

**Semester-III****Paper- Basic Engineering (Civil & Mechanical)****Full Marks-100 (80+20)****Total Hours : 42****Subject Code : ELE305****L T P  
3 2****Full Marks 100 (T) + 50(Pr)**

<b>Chapter</b>	<b>Name of Topics</b>	<b>Number of hrs</b>
01	Basic Civil Engineering Materials: 1.1 Basic Knowledge of Civil Engineering Materials like sand, Cement, Stove eves Bricks, Tiles, Terra Coat, Lime, Mortar Concrete, Paints & Varnishes.	05
02	Timber: Type & Structure of Timber tree, Defects in timber, characteristics of good timber, seasoning of timber.	03
03	Surveying & Levelling: Surveying Instruments, Measurements of horizontal distance by chair or table. Measurement of horizontal & Vertical angle. Basic Knowledge of levelling and total station.	08
04	Foundations for Machines: 5.1 Fundamental of Mechanical Vibration 5.2 Need for Foundation 5.3 Martial Required for Foundation 5.4 Foundation battz & Sizes. 5.5 Crilina for design	03
05	Joints and Fabrications Types of joints, necessary precautions for working with metals, fabrication process concept.	02
06	I. C Engine: 5.1 Construction & Working of two strokes and four stroke petrol & Diesel Engine. 5.2 Reasons of Mal functioning & remedial measurement for IC Engine	04
07	6.1 Construction & Working of Cochran, Babcock & Wilcox Boilers. 6.2 Construction & Working Principle with velocity diagram of Pelton, impulse & Reaction turbine. 6.3 Construction & Working principle of steam turbine.	02 05 02
08	Introduction of Thermodynamics. 1st and 2nd Laws of thermodynamics. Basic Knowledge of Enthalpy, Entropy etc.	04
09	Pumps & Air Compressors: 9.1 Types of Pumps- Centrifugal Pump, Reciprocating Pump, Their Function. 9.2 Air Compressors, Classification of compressors, construction & working of single & Two Stage reciprocating compressors.	02 02
	<b>Total</b>	<b>42</b>

### **Semester-III**

### **Paper- Basic Engineering Lab (Civil & Mechanical)**

**Subject Code : ELE310**

#### **List of Experiments :-**

1. Field visit for identification & Physical Properties of sand, Brick, Cement, Lime Tile and Point.
2. Field Survey of Distance measurement by chain and tape with correction.
3. Angle measurement by prismatic and surveyor compass.
4. Practice of making various types of joints
5. Practice of fabrication with metal flats.
6. Demonstration of Total Station.
7. Field visit of Machine Foundation.

#### **Reference Books :**

- |                                     |                     |
|-------------------------------------|---------------------|
| 1. Constructions materials          | Sushil Kumar'       |
| 2. Surveying and levelling          | B C Poonamia        |
| 3. Mechanical Engg.                 | Rai Choudhary       |
| 4. Workshop Technology              | Hazra Choudhary     |
| 5. Automobile Engg.                 | Kripal Singh Vol II |
| 6. Thermal Engg.                    | R K Rajput          |
| 7. Hydraulics and Hydraulic Machine | R K Bansal          |

### 3<sup>rd</sup> Semester Diploma in Engineering (Common)

**Subject Title : Development of Life Skills- I**

**Subject Code :302**

**Rationale:**

In today's competitive world, the nature of organizations is changing at very rapid speed. In this situation the responsibility of diploma holder is not unique. He will be a part of a team in the organization. As such the individual skills are not sufficient to work at his best.

This subject will develop the student as an effective member of the team. It will develop the abilities and skills to perform at highest degree of quality as an individual as well as a member of core group or team. Such skills will enhance his capabilities in the field of searching, assimilating information, managing the given task, handling people effectively, solving challenging problems.

