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Programme: **Diploma in Engineering** **Semester –III**

Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P	External	Internal	Total (100)	External	Internal	Total
DEE1301	Electrical Engineering Material	3	1	-	External (70)	Internal (30)	Min: 40 (D Grade)	Nil	Nil	Nil

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance- Max. Marks:- 15
Practical Internal Max Marks: Nil	Lab work & Sessional – Max Marks:-Nil	Assignment / Quiz/Attendance - Max. Marks:- Nil

Pre-Requisite	Knowledge of electrical terminologies.
Course Outcome	1. Analysis the behavior and structures of various elements.
	2. Improved materials to overcome the disadvantages of present day material.
	3. Material used in industry and their strengths and drawbacks.

Unit	Contents (Theory)	Marks weightage
I	**Classification:** Classification of materials into conducting, semiconducting and insulating materials with reference to their atomic structure and energy bands. **Conducting Materials:** Resistivity and factors affecting resistivity, such as temperature, alloying. Super conductivity and super conducting material. Low resistivity materials e.g. copper, aluminum and steel, their general properties as conductor e.g. resistivity, temperature co-efficient, mechanical Properties, corrosion, solar ability, contact resistance and practical application. High resistivity materials: Manganin, carbon, tungsten, their practical applications.	**14**
II	**Insulating Materials:** Properties of insulating material:- Electrical properties, Mechanical properties, Physical properties, Thermal properties, Chemical properties, Insulating materials and their application-Definition and classification of Thermo setting materials e.g. Phenol Formaldehyde, Resins (i.e. Bakelite), Thermo Plastic materials e.g. Polyvinyl Chloride (P.V.C.), ,Natural Insulating Materials- Mica and Asbestos, Gaseous Materials e.g. Air, Hydrogen and SF6.	**14**
III	**Magnetic Materials:** B-H curve of magnetic materials, Classification of magnetic materials into soft and hard magnetic materials. Soft magnetic materials - high silicon alloy steel for transformers and low silicon alloy steel, for electric rotating machine cold rolled grain oriented and non-oriented steel, Nickel iron alloy, soft, ferrites, their properties and uses. Hard magnetic materials - tungsten steel, chrome steel, cobalt steel, hard ferrites, their properties and applications.	**14**
IV	**Semiconductor Materials:** Introduction, semiconductor and their applications, Different semiconductor materials used in manufacturing various semiconductors (Si & Ge), Material used for electronic components like Resister, capacitor, diode, transistors and inductors.	**14**

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V	**Special Purpose Materials:** Thermocouple, bimetals, lead soldering and fuses material, mention their applications, Introduction of various engineering materials necessary for fabrication of electrical machines such as motors, generators, transformers etc.	**14**

Text Book/References Books/ Websites

1. Bhattacharya S K ; "Electrical and Electronics Engineering Materials"; Khanna Publishers New Delhi.
2. Grover and Jamwal; "Electronics Components and Materials"; Dhampat Rai and Co. New Delhi.
3. Dhir SM; "Electrical Engineering Materials"; Tata Mc Graw Hill, New Delhi.
4. Kapoor PL; "Electrical Engineering Materials"; Khanna Publishers, New Delhi.
5. Sharma BR and Others; "Electrical and Electronics Engineering Materials"; Satya Parkashan.
6. Dr. Arora; "Electrical and Electronics Engineering Materials"; Ishan Publications Ambala City.

Suggested List of Laboratory Experiments :- (Expandable): Nil

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External (35)	Internal (15)	Total (50)
DEE1302	Electrical Machine - I	3	1	1	External (70)	Internal (30)	Min: 40 (D Grade)	Min: 14 (D Grade)	Min: Nil	Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance- Max. Marks:-15
Practical Internal Max Marks: 15	Lab work & Sessional – Max Marks:-10	Assignment / Quiz/Attendance - Max. Marks:-05

Pre-Requisite	Knowledge of electrical circuit analysis.
Course Outcome	1. Become Familiar with the curricular structure of Single Phase Transformer.
	2. Acquire knowledge about various types of Three Phase Machines - Generator, Motor and 3 Phase Induction Motors.
	3. Acquire knowledge about various types of Single Phase Induction Motors.

