P.K.UNIVERSITY, SHIVPURI (MP)
(FACULTY OF ENGINEERING & TECHNOLOGY)

EVALUATION SCHEME & SYLLABUS

FOR

DIPLOMA IN ELECTRICAL ENGINEERING

ON

CHOICE BASED CREDIT SYSTEM (CBCS)

[Effective from the Session: 2025-26]

DIPLOMA ELECTRICAL ENGINEERING

Study And Evaluation Scheme For Diploma Electrical Engineering

Year-2nd / Semester -3rd

Subject Code	Subjects Name	Study Scheme Periods/Week			Credits	Marks in Evaluation Scheme						Total Marks of Internal & External
						Internal Assessment			External Assessment			
		L	T	P		Th	Pr	Total	Th	Pr	Total	Grand Total
DFUNCEE301	Functional Communication	3	0	0	3	30	-	30	70	-	70	100
DAPPLEE302	Applied Mathematics-III	3	1	0	4	30	-	30	70	-	70	100
DELECEE303	Electrical Instruments and Measurements	2	1	0	3	30	-	30	70	-	70	100
DELEMEE304	Elementary Mechanical & Civil Engineering	3	1	0	4	30	-	30	70	-	70	100
DELECEE305	Electrical Machine-I	3	0	0	3	30	-	30	70	-	70	100
DELECEE306	Electrical Instruments and Measurements Lab	0	0	2	1	-	25	25	-	25	25	50
DFUNCEE307	Functional Communication Lab	0	0	2	1	-	25	25	-	25	25	50
DELEMEE308	Elementary Mechanical & Civil Engineering Lab	0	0	2	1	-	25	25	-	25	25	50
DELECEE309	Electrical Machine-I Lab	0	0	2	1	-	25	25	-	25	25	50
DCOMPEE310	Computer Application Lab	0	0	4	2	-	25	25	-	25	25	50
Total		14	3	12	23	150	125	275	350	125	475	750
For pass the candidate is required to obtain 40% marks in each paper and 50% marks in aggregate.												375

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2nd Year /3rd Semester

DFUNCEE301: FUNCTIONAL COMMUNICATION

L	T	P
3	0	0

DETAILED CONTENTS
Section "A" (English) Text Lessons

Unit I. On Communication **(25 Periods)**
Unit.II Exploring Space
Unit.III Sir C.V. Raman
Unit.IV Professional Development of Technicians
Unit.V Buying a Second Hand Bicycle
Unit.VI Leadership and Supervision
Unit.VII First Aid
Unit.VIII the Romanance of Reading
Unit.IX No Escape from Computers
Unit.X Bureau of Indian Standards

Section "B" Hindi **(35 Periods)**

1. स्वरोजगार
2. भारतीय वैज्ञाननक ो ंतकनीनकयएवम ो ंकाभारत केनवकास मेंयगदान
3. ग्राम्य नवकास
4. पररवार ननय जन
5. सामानजक सोंस्थायें
6. ननय जन और जन कल्याण
7. भारत मेंप्रधनगकी केनवकास का
8. हररत क् ा ो ंनत
9. पयाावरणएवम मानव प्रदूषण
10. श्रनमक कल्याण
11. भारत मेंश्रनमक आन्द लन

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DAPPLEE302 APPLIED MATHEMATICS - III

L	T	P
3	1	0

DETAILED CONTENTS

1. Matrices (16 Periods)

1.1 Algebra of Matrices, Inverse
Addition, Multiplication of matrices, Null matrix and a unit matrix, Square matrix, Symmetric, Skew symmetric, Hermitian, Skew hermition, Orthogonal, Unitary, diagonal and Triangular matrix, Determinant of a matrix. Definition and Computation of inverse of a matrix.

1.2 Elementary Row/Column Transformation
Meaning and use in computing inverse and rank of a matrix.

1.3 Linear Dependence, Rank of a Matrix
Linear dependence/independence of vectors, Definition and computation of rank of matrix. Computing rank through determinants, Elementary row transformation and through the concept of a set of independent vectors, Consistency of equations.

1.4 Eigen Pairs, Cayley-Hamilton Theorem
Definition and evaluation of eign values and eign vectors of a matrix of order two and three, Cayley-Hamilton theorem (without Proof)and its verification, Use in finding inverse and powers of a matrix.

2. Differential Calculus (15 Periods)

2.1 Function of two variables, identification of surfaces in space, coincides

2.2 Partial Differentiation
Directional derivative, Gradient, Use of gradient f, Partial derivatives, Chain rule, higher order derivatives, Euler's theorem for homogeneous functions, Jacobeans.