**THE SUBJECT IS CLASSIFIED UNDER HUMAN SCIENCE. Objectives:** The

students will be able to:

1. Develop team spirit i.e. concept of working in teams
2. Apply problem solving skills for a given situation
3. Use effective presentation techniques
4. Apply techniques of effective time management
5. Apply task management techniques for given projects
6. Enhance leadership traits
7. Resolve conflict by appropriate method
8. Survive self in today's competitive world
9. Face interview without fear
10. Follow moral and ethics
11. Convince people to avoid frustration

**CONTENTS: Interaction by faculty / professional**

<b>Chapter</b>	<b>Name of the Topic</b>	<b>Suggested HOURS</b>
<b>1</b>	<b>SOCIAL SKILLS</b> Society, Social Structure, Develop Sympathy And Empathy.	<b>01</b>
<b>2</b>	Swot Analysis – Concept, How to make use of SWOT.	<b>01</b>
<b>3</b>	<b>Inter personal Relation</b> Sources of conflict, Resolution of conflict , Ways to enhance interpersonal relations.	<b>02</b>

4	<p><b>Problem Solving</b></p> <p><b>I)STEPS IN PROBLEM SOLVING,</b></p> <p>1)Identify and clarify the problem,  2)Information gathering related to problem,  3)Evaluate the evidence,  4)Consider alternative solutions and their implications,  5)Choose and implement the best alternative,  6)Review</p> <p><b>II)Problem solving technique.</b>(any one technique may be considered)</p> <p>1) Trial and error, 2) Brain storming, 3) Lateral thinking</p>	02
5	<p><b>Presentation Skills</b></p> <p>Body language --  Dress like the audience  Posture, Gestures, Eye contact and facial expression. STAGE FRIGHT,  Voice and language – Volume, Pitch, Inflection, Speed, Pause  Pronunciation, Articulation,  Language, Practice of speech.  Use of aids –OHP,LCD projector, white board</p>	03
6	<p><b>Group discussion and Interview technique –</b></p> <p>Introduction to group discussion,  Ways to carry out group discussion,  Parameters— Contact, body language, analytical and logical thinking, decision making</p> <p><b>INTERVIEW TECHNIQUE</b></p> <p>Necessity,  Tips for handling common questions.</p>	03
7	<p><b>Working in Teams</b></p> <p>Understand and work within the dynamics of a groups.  Tips to work effectively in teams,  Establish good rapport, interest with others and work effectively with them to meet common objectives,  Tips to provide and accept feedback in a constructive and considerate way ,  Leadership in teams, Handling frustrations in group.</p>	02
8	<p><b>Task Management</b></p> <p>Introduction,  Task identification,  Task planning ,organizing and execution, Closing the task</p>	02
<b>TOTAL</b>		<b>16</b>

## CONTENTS: PRACTICAL -

### List of Assignment: (Any Eight Assignment)

1. SWOT analysis:- Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT.
  - a) Your past experiences,
  - b) Achievements,
  - c) Failures,
  - d) Feedback from others etc.
2. Undergo a test on reading skill/memory skill administered by your teacher.
3. Solve the true life problem.
4. Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slump area, social activities like giving cloths to poor etc.( One activity per group)
5. Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.
6. Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme. #####
7. Conduct an interview of a personality and write a report on it.
8. Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed
9. Arrange an exhibition, displaying flow-charts, posters, paper cutting, photographs etc on the topic given by your teacher.

**Note:** - Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic. The **term work** will consist of any eight assignments.

**Mini Project** on Task Management: Decide any task to be completed in a stipulated time with the help of teacher. Write a report considering various steps in task management.

### LEARNING RESOURCES:

#### BOOKS:

Sr. No	Title of the book	Author	Publisher
1	Adams Time management	Marshall Cooks	Viva Books
2	Basic Managerial Skills for All	E.H. Mc Grath , S.J.	Pretice Hall of India
3	Body Language	Allen Pease	Sudha Publications Pvt. Ltd.
4	Creativity and problem solving	Lowe and Phil	Kogan Page (I) P Ltd
5	Decision making & Problem Solving	by Adair, J	Orient Longman
6	Develop Your Assertiveness	Bishop , Sue	Kogan Page India
7	Make Every Minute Count	Marion E Haynes	Kogan page India
8	Organizational Behavior	Steven L McShane and Mary Ann Glinow	Tata McGraw Hill
9	Organizational Behavior	Stephen P. Robbins	Pretice Hall of India, Pvt Ltd
10	Presentation Skills	Michael Hatton ( Canada – India Project)	ISTE New Delhi

