

CENTRAL POLYTECHNIC COLLEGE, THARAMANI-600 113.

(An Autonomous Institution)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGG.



QUESTION BANK

EEE31010 – ELECTRICAL MACHINES - I

U.NO	Q NO	QUESTIONS
1	1	In a DC generator, the role of the commutator is to (a) Increase speed (b) Reverse current direction in the armature (c) Enhance magnetic field (d) Lower voltage Ans:Reverse current direction in the armature
1	2	Which type of DC generator has self-excited field winding connected to the armature? (a) Separately excited (b) Shunt (c) Series (d) Both B & C Ans:Both B & C
1	3	A cumulatively compounded DC generator has how many field windings? (a) One (b) Two (series + shunt) (c) Three (d) None Ans:Two (series + shunt)
1	4	Which DC generator provides constant voltage applications? (a) Shunt generator (b) Series generator (c) Cumulatively compounded generator (d) Separately excited generator Ans:Shunt generator
1	5	Separated-excited DC generators require which external source? (a) External AC supply (b) Batteries or external DC source (c) Permanent magnet (d) No external source Ans:Batteries or external DC source
1	6	The EMF equation for a DC generator is: (a) $E = \frac{\phi Z N}{60 P}$ (b) $E = \frac{P \phi N Z}{60 A}$ (c) $E = \frac{2\pi N P \phi Z}{60 A}$ (d) $E = \frac{P Z \phi N^2}{\pi A}$ Ans:$E = \frac{P \phi N Z}{60 A}$
1	7	In the EMF equation, Z denotes: (a) Speed (b) Total number of conductors (c) Flux per pole (d) Number of poles Ans:Total number of conductors
1	8	Internal characteristic of a DC generator plots voltage vs: (a) Flux (b) Field current (c) Armature current (d) Speed Ans:Armature current
1	9	External characteristic differs from internal due to (a) Field winding (b) Commutator (c) Armature resistance drop (d) Rotor inertia Ans:Armature resistance drop
1	10	If armature resistance doubles, internal voltage drop at load will (a) Halve (b) Double (c) Remain same (d) Depend on flux Ans:Double

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1	11	In Build-up of EMF in a self-excited generator requires: (a) Residual magnetism (b) External voltage (c) Permanent magnet (d) AC excitation Ans:Residual magnetism
1	12	The Critical field resistance is: (a) Minimum resistance for max flux (b) Maximum shunt resistance to self-excite (c) Sum of armature and field resistance (d) Negligible Ans:Maximum shunt resistance to self-excite
1	13	If field resistance > critical value, generator: (a) Will build up voltage (b) Will not build up voltage (c) Sparks heavily (d) Run at low speed only Ans:Will not build up voltage
1	14	A remedy for failure to build EMF is: (a) Increase speed only (b) Decrease load (c) Boost field current or reduce field resistance (d) Swap poles Ans:Boost field current or reduce field resistance
1	15	The causes of failure to build voltage include: (a) No residual flux (b) short field circuit (c) Less field resistance (d) None Ans:No residual flux
1	16	The Armature reaction refers to: (a) Reaction between field and armature winding (b) Centrifugal force on rotor (c) Production of torque (d) Magnetic leakage Ans:Reaction between field and armature winding
1	17	The Armature reaction causes: (a) Flux distortion (b) Armature current reversal (c) Commutator wear (d) Speed regulation Ans:Flux distortion
1	18	Under main poles, armature reaction cross-magnetizes the field, causing: (a) Eccentric flux distribution (b) Shift of neutral plane (c) Increase in induced EMF (d) Overheating Ans:Shift of neutral plane
1	19	To improve commutation, we use: (a) Compensating winding (b) Interpoles (c) Carbon brushes (d) Both A & B Ans:Both A & B
1	20	The interpoles are located: (a) At main poles (b) Between main poles (c) On stator (d) On field windings Ans:Between main poles