2.3 Vector Calculus
Vector function, Introduction to double and triple integral, differentiation and integration of vector functions, gradient, divergence and curl, differential derivatives.

3. Differential Equation (15 Periods)

3.1 Formation, Order, Degree, Types, Solution Formation of differential equations through physical, geometrical, mechanical and electrical considerations, Order, Degree of a differential equation, Linear, nonlinear equation.

3.2 First Order Equations

Variable separable, equations reducible to separable forms, Homogeneous equations, equations reducible to homogeneous forms, Linear and Bernoulli

Form exact equation and their solutions.

3.3 Higher Order Linear Equation :

Property of solution, linear differential equation with constant coefficients (PI for X=, e^{ax} Sinax, Cosax, X^n, $e^{ax}V$, XV

3.4 Simple Applications

LCR circuit, Motion under gravity, Newton's law of cooling, radioactive decay, Population growth, Force vibration of a mass point attached to spring with and without damping effect. Equivalence of electrical and mechanical system.

4. Integral Calculus-II (12 Periods)

4.1 Beta and Gamma Functions

Definition, Use, Relation between the two, their use in evaluating integrals.

4.2 Fourier Series

Fourier series of f(x),-n<x<n, Odd and even function, Half range series.

4.3 Laplace Transform

Definition, Basic theorem and properties, Unit step and Periodic functions, inverse Laplace transform, Solution of ordinary differential equations.

5. Probability and Statistics (12 Periods)

5.1 Probability

Introduction, Addition and Multiplication theorem and simple problem.

5.2 Distribution

Discrete and continuous distribution, Binomial Distribution, Poisson distribution, Normal Distribution.

RECOMMENDED BOOKS

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
3 Applied Mathematics-III by Chauhan and Chauhan, Krishna Publications, Meerut**.**
4. Applied Mathematics-II by Kailash Sinha and Varun Kumar; Aarti Publication, Meerut.
5. Ebooks/etools/relevant software to be used as recommended by AICTE/UBTE/NITTTR, Chandigarh.

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2nd Year / 3rd Semester

DELECEE303: ELECTRICAL INSTRUMENTS AND MEASUREMENTS

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3	0	0

DETAILED CONTENTS

1. Introduction to Electrical Measuring Instruments: (05 Periods)

1.1 Concept of measurement and instruments
1.2 Concept of measurement of electrical quantities and instruments for their measurements, sources of error.
1.3 Types of electrical measuring instruments – indicating, integrating and recording type instruments
1.4 Essentials of indicating instruments – deflecting, controlling and damping torque

2. Ammeters and Voltmeters (Moving coil and moving iron type) (06 Periods)

2.1 Concept of ammeter and voltmeters and difference between them
2.2 Construction and working principles of moving Iron and moving coil instruments
2.3 Merits and demerits, sources of error and application of these instruments

3. Wattmeter (Dynamometer Type) (06 Periods)

Construction, working principle, merits and demerits of dynamometer type wattmeter, Digital wattmeters.

4. Energy meter (10 Periods)

4.1 Induction Type: Construction, working principle, merits and demerits of single-phase and three-phase energy meters
4.2 Errors and their compensation
4.3 Simple numerical problems
4.4 Construction and working principle of maximum demand indicators

4.5 Digital energy meter (diagram, construction and application)

5. Miscellaneous Measuring Instruments: (18 Periods)

5.1 Construction, working principle and application of Meggar, Earth tester (Analog and digital) Multimeter, Frequency meter (dynamometer type) singlephase power factor meter (Electrodynamometer type). Working principle ofsynchroscope and phase sequence indicator, tong tester (Clamp-on meter)

5.2 Instrument Transformers: Construction, working and applications

a) CT b) PT

6. Electronic Instruments: (06 Periods)

6.1 Cathode Ray Oscilloscope: Block diagram, working principle of CRO and its various controls. Applications of CRO.

6.2 Digital multi-meter (only block diagram) and Applications

7. LCR meters. (04 Periods)

Study of LCR meters and their applications

8. Power Measurements in 3-phase circuits by (04 Periods)

8.1 Two wattmeter method in balanced and unbalanced circuits and simple problems

8.2 Three wattmeter method

9. Transducers (10 Periods)

Introduction, Types of Transducers (1 phase, 3 phase)

Basic concept of pressure measurement, flow measurement, level measurement, displacement measurement using transducers

10. Measurement of Temperature (09 Periods)

Different types of thermometers, thermocouple, resistance temperature detector and their construction, principle and working. Thermal Imager Camera (Concept)