11	Stress Management Through Yoga and Meditation	--	Sterling Publisher Pvt Ltd
12	Target setting and Goal Achievement	Richard Hale ,Peter Whilom	Kogan page India
13	Time management	Chakravarty, Ajanta	Rupa and Company
14	Working in Teams	Harding ham .A	Orient Longman

#### INTERNET ASSISTANCE

1. <http://www.mindtools.com>
2. <http://www.stress.org>
3. <http://www.ethics.com>
4. <http://www.coopcomm.org/workbook.htm>
5. <http://www.mapfornonprofits.org/>
6. <http://www.learningmeditation.com> <http://bbc.co.uk/learning/courses/>
7. <http://eqi.org/>
8. <http://www.abacon.com/commstudies/interpersonal/indisclosure.html>
9. <http://www.mapnp.org/library/ethics/ethxgde.htm>
10. [http://www.mapnp.org/library/grp\\_cnfl/grp\\_cnfl.htm](http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm)
11. <http://members.aol.com/nonverbal2/diction1.htm>
12. [http://www.thomasarmstron.com/multiple\\_intelligences.htm](http://www.thomasarmstron.com/multiple_intelligences.htm)
13. <http://snow.utoronto.ca/Learn2/modules.html>
14. <http://www.quickmba.com/strategy/swot/>

**Electrical Engineering**  
**Subject Code : ELE303**

**L T P**  
**3 2**

**Full Marks 100 (T) + 50(Pr)**

**Objectives:**

This is a foundation course to understand the basic principles and behavior of electrical circuits, electrical power apparatus and utilization of electrical energy.

**1. Electrical Engg Fundamentals (5 hours)**

Introduction to electrical circuits: Electric field, electric current, potential and potential difference, electric power, basic circuit components, ohm's law.

Sources and its types, Ideal and practical sources, Source Conversion, independent and dependent sources, Energy Stored in Inductor and Capacitor, series, parallel and series and parallel circuit.

**2. DC Networks & Theorems: (15 hours)**

Laws and Theorems applicable to DC networks (KCL & KVL, Node voltage & Mesh current analysis, Star-Delta and Delta-Star conversion, Superposition theorem, Thevenin & Norton theorem & Maximum power Transfer theorem), Simple problems.

**3. AC Fundamentals (6 hours)**

Single-Phase AC Circuits: Single-phase EMF Generation, Average and Effective value of periodic ac signals, Peak factor & Form factor, Phasor and Complex representation of sinusoids, Power factor, complex power.

Three-Phase AC Circuits: Comparison between single-phase and three-phase systems, three phase EMF Generation, Line and Phase quantities in star and delta networks,

**4. Magnetic circuits (6 hours)**

Introduction to Magnetic Circuits: Introduction to Electromagnetism, Faradays laws of Electromagnetic Inductions, B-H curve, Permeability, Reluctance, Solution of magnetic circuits, Hysteresis and Eddy current loss.

**5. Single Phase A.C. Circuits (5 hours)**

A.C. Circuits containing resistance only, A.C. Circuits containing inductance only, A.C. Circuits containing Capacitance only, R-L Series circuits, R-C series circuits, R-L-C Series circuits, Simple Numerical problems.

**6. Parallel A.C. Circuits- (5 hours)**

R-L,R-CandR-L-C circuits. Admittance, susceptance, solution by admittance method, phasor diagram, Parallel resonance, quality factor. Comparison of Series and parallel Circuits

**Electrical Engineering Lab :-**  
**Subject Code : ELE310**

**List of Experiments:**

1. Verification of Ohm's laws
2. Verification Kirchoffs laws
3. Verification of superposition Theorem.
4. Verifications of Thevenin's and Norton's theorem.
5. Verifications of Maximum power transfer theorem.
6. Connection and measurement of power consumption of various lamps.
7. Measurement of resonant frequency of Tank Circuits.
8. V-I Characteristics of incandescent lamps and time fusing current characteristics of a fuse.
9. Calculation of current, voltage and power in series R-L-C circuit excited by single phase AC supply and calculation of power factor.
10. Verifying B-H Curve of an Electromagnet.