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1	21	In DC generators are commonly used in: (a) AC power plants (c) CNC machines Ans:Both B & C	(b) Electroplating (d) Both B & C
1	22	Why DC is important in industry? (a) For smooth variable speed control (c) For digital electronics Ans:For smooth variable speed control	(b) For high-frequency applications (d) For lightning protection
1	23	The DC generators in power generation are used for: (a) Lighting (c) Grid frequency control Ans:Local battery charging	(b) Local battery charging (d) Unlike AC, they are not used
1	24	The Series DC generator is suitable for: (a) High current low voltage (c) Neon signs Ans:High current low voltage	(b) Constant voltage load (d) Electronics
1	25	A Cumulative compound DC generators offer: (a) Voltage rise with load (c) Voltage drop with load Ans:Steady voltage at varying loads	(b) Steady voltage at varying loads (d) None of the above
1	26	The Armature has 200 conductors, 4 poles, flux/pole = 0.02 Wb, speed = 1500 rpm. EMF is (a) 400 V (c) 600 V Ans:200 V	(b) 800 V (d) 200 V
1	27	In a shunt generator, field resistance = 40 Ω and supply = 200 V, field current is: (a) 5 A (c) 0.2 A Ans:5A	(b) 4 A (d) 8 A
1	28	The Armature resistance = 0.5 Ω , armature current = 100 A, voltage drop is: (a) 10 V (c) 100 V Ans:50 V	(b) 50 V (d) 500 V
1	29	If speed is halved, generated EMF is: (a) Doubled (c) Quadrupled Ans:Halved	(b) Halved (d) Unchanged
1	30	A shunt generator delivering 100 A and $I_F = 4A$ has armature current: (a) 100 A (c) 96 A Ans:104 A	(b) 104 A (d) 0 A

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1	31	At no load, the internal and external voltage: (a) Are equal (c) Internal above external Ans:Are equal	(b) Vary significantly (d) External above internal
1	32	The External characteristic of a series generator is: (a) Flat (c) Raises with load Ans:Raises with load	(b) Droops sharply (d) Parabolic
1	33	In a shunt generator under load, internal voltage falls due to (a) Field weakening (c) Load inertia Ans:Armature drop	(b) Armature drop (d) Brush shift
1	34	The Cumulative compound gives better: (a) Speed regulation (c) Commutation Ans:Voltage regulation	(b) Voltage regulation (d) Cooling
1	35	The Differential compound is: (a) Stable at all loads (c) Always rising voltage Ans:Rarely used due to instability	(b) Prone to voltage drop (d) Rarely used due to instability
1	36	The Commutation failure manifests as: (a) Excessive noise (c) Field collapse Ans:Spark at brushes	(b) Spark at brushes (d) Shaft warping
1	37	A spark during commutation is due to: (a) Flux reversal (c) Slow current reversal Ans:Slow current reversal	(b) Inter-turn short (d) Voltage overload
1	38	The Adding inductance in series with brushes helps by: (a) Speeding reversal (c) Increasing voltage Ans:Smoothing current change	(b) Smoothing current change (d) Cooling armature
1	39	To counter reactance voltage in coils, one may introduce: (a) Capacitor (c) Interpole Ans:Interpole	(b) Third brush (d) Cooling fan
1	40	A brush shifting helps to: (a) Minimize noise (c) Align neutral plane Ans:Align neutral plane	(b) Balance current (d) Reduce resistance

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1	41	The Residual magnetism must be (a) Zero (b) Moderate (c) Maximum (d) Variable Ans:Maximum
1	42	If residual flux is too low: (a) Field winding overheats (b) Generator may fail to excite (c) Voltage too high (d) Armature slows Ans:Generator may fail to excite
1	43	A Speed variations affect EMF build-up by affecting: (a) Armature current (b) Generated voltage slope (c) Field winding resistance (d) Brush alignment Ans:Generated voltage slope
1	44	The Critical field resistance graph intersects at (a) Zero slope (b) One point of self-excitation (c) Maximum load (d) Minimum current Ans:One point of self-excitation
1	45	In Degaussing the field poles may: (a) Restore residual flux (b) Remove residual flux (c) Increase speed (d) Reduce armature current Ans:Remove residual flux
1	46	The Compensating windings are embedded in: (a) Rotor shaft (b) Pole faces (c) Commutator bars (d) Field winding Ans:Pole faces
1	47	The purpose of compensating winding is to (a) Counter cross magnetizing effect (b) Increase resistance (c) Create extra torque (d) Cool windings Ans:Counter cross magnetizing effect
1	48	Neutral plane shift causes: (a) Minimum sparking (b) Maximum output (c) Severe sparking (d) High residual flux Ans:Severe sparking
1	49	A high-speed shunt generator overheats due to: (a) Low voltage (b) Armature reaction (c) Excessive friction (d) No current Ans:Armature reaction
1	50	The best way to reduce armature reaction: (a) Use series winding (b) Increase field resistance (c) Fit interpoles + compensating winding (d) Add more brushes Ans:Fit interpoles + compensating winding