11. Smart Metering System (06 Periods)

AMI (Advance Metering Infrastructure), Functions of AMI, cyber Security, Advantages

Smart Meter Technology: AMR (Automatic Metering Reading), inverse/reverse metering system in solar power plant, MRI (Meter Reading Instrument)

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2nd Year /3rd Semester

DELEMEE304:
ELEMENTARY MECHANICAL & CIVIL ENGINEERING

L	T	P
3	1	0

SECTION A - MECHANICAL ENGINEERING

1. Thermal Engineering (14 periods)

1.1 Sources of Energy

Definition, Concept of thermodynamic system and surroundings, Closed system, Open system, Isolated system, Thermodynamics definition of work.Zeroth law of thermodynamics
Basic ideas, conventional and nonconventional forms- Thermal, Hydel, Tidal, wind, Solar, Biomass and Nuclear and their uses.

1.2 Fuels & Combustion:

Combustion of fuels- their higher and lower calorific values. Combustion equations for carbon, sulphur, hydrogen and their simple compounds. Calculation of minimum amount of air required for complete combustion.

Combustion analysis n mass basis and on volume basis. Concept of excess Air in a boiler furnace combustion. Heat carried away by flue gases.

Analysis of flue gases by Orsat apparatus. Simple numerical problems

Idea of specific properties of liquid fuels such as detonation, knock resistance (cetane and octane numbers), viscosity, solidification point, flash point and flame point.

3. Machine Components (20 periods)

Brief idea of loading on machine components.

(i) Pins, Cottor and Knuckle Joints.

(ii) Keys, Key ways and splineon the shaft. (iii)Shafts, Collars,Cranks, Eccentrics.

(iv) Couplings and Clutches.

Bearings-Plane, Bushed, Split-step, ball, Roller bearing, Journal bearing, Foot step bearing, thrust bearing, collar bearing and Special type bearings and their applications.

(vi) Gears

Different types of gears, gear trains and their use for transmission of motion. Determination of velocity ratio for spur gear trains; spur gear, single and

double helical gears, Bevel gears, Mitre wheel, worms, Rack and Pinion. Simple and compound and epicyclic gear trains and their use. Definition of pitch and pitch circle & module.

(vii) Springs

Compression, Tension, Helical springs,Torsion springs, Leaf and Laminated springs. Their use and material.

3. **Lubrication (08 periods)**

Different lubrication system for lubricating the components of machines. Principle of working of wet sump and dry sump system of lubrication. (Explain with simple line diagram). Selection of lubricant based on different application (Requirement with the help of manufacturer catalogue).

SECTION B: CIVIL ENGINEERING

4. **Construction Materials (06 periods)**

Properties and uses of various construction materials such as stones, bricks, lime, content and timber with their properties, physical/field testing, elements of brick masonry.

5. **Foundations (08 periods)**

5.1 Bearing capacity of soil and its importance

5.2 Types of various foundations and their salient features, suitability of various foundations for heavy, light and vibrating machines.

6. **Concrete (08 periods)**

Various ingredients of concrete, different grades of concrete, water cement ratio, workability, physical/field testing of concrete, mixing of concrete, placing and curing of concrete..

7. **RCC (06 periods)**

Basics of reinforced cement concrete and its use (elementary knowledge), introduction to various structural elements of a building.

Note: While imparting instructions, teachers are expected to lay more emphasis on concepts and principles. It will be better if the classes for general engineering are conducted by organized demonstrations for explaining various concepts and principles.

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DELEMEE305: ELECTRICAL MACHINE-I

L	T	P
3	0	0

DETAILED CONTENTS

1. Introduction to Electrical Machines (20 Periods)

1.1 Definition of motor and generator
1.2 Torque development due to alignment of two fields and the concept of torque angle
1.3 Electro-magnetically induced emf
1.4 Elementary concept of an electrical machine
1.5 Comparison of generator and motor
1.6 Generalized theory of electrical machines

2. DC Machines (25 Periods)

2.1 Main constructional features, Types of armature winding
2.2 Function of the commutator for motoring and generation action
2.3 Factors determining induced emf
2.4 Factors determining the electromagnetic torque
2.5 Various types of DC generators
2.6 Significance of back e.m.f., the relation between back emf and Terminal voltage
2.7 Armature Reaction
2.8 Methods to improve commutation
2.9 Performance and characteristics of different types of DC motors
2.10 Speed control of dc shunt/series motors
2.11 Need of starter, three point dc shunt motor starter and 4 point starter
2.12 Electric Braking
2.13 Applications of DC motors
2.14 Faults in dc machines and their retrospective
2.15 Losses in a DC machine
2.16 Determination of losses by Swinburne's test
2.17 Rating and Specifications of DC machines