Unit	Contents (Theory)	Marks Weightage
I	**D.C. Machines:** Principle of electromechanical energy conversion, types of d.c. machines, E.M.F. equation, Magnetization and load characteristics, losses and efficiency, need of Starter, three point starter and speed control of DC motors, their applications.	**14**
II	**Transformer(single phase):** Principle of operation, types of construction, phasor diagram, equivalent circuit, efficiency and voltage regulation of single phase transformer, O.C. and S.C. tests.	**14**
III	**Transformer (Three phase):** Three – phase unit transformer and Bank of three single phase transformers with their advantages, Three-phase transformer Groups (Phasor groups) and their connections.	**14**
IV	**Three phase induction Motor:** Principle of operation, types and methods of starting, slip-torque characteristics, and applications. **Synchronous Machines**: Principle of Operation of Alternator and synchronous motor.	**14**
V	**Single phase Motors:** Principle of operation and methods of starting of single phase induction motor, capacitor start motor, capacitor start capacitor run motor, split phase motor, shaded pole motor and Universal motor.	**14**

Text Book/References Books/ Websites

1. Asfaq Hussain; "Basic Electrical Engineering"; Dhanpat Rai Publication
2. Nagrath I.J.; "Basic Electrical Engineering"; Tata McGraw Hill.
3. A.E. Fitgerald, D.E. Higginbotham and A Grabel; "Basic Electrical Engineering"; McGraw Hill.
4. H. Cotton; "Advanced Electrical Technology"; Wheeler Publishing.

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Suggested List of Laboratory Experiments :- (Expandable):

1. To obtain load characteristics of a DC shunt and series generator.
2. To obtain load characteristics of a DC compound generator.
   (a) Cumulatively compounded
   (b) Differentially compounded
3. To obtain speed – torque characteristics of a DC shunt motor.
4. Speed control of DC shunt motor by field control.
5. Speed control of DC shunt motor by armature control.
6. To obtain efficiency & voltage regulation of a single phase transformer.
7. O.C and S.C test in a single phase transformer.
8. To obtain the V curve of the synchronous motor.
9. Study of single phase induction starting.
10. Load test on three phase induction motor.

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External (35)	Internal (15)	Total (50)
DEE1303	Electrical Instrumentation	3	1	1	External (70)	Internal (30)	Min: 40 (D Grade)	Min: 14 (D Grade)	Min: Nil	Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance- Max. Marks:-15
Practical Internal Max Marks: 15	Lab work & Sessional – Max Marks:-10	Assignment / Quiz/Attendance Max. Marks:-05

Pre-Requisite	Knowledge of measuring instrument.
Course Outcome	1. Classification of measuring instruments and types of error.
	2. Measurement of resistance and importance of earth resistance.
	3. Measurement of inductance and capacitance, construction of frequency meter.

Unit	Contents (Theory)	Marks weightage
I	Classification of measuring instruments, Indicating, recording and integrating types of meters. Errors and types of errors, accuracy, precision and sensitivity	**14**
II	Electrical measuring instruments - Construction, operation. Deflecting, controlling and damping forces, supporting systems, moving coil, electrodynamometer, moving iron and induction type instruments, simple numerical. Hot wire type instruments, vibration galvanometer, shunt and multipliers, CT & PT.	**14**
III	Wattmeter and Energy meters – Dynamometer and induction type wattmeter, Induction type energy meters. Measurement of 1-phase and 3-phase power in balanced and unbalanced load condition, 3 phase wattmeter.	**14**
IV	Measurement of resistance – Classification of resistance, measurement of low, medium, and high resistance. Kelvin's double bridge, wheat–stone bridge, Ammeter, voltmeter method and ohmmeter, multimeter, megger. Importance of earth resistance, Earth tester.	**14**
V	A. C. Bridges – Measurement of inductance and capacitance by A.C. bridges. Maxwell, Anderson, Hays, Desauty and Wien's bridge. (no phasor diagram) Additional measuring instruments – Electrical resonance, Weston and vibration reed frequency meter, dynamometer power factor meter, Weston synchro scope, Merz price maximum demand meter, Rotating type phase sequence indicator.	**14**

Text Book/References Books/ Websites

1. A.K. Sawhney; "Electrical & Electronic Measurements & Instrument"; Dhanpat Rai & Sons Pub.
2. E W Golding & F C Widdis; "Electrical Measurement & Measuring Instruments"; Wheeler Pub.
3. Buckingham & Price; "Electrical Measurements"; Prentice Hall.

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Suggested List of Laboratory Experiments :- (Expandable):

1. Measurement of low resistance by Kelvinn Double bridge.
2. Measurement of medium resistance by wheat stone bridge.
3. Measurement of insulation resistance by Megger.
4. Calibration of Voltmeter, Ammeter, Wattmeter, Energy meter.
5. Measurement of P.F. by ammeter, voltmeter and wattmeter method.
6. Measurement of 3-phase power by two wattmeter method.
7. Study and use of various electrical instruments e.g. phase sequence meter, wave meter. M.D. meter, tong tester.
8. Study and use of C.T. & P.T. for extension of instrument range.

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External (35)	Internal (15)	Total (50)
DEE1304	Electronic Circuits	3	1	1	External (70)	Internal (30)	Min: 40 (D Grade)	Min: 14 (D Grade)	Min: Nil	Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance- Max. Marks:-15
Practical Internal Max Marks: 15	Lab work & Sessional – Max Marks:-10	Assignment / Quiz/Attendance - Max. Marks:-05

Pre-Requisite	Knowledge of semiconductor device.
Course Outcome	1. Understand the current voltage characteristics of semiconductor devices .
	2. Design and analyze of electronic circuits.
	3. To understand DC analysis and AC models of semiconductor devices.