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2	1	The DC motors are widely used in industries because they (a) Fixed speed (c) Low torque	(b) Variable and precise speed control (d) High input impedance
		Ans:Variable and precise speed control	
2	2	In automation, DC motors are preferred for: (a) Heating applications (c) High-voltage transmission	(b) Smooth and reversible control (d) Radio frequency systems
		Ans:Smooth and reversible control	
2	3	A common industrial application of DC motors includes: (a) Power transmission lines (c) Microwave ovens	(b) Conveyor belts (d) Air conditioning
		Ans:Conveyor belts	
2	4	The Robotics often use DC motors due to: (a) High power consumption (c) Fixed speed profiles	(b) Precise positioning (d) Incompatibility with sensors
		Ans:Precise positioning	
2	5	Which DC motor type provides the highest starting torque? (a) Shunt (c) Compound	(b) Series (d) Permanent magnet
		Ans:Series	
2	6	A motor with field winding in series with armature is called: (a) Shunt motor (c) Compound motor	(b) Series motor (d) PMDC motor
		Ans:Series motor	
2	7	The Shunt DC motors have field winding connected (a) In parallel with the armature (c) Combined in series and shunt	(b) In series with the armature (d) Independently powered
		Ans:In parallel with the armature	
2	8	The Compound DC motors combine: (a) Only series winding (c) Both series and shunt windings	(b) Only shunt winding (d) Neither
		Ans:Both series and shunt windings	
2	9	A PMDC motors use: (a) Electromagnet field (c) No field at all	(b) Permanent magnets in stator (d) Hybrid field arrangement
		Ans:Permanent magnets in stator	
2	10	A BLDC motor is a form of: (a) AC induction motor (c) Brushless DC motor	(b) Brushed DC motor (d) Universal motor
		Ans:Brushless DC motor	

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2	11	<p>The Torque in a DC motor is proportional to:</p> <p>(a) Armature current \times flux (b) Voltage² (c) Speed \times field current (d) Resistance \times speed</p> <p>Ans: Armature current \times flux</p>
2	12	<p>The Torque equation: $T = k \phi I_a$. Here, k is:</p> <p>(a) Armature resistance (b) Motor constant (c) Field voltage (d) Armature speed</p> <p>Ans: Motor constant</p>
2	13	<p>If armature current doubles, torque will:</p> <p>(a) Halve (b) Double (c) Stay same (d) Square</p> <p>Ans: Double</p>
2	14	<p>A DC motor with flux halved but same armature current will have torque:</p> <p>(a) Doubled (b) Halved (c) Quadrupled (d) Unchanged</p> <p>Ans: Halved</p>
2	15	<p>A Compute torque: $k=0.05$, $\phi=0.2$, $I_a=50A$. Torque is</p> <p>(a) 0.5 Nm (b) 0.25 Nm (c) 5 Nm (d) 0.05 Nm</p> <p>Ans: 0.5 Nm</p>
2	16	<p>In Load characteristic relates:</p> <p>(a) Speed vs. field current (b) Torque vs. speed at constant armature voltage (c) Voltage vs. current (d) Power vs. torque</p> <p>Ans: Torque vs. speed at constant armature voltage</p>
2	17	<p>The Shunt motor's speed-torque curve is:</p> <p>(a) Parallel to x-axis (b) Steep downward (c) Rising curve (d) Horizontal line</p> <p>Ans: Parallel to x-axis</p>
2	18	<p>The Series motor speed decreases with:</p> <p>(a) Increasing torque (b) Decreasing torque (c) Constant speed (d) Increasing voltage</p> <p>Ans: Increasing torque</p>
2	19	<p>In Compound motor's speed-torque characteristic is:</p> <p>(a) Unpredictable (b) Well regulated under load (c) Identical to series motor (d) Identical to shunt motor</p> <p>Ans: Well regulated under load</p>
2	20	<p>A PMDC motor's speed is controlled by:</p> <p>(a) Armature voltage (b) Field current (c) Both A & B (d) Neither</p> <p>Ans: Both A & B</p>