**Text/reference books:**

1. Rizzoni, Principles and Applications of Electrical Engineering., McGrawHill
2. Hughes, "Electrical & Electronic Technology", Ninth Edition Pearson Education.
3. V.D.Toro, "Basic Electrical Engineering", Prentice-Hall of India.
4. B.L.Theraja, A.K.Theraja, "A textbook of Electrical Technology" S.Chand. Ltd.
5. Rajendra Prasad, "Fundamentals of Electrical Engineering", PHI,
6. 6.D P kothari and I J Nagratha "Basic electrical engineering" 2nd ed, TMH.
7. N.N.ParkerSmith, "Problems in Electrical Engineering", CBS Publisher



**Semester-III****Branch-Electrical Engineering & EEE****Paper- Electronics Engineering****Subject Code : ELE306****Total Hours : 42****Full Marks-100 (80+20)**

<b>Chapter</b>	<b>Topics</b>	<b>Hours</b>
01.	<p>Semiconductor Diode:</p> <p>1.1 Semiconductor Theory</p> <ul style="list-style-type: none"><li>• Review of Semiconductor theory (No Question to be set in theory paper)</li><li>• Intrinsic semiconductor, Extrinsic semiconductor, doping, dopant</li><li>• trivalent &amp; pentavalent impurities, P-Type and N-Type Semiconductor.</li></ul> <p>1.2 Semiconductor Diode</p> <ul style="list-style-type: none"><li>• PN Junction</li><li>• Junction theory: Barrier voltage, Depletion region, Junction capacitance, Forward and reverse biased junction.</li><li>• V-I characteristics of P-N Junction diode.</li><li>• Circuit diagram for characteristics (Forward &amp; Reverse)</li></ul> <p>1.3 Specification of diode</p> <ul style="list-style-type: none"><li>• Forward Voltage Drop, Reverse Saturation Current, Maximum Forward Current, Power Dissipation.</li><li>• Ideal Diode Model.</li></ul> <p>1.4 Zener Diode</p> <ul style="list-style-type: none"><li>• Construction &amp; Symbol</li><li>• Circuit diagram for characteristics (Forward &amp; Reverse)</li><li>• Specification of zener diode: zener voltage (<math>V_Z</math>), Maximum Power dissipation (<math>P_D \max</math>), Break over current, zener resistance.</li><li>• Special Purpose diodes: Schott key diode, Point-contact diode, Varacter Diode (Construction, Symbol, Characteristics and application).</li><li>• Optical diodes: LED, IRLED, Photodiode and Lased diode (Symbol, Operating Principle and application of each)</li></ul>	04
02	<p>Rectifiers and Filters</p> <p>2.1 Rectifiers</p> <ul style="list-style-type: none"><li>• Need of rectifier</li><li>• Types of rectifier: Half wave rectifier, Full wave</li></ul>	06