Unit	Contents (Theory)	Marks weightage
I	**Semiconductor:-** intrinsic and extrinsic, doping, types of material used in doping ,p-type and n-type, energy band diagrams, effect of temperature on semiconductor, majority and minority carrier, generation and recombination of charges, process of diffusion, diffusion and drift currents. Properties of silicon and germanium	**14**
II	**P-N Junction:-** depletion layer, potential barrier, electric field, forward and reverse biased junction, current components in p-n diode, current equation, V-I characteristics, reverse saturation current cut in voltages of Si and Ge diode.	**14**
III	**Various diodes construction and working:-** Zener diode, Varactor diode, Schottky diode, PIN diode, LED, photodiodes, solar cell	**14**
IV	**Bipolar junction transistor** – Construction, symbolic representation modes of operation of transistor working of transistor. CB, CE and CC-configuration, input and output characteristics	**14**
V	Introduction & Applications of Diodes and Transistor-Diode as a rectifier, half wave rectifier and full wave rectifier, Zener diode as a regulator, various applications of PIN Diode, LED and LASER.	**14**

Text Book/References Books/ Websites

1. Gayakwad ; "OPAMP and Linear Integrated Circuits'; Pearson Education.
2. Boylestad and Nashelsky; "Electronic Devices and Circuit Theory"; PHI.
3. Sendra and Smith; "Microelectronics"; Oxford Press.
4. Donald A Neamen; "Electronic Circuits Analysis and Design"; TMH.

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Suggested List of Laboratory Experiments :- (Expandable):

1. To Study the V-I Characteristics of Silicon Diode.
2. To Study the V-I Characteristics of Germanium Diode.
3. To Study the V-I Characteristics of Zener Diode.
4. To Study the V-I Characteristics of Light Emitting Diode (LED).
5. To Study the V-I Characteristics of BJT.

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External (35)	Internal (15)	Total (50)
DEE1305	Electrical Circuits Analysis	3	1	1	External (70)	Internal (30)	Min: 40 (D Grade)	Min: 14 (D Grade)	Min: Nil	Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: 30	Best of Two Mid Semester Test – Max Marks:-15	Assignment/Quiz/Attendance- Max. Marks:-15
Practical Internal Max Marks: 15	Lab work & Sessional – Max Marks:-10	Assignment / Quiz/Attendance- Max. Marks:-05

Pre-Requisite	Knowledge of basic physics.
Course Outcome	1. Importance of sensing relating to power system with loading effect and compensation in power system.
	2. Application of electrical circuit element in electrical engineering.
	3. Knowledge how we can use electrical circuit element.

Unit	Contents (Theory)	Marks weightage
I	D.C. Network Theory Circuit theory concepts- KCL, KVL Ohms law dependent and independent source transformation of source Mesh and node analysis. Network Theorems- Super-position theorem. Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem and Star Delta transformation.	**14**
II	A.C network Theory: Review on basic of R-L-C circuits on AC. Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum transfer theorem.	**14**
III	Resonance: Resonance in series RLC circuit, waveforms for voltage, current, Power Factor and impedance, Quality factor, expression for quality factor, selectivity, resonance in parallel RLC circuit.	**14**
IV	Phase A.C. Circuits: Star-Delta connections, line and phase voltage/current relations, three phase power and its measurement.	**14**
V	Steady state analysis: -Concepts of phasors and vectors, impedance and admittance. Node and mesh analysis of RL, RC and RLC networks with sinusoidal and other driving sources. Resonance Circuits.	**14**

Text Book/References Books/ Websites

1. Hayt W H, Kemmerly J E; "Engineering Circuit Analysis"; McGraw-Hill, 2002.
2. Nilsson J W, Riedel S A; "Electric Circuits"; Prentice-Hall 2000.
3. Asfaq Hussain; "Network Analysis and synthesis"; Dhanpat Rai Publications
4. J.B.Gupta; "Basic Electrical Engineering"; Kataria & Sons Publication.

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Suggested List of Laboratory Experiments :- (Expandable):

1. To study and determine the loop currents in any DC network.
2. To study and determine the node voltages in any DC network.
3. Verification of principle of superposition with DC sources.
4. Verification of Thevenin's Theorems in DC circuits.
5. Verification of Norton Theorems in DC circuits.
6. Verification of Maximum power transfer theorems in DC circuits.
7. Study of RLC series resonance.
8. Study of RLC Parallel resonance.