3. Single Phase Transformer (25 Periods)

3.1 Introduction
3.2 Constructional features of a transformer and parts of transformer
3.3 Working principle of a transformer
3.4 EMF equation
3.5 Transformer on no-load and its phasor diagram
3.6 Transformer – neglecting voltage drop in the windings – Ampere turn

balance –its phasor diagram

3.7 Mutual and leakage fluxes, leakage reactance

3.8 Transformer on load, voltage drops and its phasor diagram

3.9 Equivalent circuit diagram

3.10 Relation between induced emf and terminal voltage, voltage regulation of a transformer- mathematical relation

3.11 Losses in a transformer

3.12 Open circuit and short circuit test. Calculation of efficiency, condition for maximum efficiency-maintenance of Transformer, scheduled Maintenance

3.13 Auto transformer construction, working and applications

3.14 Different types of transformers including dry type transformer.

3.15 Rating and Specifications of single phase transformer

4. Three Phase Transformer (14 Periods)

4.1 Construction of three phase transformers and accessories of transformers such as Conservator, breather, Buchholtz Relay, Tap Changer (off load and on load) (Brief idea)

4.2 Types of three phase transformer i.e. delta-delta, delta-star, star-delta and star- star

4.3 Star delta connections (relationship between phase and line voltage, phase and line current)

4.4 Conditions for parallel operation (only conditions are to be studied)

4.5 On load tap changer

4.6 Difference between power and distribution transformer

4.7 Cooling of transformer

4.8 Rating and Specifications of three phase transformers

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2nd Year/ 3rd Semester

L	T	P
0	0	2

DELECEE306: ELECTRICAL INSTRUMENTS AND MEASUREMENTS LAB

LIST OF PRACTICALS

1. Use of analog and digital multimeter for measurement of voltage, current (A.C/D.C)and resistance
2. Measurement of pressure by using LVDT
3. To measure the value of earth resistance using earth tester.
4. To measure power, power factor in a single-phase circuit, using wattmeter and power factor meter and to verify results with calculations.
5. Measurement of power and power factor of a three-phase balanced load by two wattmeter method.
6. Measurement of voltage and frequency of a sinusoidal signal using CRO and draw wave shape of signal.
7. Measurement of power in a 3 phase circuit using CT, PT and 3-phase wattmeter.
8. Use of LCR meter for measuring inductance, capacitance and resistance.
9. To record all electrical quantities from the meters installed in the institution premises.
10. To measure Energy at different Loads using Single Phase Digital Energy meter
11. Measurement of temperature by using thermistor/Thermal Imager
12. Calibration of single phase and three-phase energy meter and digital energy meter

RECOMMENDED BOOKS

1. Electrical Measurements and Measuring Instruments by Golding and Widdis; Wheeler Publishing House, New Delhi
2. Electrical Measurements and Measuring Instruments by SK Sahdev, Uneek International Publications, Jalandhar
3. A Course in Electrical Measurement and Measuring Instruments by AK Sawhney andPL Bhatia; Dhanpat Rai and Sons, New Delhi
4. Electric Instruments by D. Cooper
5. Experiments in Basic Electrical Engineering by SK Bhattacharya and KM Rastogi,New Age International (P) Ltd., Publishers, New Delhi
6. Electronics Instrumentation by Umesh Sinha, Satya Publication, New Delhi
7. Basic Electrical Measurements by Melville B. Staut.
8. Electrical Measurement and Measuring Instruments by JB Gupta, SK Kataria and Sons,New Delhi
9. Electrical Measurement and Measuring Instruments by ML Anand, SK Kataria andSons, New Delhi

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2nd Year /3rd Semester

L	T	P
0	0	2

DFUNCEE307: FUNCTIONAL COMMUNICATION LAB

List of Practical's

1. Debate
2. Telephonic Conversation: general etiquette for making and receiving calls
3. Offering- Responding to offers.
4. Requesting – Responding to requests
5. Congratulating
6. Exploring sympathy and condolences
7. Asking Questions- Polite Responses
8. Apologizing, forgiving
9. Complaining
10. Warning
11. Asking and giving information
12. Getting and giving permission
13. Asking for and giving opinions

RECOMMENDED BOOKS

1. Communicating Effectively in English, Book-I by RevathiSrinivas; Abhishek Publications, Chandigarh.
2. Communication Techniques and Skills by R. K. Chadha; DhanpatRai Publications, New Delhi.
3. High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
4. Excellent General English-R.B.Varshnay, R.K. Bansal, Mittal Book Depot, Malhotra
5. The Functional aspects of Communication Skills – Dr. P. Prsad, S.K. Katria & Sons, New Delhi
6. Q. Skills for success – Level & Margaret Books, Oxford University Press.
7. E-books/e-tools/relevant software to be used as recommended by AICTE/UPBTE/NITTTR.