	<p>rectifier (Bridge and centre tapped).</p> <ul style="list-style-type: none"> <li>• working with waveform (IP/OP) waveforms for voltage and current, Average (DC) value of current and voltage (No derivation).</li> <li>• Ripple, ripple factor, ripple frequency, PIV of diode used, transformer utilization factor, efficiency of rectifier.</li> <li>• Comparison of three types of rectifiers (HWR, FWR (Bridge &amp; Centre Tapped)).</li> </ul> <p>2.2 Filters</p> <ul style="list-style-type: none"> <li>• Need of Filters</li> <li>• Types of Filters: Shunt capacitor, series inductor, LC filter, <math>\pi</math> filter (circuit diagram, operation, DC O/P voltage, ripple factor (Formula), ripple frequency, dependence of ripple factor on load.</li> <li>• I/P and O/P waveforms, Limitations and Advantages of all types of filters.</li> </ul>	
03	<p>Bipolar Junction Transistor</p> <p>3.1 transistor</p> <ul style="list-style-type: none"> <li>• Transistor definition</li> <li>• Types: NPN, PNP Junction transistors (Symbols, operating principle)</li> <li>• Transistor configuration: Common emitter (CE), Common Collector (CC), Common base (CB).</li> <li>• Characteristics in CE configuration (Circuit diagram, I/P and O/P characteristics, different points of characteristics (Cut-off, Active and Saturation), input resistance, Output resistance, current gain (<math>\alpha</math> and <math>\beta</math>) Transistor Biasing).</li> <li>• Need of biasing, DC load line, Operating Point.</li> <li>• Types of Biasing Circuits: Fixed bias circuit, Base biased with emitter feedback, Base biased with collector feedback, voltage divider bias, emitter biased.</li> <li>• Transistor Model of h-parameters.</li> </ul> <p>3.2 Transistor as an amplifier (CE configuration only)</p> <ul style="list-style-type: none"> <li>• Graphical representation, Current gain, Voltage gain, Power gain (No derivation), Input Output resistance, Phase Shift between input and output.</li> <li>• AC Load Line.</li> <li>• Single Stage CE amplifier: Circuit diagram, Function of each component. Frequency response and bandwidth.</li> </ul> <p>3.3 Need of Cascaded amplifier</p> <ul style="list-style-type: none"> <li>• Types of coupling: RC couple, Transformer couple, Direct Couple (Circuit diagram and function of each component).</li> <li>• Application of each amplifier</li> <li>• Transistor as a switch-(Circuit diagram, Operation,</li> </ul>	12

	<p>Application).</p> <p>UJT</p> <ul style="list-style-type: none"> <li>• Symbol, characteristics and working principle of UJT.</li> </ul>	
04	<p>Field Effect Transistor (Unipolar Transistor)</p> <p>4.1 FET</p> <ul style="list-style-type: none"> <li>• Types, Symbols and working principle.</li> <li>• Characteristics of FET, Circuit diagram for drain characteristics, Operating regions of characteristics.</li> <li>• Drain resistance, Mutual capacitance, amplification factor and their relation, Pinch off voltage of FET.</li> <li>• Comparison of BJT and FET. (Type of carriers, switching speed, Thermal stability, space in case of IC fabrication, control parameter, input impedance, offset voltage, power gain at audio frequencies)</li> </ul> <p>4.2 MOSFET</p> <ul style="list-style-type: none"> <li>• Types, Symbol, working principle.</li> <li>• Application of FET and MOSFET.</li> </ul>	08
05	<p>Regulated Power Supply</p> <p>5.1</p> <ul style="list-style-type: none"> <li>• Definition of regulator, Need of regulator, Voltage regulation factor</li> <li>• Concept of load regulation and line regulation.</li> <li>• Zener diode as a voltage regulator.</li> <li>• Basic block diagram of DC Power supply</li> <li>• Transistorized Series voltage regulator, Transistorized Shunt Voltage regulator, (Circuit diagram and operation).</li> </ul> <p>5.2 Regulator IC's</p> <ul style="list-style-type: none"> <li>• IC's 78XX, 79XX (Functional Pin diagram)</li> <li>• IC 723 as fixed, variable and Dual regulator.</li> </ul>	04
06	<p>OP Amp</p> <ul style="list-style-type: none"> <li>• Block diagram, Basic definition of Terms</li> <li>• Equivalent Circuit</li> <li>• Open Loop &amp; closed Loop, OP Amp</li> <li>• Inverting &amp; Non inverting OP Amp</li> <li>• Adder and Subtractor</li> <li>• Integrator, differentiator &amp; Comparator circuit using OP Amp.</li> </ul>	08
	Total	42

## Reference Books :

01	Principles of Electronics by Malvino
02	Electronics device & circuits by Neselski & Boylsted
03	Electronics device & circuits by Grove
04	Electronics device & circuits by by Milliman & Holkias
05	Electronics device & circuits by V.K. Mehta
06	Op Amp by Gaikwad

## Electronics Lab :- Subject Code :-ELE309

### Practical :-

Skills to be developed

Intellectual Skills :

