magnet Moving coil type instruments. | 2 | | | |
| | 2.3 | Dynamometer type instruments | 2 | | | |
| | 2.4 | Rectifier type instruments | 1 | | | |
| | 2.5 | Induction type instruments | 1 | | | |
| | 2.6 | Extend the range of instruments by use of shunts and Multipliers | 1 | | | |
| | 2.7 | Solve Numerical | 1 | | | |
| 3 | | WATTMETERS AND MEASUREMENT OF POW | 7 | | | |
| | 3.1 | Describe Construction, principle of working of Dynamometer type wattmeter. | 2 | | | |
| | 3.2 | What are the Errors in Dynamometer type wattmeter and methods of their correction | 2 | | | |
| | 3.3 | Discuss L P F Electro – Dynamometer type wattmeter | 1 | | | |
| | 3.4 | Discuss Induction type watt meters | 1 | | | |
| | 3.5 | Measurement of Power in Single Phase and Three Phase Circuit | 1 | | | |
| 4 | | ENERGY METERS AND MEASUREMENT OF ENERGY | 6 | | | |
| | 4.1 | Introduction | 2 | | | |
| | 4.2 | Single Phase and poly phase Induction type Energy meters – construction, working principle and their compensation and adjustments. | 2 | | | |
| | 4.3 | Testing of Energy Meters | 2 | | | |
| 5 | | MEASUREMENT OF SPEED, FREQUENCY AND POWER FACTOR | 5 | | | |
| | 5.1 | Tachometers, types and working principles | 1 | | | |
| | 5.2 | Principle of operation and construction of Mechanical and Electrical resonance Type frequency meters. | 1 | | | |

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| | 5.3 | Principle of operation and working of Dynamometer type single phase and three phase power factor meters. | 1 | | |
| | 5.4 | Synchroscopes – objectives and working | 1 | | |
| | 5.5 | Phase Sequence Indicators and its working | 1 | | |
| 6 | | **INSTRUMENT TRANSFORMER** | **8** | | |
| | 6.1 | Explain Current Transformer and Potential Transforme | 2 | | |
| | 6.2 | Explain Ratio error, Phase Angle error and Burden | 2 | | |
| | 6.3 | Clamp – On Ammeters | 2 | | |
| | 6.4 | State Use of CT and PT | 2 | | |
| 7 | | **MEASUREMENT OF RESISTANCE** | **6** | | |
| | 7.1 | Classification of resistance | 1 | | |
| | 7.2 | Explain Measurement of low resistance by voltage drop and potentiometer method & its use to Measure resistance. | 1 | | |
| | 7.3 | Explain Measurement of medium resistance by wheat Stone bridge method and substitution Method | 1 | | |
| | 7.4 | Explain Measurement of high resistance by loss of charge method. | 1 | | |
| | 7.5 | Explain construction & principle of operations (meggers) insulation resistance & Earth resistance megger. | 1 | | |
| | 7.6 | Explain construction and principles of Multimeter | 1 | | |
| 8 | | **MEASUREMENT OF INDUCTANCE NAD CAPACITANCE** | **6** | | |
| | | Explain measurement of inductance by : | | | |
| | 8.1 | Maxewell's Bridge method | 2 | | |
| | 8.2 | Owen Bridge method | 1 | | |
| | | Explain measurement of capacitance by: : | | | |
| | 8.3 | De Sauty Bridge method | 1 | | |
| | 8.4 | Schering Bridge method | 1 | | |
| | 8.5 | LCR Bridge method | 1 | | |
| 9 | | **DIGITAL INSTRUMENTS** | **5** | | |
| | 9.1 | Digital Voltmeters (DVM) | 2 | | |
| | 9.2 | Characteristic of Digital Meters | 2 | | |
| | 9.3 | Digital Multimeters | 1 | | |

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| **LESSION PLAN** | | | |
| DISCIPLINE : ELECTRICAL ENGG. | SEMESTER : 4th SEM | | NAME OF TEACHING FACULTY : Satish Kumar Behera |
| SUBJECT : Analog Electronics and OP-AMP | NO. OF DAYS /PER WEEK CLASS ALLOTED : 5 | | SEMESTER FROM Dt. 13th feb to 23rd may NO OF WEEKS : 15 |
| WEEK | CLASS DAY | DATE | THEORY / PRACTICAL TOPICS |
| | | | **P-N JUNCTION DIODE:** |
| 1 | 1st | | 1 . 1 P-N Junction Diode |
| | | | 1 . 2 Working of Diode |
| | 2nd | | 1 . 3 V-I characteristic of PN junction Diode. |
| | 3rd | | 1 . 4 DC load line |
| | 4th | | 1 . 5 Important terms such as Ideal Diode, Knee voltage |
| | 5th | | 1 . 6 Junctions break down. |
| 2 | 1st | | 1.6.1 Zener breakdown |
| | | | 1.6.2 Avalanche breakdown |
| | | | 1 . 7 P-N Diode clipping Circuit. |
| | | | 1 . 8 P-N Diode clamping Circuit |
| | | | **SPECIAL SEMICONDUCTOR DEVICES:** |
| | 2nd | | 2 . 1(a)Thermistors |
| | 3rd | | 2 . 1(b)Sensors & barretters |
| | 4th | | 2 . 2 Zener Diode |
| | 5th | | 2 . 3 Tunnel Diode |
| 3 | 1st | | 2 . 4 PIN Diode |
| | | | **Classification of rectifiers** |
| | 2nd | | 3.2(a) Analysis of half wave, full wave centre tapped |
| | 3rd | | 3.2(b) Bridge rectifier |
| | | | **Rectifiers and calculate:** |
| | 4th | | 3.2.1 DC output current and voltage |
| | | | 3.2.2 RMS output current and voltage |
| | 5th | | 3.2.3 Rectifier efficiency |
| | | | 3.2.4 Ripple factor |
| | | | 3.2.5 Regulation |
| | | | 3.2.6 Transformer utilization factor |
| | | | 3.2.7 Peak inverse voltage |
| | | | **Filters:** |
| 4 | 1st | | 3.3.1 Shunt capacitor filter |
| | 2nd | | 3.3.2 Choke input filter |
| | 3rd | | 3.3.3 π filter |
| | | | **TRANSISTORS:** |
| | 4th | | 4.1 Principle of Bipolar junction transistor |
| | 5th | | 4.2 Different modes of operation of transistor |
| 5 | 1st | | 4.3 Current components in a transistor |
| | 2nd | | 4.4 Transistor as an amplifier |
| | 3rd | | 4.5 Transistor circuit configuration & its characteristics |
| | 4th | | 4.5.1 CB Configuration |