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total	External (35)	Internal (15)	Total (50)
DEE1306	Electrical Workshop	-	-	1	External (Nil)	Internal (Nil)	Min: Nil	Min: 14 (D Grade)	Min: Nil	Min: 20 (D Grade)

Duration of Theory (Externals): 3 Hours

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test – Max Marks:-Nil	Assignment/Quiz/Attendance- Max. Marks:-Nil
Practical Internal Max Marks: 15	Lab work & Sessional -- Max Marks:-10	Assignment / Quiz/Attendance - Max. Marks:-05

Pre-Requisite	Knowledge of wiring and testing.
Course Outcome	1. Connection of various electrical components for domestic and industrial purpose.
	2. Understand basic construction and operation of various laboratory equipments.
	3. Identify and understand importance of various electrical and electronics components.

Unit	Contents (Theory)	Marks Weightage
I	Miscellaneous Electrical Workshop Processes Acquaintance with the average tools and equipments used for electrical workshop. Soldering wire jointing of different types, Making of extension board containing two 5A and one one 15A plug-points.	**50**
II	House Wiring Processes Wiring of different lamp control, stair casing circuits, batton wiring,cleat wiring and conduit wiring Assembly and interchange wiring of fluorescent tube light, Connection of table and ceiling fans with regulators, Earth resistance measurement and earthing processes.	
III	Distribution Boards Processes To make a distribution board containing at least two switches, one fan regulator and one 5A plug point energy meter with main switch, Fault detection and repair of domestic electric installation, Fault detection and its repair in institution's workshop installations.	
IV	Repairing, assembling and testing of domestic appliance like electric iron, room heater, electric toaster, water heater, electric kettle, electric oven, ceiling fan, Table Fan, regulators, alarm bell, Coil winding for small transformers or alarm bell, Assembling small transformer cores from the given lamination plates. Assembling small battery charger.	
V	Armature Winding Armature winding of car dynamo, Armature winding of table fan, Armature winding of ceiling fan. Armature winding of 3 phase induction motor.	

Text Book/References Books/ Websites

1. Singh R. P.; "Electrical Workshop"; Second Edd.
2. Hajra Choudhury & A.K. Hajra Choudhury & Nirjhar Roy S.K ;Elements Of Workshop Technology - Volume I - Manufacturing Processes.
3. Hajra Choudhury & Nirjhar Roy S.K Elements Of Workshop Technology - Volume II – Machine Tools.

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Suggested List of Laboratory Experiments :- (Expandable):

1. To Study of power supplies and safety devices.
2. Electrical wiring practices (House wiring).
3. Study of domestic appliances.
4. A brief on electric lamps.
5. To Study of Armature winding of 3 phase induction motor.

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Subject Code	Subject Title	Credit			Theory			Practical		
		L	T	P			Total (100)	External (Nil)	Internal (50)	Total (50)
DPE1307	Professional Skill	-	-	1	External (Nil)	Internal (Nil)	Min: Nil	Min: (Nil)	Min: 20 (D Grade)	Min: 20 (D Grade)

Duration of Theory (Externals): Nil

Theory Internal- Max Marks: Nil	Best of Two Mid Semester Test –Max Marks: Nil	Assignment/Quiz/Attendance Max. Marks: Nil
Practical Internal Max Marks: 50	Lab work & Sessional – Max Marks: Nil	Assignment / Quiz/ Attendance Max. Marks: 50

Pre-Requisite	**Nil**
Course Outcome	1. Able to solve problems ask in the competitive exams.

Unit	Contents (Theory)	Marks Weightage
I	**Quantitative Aptitude:** Percentages/Profit & Loss, Time and Work, Simple and Compound Interest, Series and Progression.	**50**
II	**Reasoning :** Puzzles and Seating Arrangement, Data Sufficiency, Coding-decoding, Blood Relation, Order and Ranking, Alpha Numeric Symbol Series, Logical Reasoning:	
III	**English**: free quizzes related to Synonyms, Antonyms, One Word Substitution, Idioms and Phrases, Spelling Correction; Fill in the Blanks and Common Errors in English.	

Text Book/References Books/ Websites

1. R.S. Aggarwal; Quantitative Aptitude for Competitive Examinations.
2. Arihant Publications; Fast Track Objective Arithmetic.
3. R S Aggarwal; Verbal and Nonverbal Reasoning.
4. M K Pandey; Analytical Reasoning.
5. B S Sijwali, Indu Sijwal; A New Approach to Reasoning Verbal and Non-Verbal (English) 1st Edition.
6. SP Bakshi; Objective General English.
7. Wren and martin; English grammar book.
8. Neetu singh; Plinth to paramount English.
9. Norman Lewis; Word power made easy (Mainly for development of vocab)
10. https://www.playquiz2win.com/engquizmenu.html
11. https://www.sawaal.com

Suggested List of Laboratory Experiments :- (Expandable):

Students should solve various problems and quiz on the above mention topics, and prepare an assignment.