1. Identification & selection of Components
2. Interpretation of Circuits
3. Understand working of rectifier, filter, amplifier and Oscillator circuits

### Motor Skills :

1. Ability to draw the circuits
2. Ability to measure various parameters
3. Ability to test the components using Multimeter
4. Ability to read data sheets of components
5. Follow standard test procedures

### List of Practicals

1. Forward & Reverse characteristics of diode
2. Characteristics of Zener diode
3. Study of Rectifiers (Half wave & Full wave) & Filters (Capacitor & Inductor filter)
4. Input & Output Characteristics of transistor in CE mode
5. Characteristics of FET
6. Characteristics of UJT
7. Load & Line regulation Characteristics of Regulator
8. Frequency response of single stage RC coupled amplifier.
9. To Study the V-I Characteristics of PN Junction diode.
10. Determination of h parameter.

**Diploma in Engineering (All branch except Mining, Arch & Non Tech)**

**Semester : Third**

**Subject Title : Engineering Mathematics-III**

**Subject Code: 301**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
L	T	P	Full Marks.	External Exam Marks	Internal Exam Marks	External Pas Marks	Total Pass Marks	Duration of External Exams
TH								
03	01		100	80	20	26	40	3 Hrs

**NOTE:Internal marks will be allotted on the basis of two snap tests and 2 assignment of equal marks to be conducted by the faculty teaching the subject.**

Rationale:

The subject is extension of Engineering Mathematics – 1 & 2 of First year and stepping into the prerequisites to learn Applied Mathematics applicable in engineering solutions. Engineering Mathematics lay down the foundation to understand and express principles and laws involved in other technological subjects. The study of Engineering Mathematics will help to develop the skills essential for new emerging avenues.

Objective:

The student will be able to acquire knowledge of mathematical terms, concepts and principles. They can acquire sufficient mathematical techniques and can develop the ability to apply mathematical methods to solve technical and day to day practical problems and to execute management plans with precision.

Sub Objective:

This course is divided into five units. After completion of this course one could become able to learn the following.

- Intuitive meaning and Methods of finding integration definite integration and its properties.
- Application of Integration in finding Area, volume of irregular shapes.
- Methods of solving differential equation of first order and first degree.
- Methods for finding approximate roots by using bisection, Regula-falsi, Newton-Raphson method, Gauss elimination, Jacobi and Gauss- Seidal methods.
- Use of Binomial, Normal and Poisson distributions for solving different examples.

- Use of Laplace transform for solving problems of Differential Equations.
- Use of Fourier series for expansion of function at the given intervals

Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	<b>Integration:</b> 1.1 Definition of integration as anti-derivative. Integration of standard function. 1.2 Rules of integration (Integrals of sum, difference, scalar multiplication). 1.3 Methods of Integration. 1.3.1 Integration by trigonometrical transformation. 1.3.2 Integration by substitution 1.3.3 Integration by parts. 1.3.4 Integration of rational and irrational functions. 1.3.5 Integration by Partial fractions.	7	16
	<b>1.4 Definite Integration.</b> 1.4.1 Concept of definite integrations with examples. 1.4.2 Properties of definite integral with simple problems.	3	
	<b>1.5 Applications of definite integrals.</b> 1.5.1 Area under the curve. 1.5.2 Area bounded by two curves.	3	
2	<b>Differential Equation</b> 2.1 Definition of differential equation, order and degree of differential equation. Formation of differential equation. 2.2 Solution of differential equations of first order and first Degree such as variable separable form, reducible to Variable separable, Homogeneous and Linear Differential Equation.	6	16
	<b>2.3 Applications of Differential equations.</b> 2.3.1 Rectilinear motion (motion under constant and variable acceleration) 2.3.2 Newton's Law of Cooling	3	
	<b>Numerical Methods</b> <b>3.1 Solution of algebraic equations</b> Bisection method, Regula falsi method and Newton-Raphson method.	3	
3	<b>3.2 Solution of simultaneous equations containing 3 unknowns</b>		16

