## KANNUR UNIVERSITY
### FACULTY OF ENGINEERING

Curricula, Scheme of Examinations & Syllabi for B.Tech Degree Programme (III-IV Semesters) in ELECTRICAL AND ELECTRONICS ENGINEERING

With effect from 2007 Admissions

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### THIRD SEMESTER

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Hours/Week</th>
<th>Sessional Marks</th>
<th>University Examination</th>
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**TOTAL**

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**Sessional Marks**

**University Examination**

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### FOURTH SEMESTER

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**Sessional Marks**

**University Examination**
## Module I:


## Module II:


## Module III:

**Vector Integral Calculus**: Evaluation of line integral, surface integral and volume integrals – Line integrals independent of the path, conservative force fields, scalar potential- Green’s theorem- Gauss’ divergence theorem- Stoke’s theorem (proof of these not required).

## Module IV:

**Vector Spaces**: subspaces–linear dependence and independence–bases and dimension-linear transformations -sums, products and inverse of linear transformations.

## References:


## Sessional work assessment

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<th>Assignments</th>
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<td><strong>Total marks</strong></td>
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## University examination pattern

- **Q I** - 8 short type questions of 5 marks, 2 from each module
- **Q II** - 2 questions A and B of 15 marks from module I with choice to answer any one
- **Q III** - 2 questions A and B of 15 marks from module II with choice to answer any one
- **Q IV** - 2 questions A and B of 15 marks from module III with choice to answer any one
- **Q V** - 2 questions A and B of 15 marks from module IV with choice to answer any one
Module I (20 hours)


Module II (14 hours)

Technical Communication
2. Barriers to effective communication – improper encoding, bypassing inter-cultural differences etc.
3. Organization in technical communication – spatial, chronological etc.
4. Style in technical communication - objectivity, accuracy, brevity, clarity etc.
5. Technical reports – types and format

Professional Ethics: 1. Ethics in Engineering, copyright – IPR- patents

Module III (10 hours)

Humanities, Science and Technology
1. Importance of humanities to technology, Education and Society
2. Relevance of a scientific temper
3. Relation between science, society and culture – the views of modern thinkers
4. The development of science and technology in society – science and technology in ancient Greece and India – the contribution of the Arabs to science and technology – recent advances in Indian science.

Reference books
2. Pennyor, Grammar Practice Activities, Cambridge University Press
5. Vesilind; Engineering, Ethics and the Environment, Cambridge University Press
6. Larson E; History of Inventions, Thompson Press India Ltd.
9. Encyclopedia Britannica, History of Science, History of Technology
10. Subrayappas; History of Science in India, National Academy of Science, India

Sessional work assessment
Assignments 2x10 = 20
2 tests 2x15 = 30
Total marks = 50

University examination pattern
Q I - 10 short type questions of 2 marks, from Module 1
Q II - 10 questions of 5 marks, from module II and III for writing short notes with choice to answer any seven
Q III - 2 questions A and B of 15 marks from module I for writing essay with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module II for writing essay with choice to answer any one
Q V - 2 questions A and B of 15 marks from module III for writing essay with choice to answer any one
Module I (13 hours)
Fluids and continuum-Fluid properties-Ideal and real fluids-Fluid statistics-Fluid Pressure-Manometer-Centre Of pressure-Buoyancy-Metacentric height Fluid dynamics -Equation of continuity, momentum and energy Laminar and turbulent flow-Friction factor

Module II (13 hours)

Module III (13 hours)
Steam turbine-basic cycle of operation-Impulse and reaction turbine compounding —efficiency —governing. Gas turbine-Basic cycle of operation-application-single stage and multi stage turbines .Air compressor: Classification, working principle of reciprocating and rotary compressors.

Module IV (13 hours)

Text books
2. Jagadishlal: Hydraulic Machines and its applications,

Reference books
1. Gupta V. & Gupta S. Fluid Mechanics and its applications, Wiley Eastern
2. Dr. R.K. Bansal, Fluid Mechanics & Hydraulic Machine, Lakshmi Publishers
3. Holman J.P. Heat transfer, McGraw Hill
4. Mathur & Metha, Thermodynamics & heat power Engineering

Sessional work assessment
Assignments 2x10 = 20
2 tests 2x15 = 30
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University examination pattern
Q I  - 8 short type questions of 5 marks, 2 from each module
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Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V  - 2 questions A and B of 15 marks from module IV with choice to answer any one
Module I (14 hours)

Module II (12 hours)
Transistor Amplifier Basics - Operating point of a BJT - bias stability - thermal runaway - Different Types of Biasing - h parameter model of a BJT - CE, CB and Emitter follower analysis - biasing a JFET - CS and CD amplifiers.