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| 6 | 1st | | 4.5.2 CE Configuration |
| | | | 4.5.3 CC Configuration |
| | | | **TRANSISTOR CIRCUITS:** |
| | 2nd | | 5.1 Transistor biasing |
| | 3rd | | 5.2 Stabilization |
| | 4th | | 5.3 Stability factor |
| 7 | 1st | | 5.4 Different method of Transistors Biasing |
| | 2nd | | 5.4.1 Base resistor method |
| | 3rd | | 5.4.2 Collector to base bias |
| | 4th | | 5.4.3 Self bias or voltage divider method |
| 8 | | | **TRANSISTOR AMPLIFIERS & OSCILLATORS:** |
| | 1st | | 6.1 Practical circuit of transistor amplifier |
| | | | 6.2 DC load line and DC equivalent circuit |
| | | | 6.3 AC load line and AC equivalent circuit |
| | 2nd | | 6.4 Calculation of gain |
| | 3rd | | 6.5 Phase reversal |
| | 4th | | 6.6 H-parameters of transistors |
| | | | 6.7 Simplified H-parameters of transistors |
| | 5th | | 6.8 Generalised approximate model |
| | 1st | | 6.9 Analysis of CB amplifier using generalised approximate model |
| | 2nd | | 6.9 Analysis of CE amplifier using generalised approximate model |
| | 1st | | 6.9 Analysis of CC amplifier using generalised approximate model |
| | 1st | | 6.10 Multi stage transistor amplifier |
| | | | 6.10.1 R.C. coupled amplifier |
| | | | 6.10.2 Transformer coupled amplifier |
| | | | **Feed back in amplifier** |
| | 2nd | | 6.11.1 General theory of feed back |
| | | | 6.11.2 Negative feedback circuit |
| | | | 6.11.3 Advantage of negative feed back |
| | | | **Aplifier and its classification** |
| | 3rd | | 6.12.1 Difference between voltage amplifier and powe amplifier |
| | | | 6.12.2 Transformer coupled class A power amplifier |
| | 4th | | 6.12.3 Class A push – pull amplifier |
| | | | 6.12.4 Class B push – pull amplifier |
| | | | **Oscillators** |
| | | | 6.13.1 Types of oscillators |
| | | | 6.13.2 Essentials of transistor oscillator |

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| | 5th | | 6.13.3 Principle of operation of tuned collector, Hartley, colpitt, phase shift wein-bridge oscillator (no mathematical derivations) |
| | | | **FIELD EFFECT TRANSISTOR:** |
| | 1st | | 7.1 Classification of FET |
| | | | 7.2 Advantages of FET over BJT |
| | 2nd | | 7.3 Principle of operation of BJT |
| | 3rd | | 7.4 FET parameters (no mathematical derivation) |
| | 4th | | 7.4.1 DC drain resistance |
| | 5th | | 7.4.2 AC drain resistance |
| | | | 7.4.3 Trans-conductance |
| | 1st | | 7.5 Biasing of FET |
| | | | **OPERATIONAL AMPLIFIERS:** |
| | 2nd | | 8.1 General circuit simple of OP-AMP and IC – CA – 741 OP AMP |
| | 3rd | | 8.2 Operational amplifier stages |
| | 4th | | 8.3 Equivalent circuit of operational amplifier |
| | 5th | | 8.4 Open loop OP-AMP configuration |
| | 1st | | 8.5 OPAMP with fed back |
| | 2nd | | 8.6 Inverting OP-AMP |
| | 3rd | | 8.7 Non inverting OP-AMP |
| | 4th | | 8.8 Voltage follower & buffer |
| | | | **Differential amplifier** |
| | 1st | | 8.9.1 Adder or summing amplifier |
| | | | 8.9.2 Subtractor |
| | | | 8.9.3 Integrator |
| | | | 8.9.4 Differentiator |
| | | | 8.9.5 Comparator |