	<p>3.2.1 Gauss elimination method.</p> <p>3.2.2 Jacobi's Iterative method.</p> <p>3.3.3 Gauss Seidal method.</p>	3	
	<p><b>3.3 Interpolation</b></p> <p>3.3.1 Concept of interpolation and extrapolation.</p> <p>3.3.2 Different operators (<math>\Delta, \nabla</math> &amp; <math>E</math>), relation between them, some problems based on operators, formation of Difference Table.</p> <p>3.3.3 Newton's Forward and Backward difference interpolation formulae.</p> <p>3.3.4 Lagrange's interpolation formula.</p> <p>3.3.5 Problems based on above.</p>	6	
	<p><b>3.4 Numerical Differentiation &amp; Integration.</b></p> <p>3.4.1 Newton's forward and backward difference formulae for first and second order differentiation at any point.</p> <p>3.4.2 Numerical integration Trapezoidal rule and Simpson's <math>1/3^{\text{rd}}</math> rule.</p>	3	
4	<p><b>4.1 Probability:</b></p> <p>4.1.1 Definition of random experiment, sample space, event occurrence of event and types of events (impossible, mutually exclusive, exhaustive, equally likely)</p> <p>4.1.2 Definition of probability, addition and multiplication theorems of probability.</p>	05	16
	<p><b>4.2 Probability Distribution</b></p> <p>4.2.1 Binomial distribution.</p> <p>4.2.2 Poisson's distribution.</p> <p>4.2.3 Normal distribution</p> <p>4.2.4 Simple examples based on above.</p>	05	
5	<p><b>Laplace Transform</b></p> <p>5.1 Definition of Laplace transforms Laplace transform of standard functions.</p> <p>5.2 Properties of Laplace transform such as Linearity, first shifting, second shifting, multiplication by <math>t^n</math>, division by <math>t</math>.</p> <p>5.3 Inverse Laplace transforms. Properties-linearly first shifting, second shifting. Method of partial fractions,</p>	3	
6	<p><b>Fourier Series</b></p> <p>6.1 Definition of Fourier series (Euler's formula).</p> <p>6.2 Series expansion of continuous functions in the intervals <math>(0, 2l), (-l, l), (0, 2\pi), (-\pi, \pi)</math></p>	3	16

7	<b>Linear Programming</b> <b>7.1 Introduction</b> <b>7.2 Solution of Linear Programming problem (LPP) by Graphical Method.</b>	3	
	<b>TOTAL:</b>	56	80

**Tutorial:** Tutorials are to be used to get enough practice for solving problems. It is suggested that in each tutorial at least five problems should be solved.

**Learning Resources:**

**Text Book:**

Sr. No	Title	Authors	Publications
1	Higher Engg. Mathematics	B. S. Grewal	Dhanpat Rai

**Ref. Books:**

Sr. No	Title	Authors	Publications
1	Engineering Mathematics	H.K.Das	S.Chand & Company LTD, New Delhi
2	Higher Engineering Mathematics	B.V,Ramana	Mcgraw Hill Education ( India) Private limited , New Delhi
3	Practical Mathematics	I.B. Prasad	Khanna
4	Introductory Method of Numerical Analysis	S.S.Shastri	P.H.I
5	Linear Programming	G. Hadley	
6	A text book for class 12, Part- I & II	NCERT	NCERT, Delhi

**Note:**

In board examination, question setter may be advised to select 20% questions of objective, 30% of short type and remaining 50% of long type based on basic concepts, formula and calculations respectively.





# Measurement I

## Semester- 3<sup>rd</sup>

L T P  
3 2

Full marks Theory 80 + 20 (100)  
Full marks Practical 40 + 10 (50)

### Subject Code : ELE304

#### **01. Fundamentals of Measurement**

**4 Hr**

- 1.1 Electrical signals and errors, their types
- 1.2 Desirable qualities of measuring instruments.
- 1.3 Various effects of electricity employed in measuring instruments.
- 1.4 Classification of measuring Instruments.