Module III (13 hours)
Frequency response of amplifiers - Low frequency response of BJT and FET amplifiers - hybrid Π equivalent circuit of BJT - high frequency response of CE amplifier - current gain - cutoff frequencies - gain bandwidth product - miller effect - Power amplifiers - Class A, Class B and Class AB - power amplifiers using BJT.

Module IV (13 hours)
Feedback Amplifiers & Oscillators - negative and positive feedback - Different topologies and properties of oscillators - Barkhausen's criterion for stability of feedback amplifiers - transistor phase shift oscillator - Wein's bridge oscillator.

Linear Op-amp Circuits - ideal and practical op-amps - CMRR - slew rate - inverting and non inverting amplifier - voltage follower - summing amplifier - subtracting circuits - voltage to current converter - op-amp integrator - op-amp differentiator.

Reference books:
1. Millman & Halkies.: Integrated Electronics, McGraw Hill
3. Sedra & Smith: Microelectronic Circuits, Oxford University Press

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Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one
2K6 EE 305: NETWORK ANALYSIS

| 3 hours lecture and 1 hour tutorial per week |

Module I (15 Hours)
Network theorems & Laplace Transforms

Module II (13 hrs)
Application of Laplace Transforms - Transient analysis of RL, RC and RLC series circuits with DC applied - RL and RC circuits with impressed sinusoidal voltage-
Introduction to network topology: -Definition of graph, trees, incidence matrix, cut sets-Fundamental cut sets-Cut set schedule-Tie sets-Fundamental tie sets-tie set schedule-Applications of graph-theoretical methods to formation of network equations-Current Variable and Voltage Variable Methods.

Module III(12 Hours)
Fourier Series and Fourier transforms
Fourier Series representation of non-sinusoidal periodic waveforms- Fourier coefficients-Determination of coefficients- Waveform symmetry- Exponential Fourier Series-Discrete amplitude and phase spectra- Steady state solution of circuits with non-sinusoidal periodic inputs by Fourier series. Fourier representation of aperiodic signals - Fourier transform and inverse transform -Transform pairs - Properties of Fourier transforms - Continuous amplitude and phase spectra - Relation between Laplace transforms and Fourier transforms-power spectral density-energy spectral density – Parseval’s theorem

Module IV (12 hrs)
Two port networks: -Characterisation in terms of impedances and admittances -Hybrid and transmission parameters- Inter relationships among parameter sets-Reciprocal and symmetrical two port networks - Interconnection of two port networks- Series, parallel, and cascade- T and П equivalent of a two port network- Image impedances.
Filter fundamentals- pass and stop bands- passive filters- different types (Basic Concepts only).

Reference Books:
2. Valkenberg : Network Analysis ,Prentice Hall of India
5. A. Chakrabarti : Circuit Theory (Analysis and Synthesis),Dhanpat Rai &Co
6. B.R. Gupta: Network Systems and Analysis, S.Chand & Company ltd
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| Q IV  - 2 questions A and B of 15 marks from module III with choice to answer any one |
| Q V   - 2 questions A and B of 15 marks from module IV with choice to answer any one |
Module I (13 hrs)

General Principles of Measurements: Absolute and Working Standards- Calibration of Meters- Qualities of Measurements - Characteristics - Errors in Measurement - Essentials of indicating instruments-deflecting, damping, controlling torques- Moving Coil, Moving Iron, Dynamo Meter, Induction, Thermal, Electrostatic and Rectifier Type meter; Shunts and Multipliers-Various Types of Galvanometers- Accuracy class

Module II (13 hrs)


Module III (13 hrs)

Potentiometers: General Principle- Direct Current Potentiometer- AC potentiometer- Application of DC and AC potentiometers

Bridges: Wheatstone’s Bridge – Kelvin’s Double Bridge - Carry Foster Slide Wire Bridge - Bridge Current Limitations - Maxwell’s bridge- Schering bridge- Anderson’s bridge and Wein’s bridge

Module IV (13 hrs)


Reference Books:
2. Sawhney AK: A course in Electrical and Electronic Measurements & instrumentation, Dhanpat Rai .
4. Stout M.B: Basic Electrical Measurements, Prentice Hall.