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L	T	P
0	0	2

DELEMEE308: ELEMENTARY MECHANICAL & CIVIL ENGINEERING LAB

LIST OF PRACTICALS

1. Study and Sketch of Pins and Cottor
2. Study and Sketch of Keys and Key ways
3. Study and sketch of Couplings andClutches
4. Study and Sketch of Bearings
5. Study and Sketch of Springs
6. Study of green energy
7. Testing of bricks
   a) Shape and size
   b) Soundness test
   c) Water absorption
   d) Crushing strength
8. Testing of concrete
   a) Slump test
   b) Compressive Strength of concrete cube
9. The students should be taken to different construction sites to show them various construction materials, concreting process and construction of RCC structural elements, foundations and other civil works.

RECOMMENDED BOOKS

1. Textbook of Concrete Technology 2nd Edition, by Kulkarni, PD Ghosh TK and Phull, YR; New Age International(P) Ltd, Publishers, New Delhi
2. Materials of Construction by Ghosh; Tata McGraw Hill Publishing Co. Ltd., New Delhi
3. Civil Engineering Materials by TTTI, Chandigarh; Tata McGraw Hill Publishing Co. Ltd., New Delhi
4. Concrete Technology by J.Jha and Sinha; Khanna Publishers, Delhi
5. Building Construction by Jha and Sinha; Khanna Publishers, Delhi
6. Building Construction by Vairani and Chandola; Khanna Publishers, Delhi
7. Civil Engineering Materials by SV Deodhar and Singhai; Khanna Publishers, New Delhi
8. Soil Mechanics and Foundation Engineering by SK Garg; Khanna Publishers, New Delhi

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DELEC309: ELECTRICAL MACHINE-I LAB

L	T	P
0	0	2

LIST OF PRACTICALS

1. To measure the angular displacement of rotor of the three phase synchronous machine with respect to the stator on application of DC to the field winding and simultaneously to each phase-winding in sequence

OR

Measurement of the angular displacement of the rotor of a slip-ring induction motor on application of DC to stator of motor winding in sequence and simultaneously to each phase of rotor winding

2. Speed control of DC shunt motor (i) Armature control method (ii) Field control method

3. Study of DC series motor with starter (to operate the motor on no load for a moment)

4. Determine efficiency of DC motor by Swinburne's Test at (i) rated capacity (ii) half full load

5. To perform open circuit and short circuit test for determining: (i) equivalent circuit (ii) the regulation and (iii) efficiency of a transformer from the data obtained from open circuit and short circuit test at full load

6. To find the efficiency and regulation of single phase transformer by actually loading it.

7. Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations

8. Finding the voltage and current relationships of primary and secondary of a three phase transformer under balanced load in various configurations conditions such as

(a) Star-star
(b) Star-delta
(c) Delta-star
(d) Delta - Delta configuring conditions

RECOMMENDED BOOKS

1. Electrical Machines by SK Bhattacharya, Tata Mc Graw Hill, Education Pvt Ltd. NewDelhi
2. Electrical Machine by B.L. Thareja, S. Chand Publication, New Delhi.
3. Electrical Machines by SK Sahdev, Uneek Publications, Jalandhar
4. Electrical Machines by Nagrath and Kothari, Tata Mc Graw Hill, New Delhi
5. Electrical Machines by JB Gupta, SK Kataria and Sons, New Delhi
6. Electrical Machines by Smarajit Ghosh-Pearson Publishers, Delhi.

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DCOMPEE310: COMPUTER APPLICATION LAB

L	T	P
0	0	4

List of Practicals

1. Practice on utility commands in DOS.
2. Composing, Correcting, Formatting and Article (Letter/Essay/Report) on Word Processing tool Word and taking its print out.
3. Creating, editing, and modifying tables in Database tool.
4. Creating labels, report, and generation of simple forms in Database tool.
5. Creating simple spread sheet, using in built functions in Worksheet tool.
6. Creating simple presentation.
7. Creating mail ID, Checking mail box, sending/replying e-mails.
8. Surfing web sites, using search engines.

Note : In the final year, related students have to use the concept of MS Word/MS Excel/MS Access/ MS Power Point in their respective branch's project work such as creating project report through MS Word/Creation of statistical data in MS Excel/Creation of database in MS Excel/ Demonstration of project through Power Point Presentation.