#### **02. Measurement of Current and Voltage**

**9 Hr**

- 2.1 Construction and principle of PMMC, MI, Dynamometer & induction type instruments, Hot wire & electrostatic instruments.
- 2.2 Voltmeter, Ammeter, Multi-meter : analog and digital types
- 2.3 Range Extension of Ammeter and Voltmeter.
- 2.4 Instrument transformers (CT & PT), tongue tester, their use in extension of ranges

#### **03. Measurement of Power**

**6 Hr**

- 3.1 Principle and Construction of single phase & three phase dynamometer type wattmeter.
- 3.2. Errors and their compensation.
- 3.3 Measurement of single phase power with one wattmeter and 2 wattmeter methods for balanced and unbalanced loads.
- 3.4 Three phase power measurement by two wattmeter and three wattmeter for balanced and unbalanced loads.
- 3.5 Effect of power factor variation on wattmeter readings in two wattmeter method.

#### **04. Measurement of Energy**

**6 Hr**

- 4.1 Constructional feature & principle of working of single phase induction type energy meter.
- 4.2 Constructional feature & principle of working of three-phase induction type energy meter.
- 4.3 Different types of errors and their compensation.
- 4.4 Concept of Electronic energy meter.

#### **05. Measurement of Resistance**

**4 Hr**

- 5.1 Low, medium & high resistance
- 5.2 Measurement of low resistance by potentiometer & Kelvin's double bridge
- 5.3 Measurement of earth resistance by megger
- 5.4 Measurement of medium resistance by Wheatstone bridge method.
- 5.5 Measurement of high resistance by loss of charge method.

## **06. Measurement of Inductance & Capacitance**

**6 Hr**

- 6.1 Measurement of inductance by Maxwell Bridge, Andersons Bridge, Hays Bridge
- 6.2 Measurement of capacitance by D-sauty Bridge, Schering Bridge.
- 6.3 Self & Mutual inductance Measurement,
- 6.4 Digital multimeter, LCR meter.

## **07. Transducers**

**7 Hr**

- 7.1 Introduction of different types of transducers.
- 7.2 Primary and Secondary, Active and Passive Transducers.
- 7.3 LVDT, RVDT, RTD, Thermistor,
- 7.4 Piezoelectric, photoelectric, ultra-sonic.

### **MEASUREMENT LAB**

**Subject Code : ELE308**

### **List of Practical's: (Minimum 10 experiments to be performed by students)**

**Marking will be in the following pattern**

**Attendance Previous Lab records Experiment performance Observations Viva**

**(all heads will have equal weight age)**

1. Measurement of Current and Voltages by Low range ammeter and voltmeter respectively with shunt and multiplier.
2. Calibration of Wattmeter at various power factors by standard Wattmeter.
3. Measurement of active power in three phase balanced load by single wattmeter method.
4. Measurement of active and reactive power in three phase balanced load by two wattmeter method
5. Measurement of single phase power with 3 ammeters and 3 voltmeters.
6. Calibration of Energy meter at various power factors by standard energy meter.
7. Measurement of energy in single phase & three phase balanced load using Electronic Energy Meter.
8. Measurement of Low resistance by Kelvin's Double Bridge.
9. Measurement of Medium resistance by Wheatstone bridge.
10. Measurement of Insulation Resistance by Megger.
11. Measurement of Resistance, Voltage, Current, Voltage, Current in A.C & D. C. Circuit by using digital multimeter.
12. Measurement of A.C. Current by tongue tester.
13. Measurement of Circuit Parameters by LCR meter.
14. To measure linear displacement by LVDT and plot characteristics.
15. Measurement of inductance by Maxwell Bridge.
16. Measurement of Capacitance by Schering Bridge.
17. Measurement of inductance by Hay's Bridge.

### **Books Recommended:-**

1. Electrical & Electronics Measuring Instrument- Dhanpat Rai & Sons.--- A.K Sawhney
2. Electrical Measurement & Measuring Instrument-Khanna Publisher—Rejendra Prasad
3. Electrical Measurement & Measuring Instrument --- E.W.Golding
4. Electrical & Electronic Measurement by J B Gupta
5. Electrical & Electronic Measurement by Ryder
6. Electronic Instrumentation and Measurement by W D Cooper