Sessional work assessment
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University examination pattern
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Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one
Set 1

**Fluid Mechanics Lab:** - calibration of Venturimeter, Orifice Meter, Notches, Pipe Friction

Set 2

**Hydraulic Machinery Lab:** - Characteristics of Turbines & Pumps – Pelton Turbine & Francis Turbine – Centrifugal, Gear & Reciprocating Pumps

Set 3

**Heat Engine Lab:** - Constant Speed Characteristics of SI & CI Engines.

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University evaluation will be for 100 marks of which 70 marks are allotted for writing the procedure/formulae/sample calculation details, preparing the circuit diagram/algorithm/flow chart, conduct of experiment, tabulation, plotting of required graphs, results, inference etc., as per the requirement of the lab experiments, 20 marks for the viva-voce and 10 marks for the lab record.

Note: Duly certified lab record must be submitted at the time of examination.
2K6 EE 308(P) : BASIC ELECTRONICS LAB

<table>
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<th>3 hours practicals per week</th>
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                 b) Z-Modulation of frequency Measurement. |
|2. Semiconductor diodes: V-I characteristics, static and dynamic resistance of Si, Ge and Zener diodes. |
|3. Transistor characteristics in CB and CE configuration, Identification of cut off, active and saturation regions. |
|4. JFET characteristics in the common source configuration, determination of equivalent circuit parameter. |
|6. FET Amplifier – Measurement of voltage gain, current gain, input & output impedance. |
|7. UJT Relaxation Oscillator – Design for a particular frequency. |
|8. Rectifiers & Filters - characteristics of Half wave, Full wave & Bridge Rectifiers –  
Ripple factor, rectification efficiency & % Regulation. |
|9. BJT Emitter follower- measurement of voltage gain, current gain input and output impedance & Load characteristics. |
|11. Characteristics of voltage regulators -  
    a) simple Zener voltage regulator. b) Zener regulator with emitter follower output. |
|13. RC phase shift & Wien’s bridge oscillator using transistor |

Reference books
1. Bhargava et.al., Basic Electronic Circuits and Linear Circuits, Tata McGraw Hill  
3. Nagarath J., Electronics Analog & Digital, Prentice Hall India  

Sessional work assessment
| Lab practicals & record | = 30 |
| Test | = 20 |
| Total marks | = 50 |

University evaluation will be for 100 marks of which 70 marks are allotted for writing the procedure/formulae/sample calculation details, preparing the circuit diagram/algorithm/flow chart, conduct of experiment, tabulation, plotting of required graphs, results, inference etc., as per the requirement of the lab experiments. 20 marks for the viva-voce and 10 marks for the lab record.  
Note: Duly certified lab record must be submitted at the time of examination.
Module I: (13 hours)
Complex analytic functions and conformal mapping: Complex functions – limits, derivative, analytic function- Cauchy-Riemann equations- elementary complex functions such as powers, exponential function, logarithmic, trigonometric and hyperbolic functions- Conformal mapping – Linear fractional transformations- mapping by elementary functions

Module II: (13 hours)
Complex integration: Line integral, Cauchy’s integral theorem - Cauchy’s integral formula – Taylor’s series, Laurent series – residue theorem – evaluation of real integrals using integration around unit circle, around semicircle, integrating contours having poles on the real axis

Module III: (13 hours)
Jointly Distributed Random Variables: Joint distribution functions, independent random variables , covariance and variance of sums of random variables, joint probability distribution functions of random variables, conditional probability and conditional expectations. Curve fitting: Method of least squares, correlation and regression, line of regression.

Module IV: (13 hours)
Vibrating strings: One dimensional wave equation – D’ Alembert’s solution – solution by method of separation of variables One dimensional heat equation - solution of the equation by the method of separation of variable Solutions of Laplace’s equation over a rectangular region and a circular region by the method of separation of variable

Reference books

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Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one
Module I (15 hours)
Overview of C – Variables, Expressions and assignments, Lexical Elements, Fundamental Data Types, Operators Control Statements – if, switch-case, for , while, do, goto, break, switch Functions- Parameter passing , scope rules, recursion

Module II (12 hours)
Arrays – One dimensional and Multi Dimensional, Pointer-Linked List, Arrays of Pointers, Dynamic Memory Allocations, Strings – Operations and functions , Bitwise Operators and Enumeration Types , Structures and Unions, Files and File Operations

Module III (13 hours)
Overview of Java Language- Constants, Variables and Data Types, Operators and Expressions Control Structures – Decision Making, Branching and Looping, Object Oriented Programming – Concept of Classes, Objects and Methods, Benefits Java and OOP- Polymorphism and Overriding of methods, Inheritance

Module IV (12 hours)
Arrays and Strings, Interfaces, Multiple Inheritance, Packages – Putting Classes together – Managing Errors and Exceptions – Applet Programming and Graphics Programming (Basics only) – Managing Input/Output Files in Java

Text books

Reference books
2. Eckel, Bruce., Thinking in Java, 2nd Ed, Pearson Education

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MODULE I (16 Hours)
Intel 8085 processors - architecture - pin configuration - memory addressing - addressing modes - instruction set - assembly language programming - interrupts - timing diagrams-data Transfer schemes, Programmed Data Transfer-DMA
Intel 8086 processors- architecture - addressing modes-instruction sets- minimum and maximum mode - multiprocessor configuration – Execution of Assembly Language Programs in PC.

MODULE II (10 Hours)
Interfacing - address decoding - interfacing chips - programmable peripheral interface (8255) - programmable communication interface (8251) - programmable timer (8253) - DMA controller (8257) - programmable interrupt controller (8259) - keyboard display interface (8279)

MODULE III (10 Hours)
Introduction to 80386 - memory management unit - descriptors, selectors, description tables and TSS - real and protected mode - memory paging - special features of the Pentium processor - branch prediction logic - superscalar architecture

MODULE IV (16 Hours)
Introduction to 80196 microcontroller

Text Books
1. Gaonker R.S., Microprocessor Architecture, Programming and applications
2. Hall D.V., Microprocessors & Interfacing, McGraw Hill
8. A Nagoor Kani : Microprocessors & Micro Controllers

Reference Books
1. Intel Data Book Vol.1, Embedded Microcontrollers and Processors
3. Mohammed R., Microprocessors & Microcomputer Based System Design, Universal Bookstall
5. Intel Data Book, EBK 6485 Embedded Microcontrollers Data Book

Sessional work assessment
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Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one
Module I (12 hours)

Module II (14 hours)
Regenerative comparator circuits using op-amps (741) - comparator IC LM311 and its applications - square, triangle and ramp generator circuits using op-amps and comparator ICs - effect of slew rate on waveform generation - principles of VCO circuits - precision half wave and full wave rectification using op-amps - log and anti-log amplifiers and applications - phase locked loops - principles - lock and capture ranges - capture process - loop filter - PLL dynamics under locked condition - study of NE564 and CD4046 - applications of PLL in signal reconstruction – 555 applications- Three terminal regulators.

Module III (14 hours)
Logic families - ideal logic gates - truth tables of basic gates - logic levels - noise margin - basic Boolean algebra - De Morgan’s theorems - DTL gates - HTL gates - TTL gates - standard TTL - schottky TTL - ECL logic - MOS logic - NMOS logic gates - CMOS logic - tristate logic - comparison of logic families
Combinational circuits - number systems - signed and unsigned numbers - one’s complement and two’s complement- Boolean functions - canonical and standard forms - simplification of Boolean functions by Karnaugh’s map up to five variable map - NAND, NOR, EX-OR & EX-NOR implementation - codes and code converters - multi level NAND circuits - multi level NOR circuits - adders - subtractors - BCD adder - magnitude comparator - BCD multiplier - decoders and encoders - multiplexers and demultiplexers - implementation of combinational logic by using multiplexers - ROM, PLA and PAL.

Module IV (12 hours)

Reference books:
1. Millman & Taub: Pulse, Digital and Switching Waveforms, TMH,1999
### Sessional work assessment

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- **Q V** - 2 questions A and B of 15 marks from module IV with choice to answer any one
Module I (12 hours)
**DC machines Fundamentals:** Armature windings – lap winding and wave winding - single layer winding and double layer winding - Commutators - MMF - torque developed in a winding - EMF developed in a winding - Armature reaction - demagnetising and cross magnetising ampere turns - commutation.

Module II (12 hours)
**DC generators:** EMF Equation - Types of Excitation, Power flow diagram - circuit model - magnetization characteristics - process of voltage build up - terminal characteristics - control of terminal voltage - parallel operation - applications.

Module III (14 hours)
**DC Motors:** Back EMF - Torque and speed equations - Power flow diagram - circuit model - performance characteristics - applications - starting methods - design of starters - methods of speed control - Solid State Speed Control (Block Diagram) - Testing - Swinburne's test - Hopkinson's test - separation of losses - retardation test - permanent magnet DC motor.

Module IV (14 hours)
**Transformers:** EMF Equation - Magnetising current - harmonics - ideal and real transformer - dot convention - current and voltage ratio - equivalent circuit - phasor diagram - per unit impedance - OC and SC tests - losses - efficiency and regulation - all day efficiency - Sumpner's test - Parallel operation - tap changing - switching transients - auto transformers - voltage and current relationships - saving of copper - different connections of three phase transformers - notations - Scott connection - Transformer with tertiary winding - cooling methods.

**Reference books:**
1. Clayton & Hancock: Performance & Design Of DC Machines, ELBS
4. Say M. G.: Performance & Design of AC Machines, Pitman, ELBS.
7. J B Gupta: Electrical Machines
8. Ashfaq Hussain: Electrical Machines. Dhanpath Rai

**Sessional work assessment**
- Assignments: 2x10 = 20
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Module I (13 hours)
Semiconductor: Compound semiconductors – Basic ideas of amorphous and organic semiconductors

Module II (13 hours)

Module III (13 hours)
Insulating Materials: Good insulator properties and classification on temperature basis – Properties of insulators in static Electric Field-Common insulating Material used in electrical apparatus - Inorganic materials (Mica, Glass, Porcelain, Asbestos) – Organic materials (Paper, rubber, cotton, silk, fiber, wood, plastics, bakelite) – Resins and varnishes – liquid insulators (Transformer oil) –Gaseous insulators (air, SF₆) – Ageing of insulators

Module IV (13 hours)


Text Books
3. Tareev, Electrical Engineerin Materials, Mir Publications

Reference Books:
1. Indulkar O.S & Thiruvegadam S., An Introduction to electrical Engineering Materials, S. Chand
3. Arumugam M., Material Science, Anuradha Agencies
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<td>2 x 15 = 30</td>
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<td>Total marks</td>
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### University examination pattern

**Q I** - 8 short type questions of 5 marks, 2 from each module

**Q II** - 2 questions A and B of 15 marks from module I with choice to answer any one

**Q III** - 2 questions A and B of 15 marks from module II with choice to answer any one

**Q IV** - 2 questions A and B of 15 marks from module III with choice to answer any one

**Q V** - 2 questions A and B of 15 marks from module IV with choice to answer any one
List of experiments:
1) Familiarization of Logic Gates
2) Realisation of basic gates using Universal Gates
3) Half adder & Half Subtracter Circuits.
4) Full adder & Full Subtracter Circuits.
5) Code Converters using basic gates.
6) Realisation of Flip-flops using gates
7) Counters a) Ripple counter  
   b) Johnson Counter
8) Shift Registers.
9) Sequence Generator
10) Multivibrator using AND gates
11) Combinational Logic Design using Decoders and MUX
12) 4 bit adder subtracter IC & BCD adder Circuits.
13) Interfacing & addressing Memory Chips.
14) ADC Circuits & ICs
15) DAC Circuits & ICs
16) EEPROM Programming experiments

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<tr>
<th>Sessional work assessment</th>
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<tbody>
<tr>
<td>Lab Practicals and Record</td>
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<tr>
<td>Test</td>
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<tr>
<td>Total marks</td>
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Reference books

University evaluation will be for 100 marks of which 70 marks are allotted for writing the procedure/formulae/sample calculation details, preparing the circuit diagram/algorithm/flow chart, conduct of experiment, tabulation, plotting of required graphs, results, inference etc., as per the requirement of the lab experiments. 20 marks for the viva-voce and 10 marks for the lab record.
Note: Duly certified lab record must be submitted at the time of examination
1. Potential divider connection of a rheostat and study of the dependence of output voltage upon the value of load resistance
2. Verification of superposition Theorem in dc circuits.
3. Verification of Thevenin’s Theorem in dc circuits.
4. Determination of impedance, admittance, power factor and real/reactive/apparent power drawn in RLC series/parallel circuits.
5. Single-phase power measurement using a dynamometer type wattmeter.
7. 3-phase power measurement using one wattmeter and two-wattmeter method.
8. Determination of B-H curve, μ-H curve and μ-B curve of an iron ring specimen.
9. Measurement of resistance using Wheastone’s bridge and Kelvin’s double bridge and extension of range of voltimeters and ammeters.
10. Measurement of self/mutual inductance and coupling co-efficient of iron cored coil and air-cored coil.
11. Calibration of meters and measurement of unknown resistance using slide-wire potentiometer.
12. Calibration of single phase energy meter by direct and phantom loading at various power factors.
15. Insulation Resistance measurement using digital insulation tester and interfacing with PC
16. Experiment using Digital Earth Resistance Tester

**Sessional work assessment**

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<td>Laboratory practicals and record</td>
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