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2	21	<p>A starter prevents:</p> <p>(a) Over-speed (b) Excess current at start (c) Field weakening (d) Mechanical resonance</p> <p>Ans:Excess current at start</p>
2	22	<p>A 3-point starter regulates:</p> <p>(a) Armature only (b) Field only (c) Both field and armature (d) Voltage only</p> <p>Ans:Armature only</p>
2	23	<p>In a 4-point starter, the fourth point is:</p> <p>(a) For a second armature (b) Field supply separated (c) Emergency breaker (d) Speed sensor</p> <p>Ans:Field only</p>
2	24	<p>A no-voltage release coil ensures the motor:</p> <p>(a) Continues on power loss (b) Stops on power loss (c) Increases speed (d) Reverses direction</p> <p>Ans:Stops on power loss</p>
2	25	<p>The Overload protection in a starter uses:</p> <p>(a) Timer (b) No-load coil (c) Overload coil (d) Temperature sensor</p> <p>Ans:Overload coil</p>
2	26	<p>The One way to reduce speed is</p> <p>(a) Increase field current (b) Decrease armature voltage (c) Add load (d) Reverse field</p> <p>Ans:Decrease armature voltage</p>
2	27	<p>A Field-weakening control increases speed by:</p> <p>(a) Decreasing flux (b) Increasing armature resistance (c) Using feedback loop (d) Increasing field voltage</p> <p>Ans:Decreasing flux</p>
2	28	<p>In Armature resistance control has:</p> <p>(a) High efficiency (b) Low efficiency due to voltage drop (c) Zero loss (d) Only used in series motors</p> <p>Ans:Low efficiency due to voltage drop</p>
2	29	<p>A chopper-based controller adjusts:</p> <p>(a) Field current (b) Armature voltage using pulses (c) Temperature (d) Mechanical load</p> <p>Ans:Armature voltage using pulses</p>
2	30	<p>The Ward-Leonard system uses:</p> <p>(a) Mechanical linkage (b) AC motor-generator set (c) Electronic converter (d) None of the above</p> <p>Ans:AC motor-generator set</p>

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2	31	<p>The Main losses include:</p> <p>(a) Copper, iron, mechanical, stray load (b) Only copper loss (c) Only friction (d) Only core loss</p> <p>Ans:Copper, iron, mechanical, stray load</p>
2	32	<p>A Mechanical losses are due to:</p> <p>(a) Armature winding (b) Core saturation (c) Friction and windage (d) Commutation</p> <p>Ans:Friction and windage</p>
2	33	<p>The Copper loss in armature is:</p> <p>(a) $I^2 R$ (b) IR (c) V^2/R (d) Constant</p> <p>Ans:$I^2 R$</p>
2	34	<p>If Efficiency is highest when:</p> <p>(a) Load is light (b) Near full load (c) No load (d) At starting</p> <p>Ans:Near full load</p>
2	35	<p>The Voltage regulation accounts for variation from no-load to full-load in:</p> <p>(a) Efficiency (b) Speed (c) Output voltage (d) Frequency</p> <p>Ans:Output voltage</p>
2	36	<p>If armature resistance=0.2Ω, current = 50 A, copper loss is:</p> <p>(a) 500 W (b) 1000 W (c) 2500 W (d) 100 W</p> <p>Ans:500 W</p>
2	37	<p>A motor having output power of 5 kW and input 5.5 kW has efficiency</p> <p>(a) 90.90% (b) 10% (c) 85% (d) 95%</p> <p>Ans:90.90%</p>
2	38	<p>If iron and friction losses=100 W, copper loss = 400 W, input = 5, output =:</p> <p>(a) 4.5 kW (b) 4.6 kW (c) 4.4 kW (d) 4.7 kW</p> <p>Ans:4.5 kW</p>
2	39	<p>A Voltage drop across armature (0.1Ω, 20 A) is:</p> <p>(a) 2 V (b) 0.5 V (c) 20 V (d) 200 V</p> <p>Ans:2 V</p>
2	40	<p>A motor draws 10 A at 220 V, input power is:</p> <p>(a) 2200 W (b) 200 W (c) 220 W (d) 22000 W</p> <p>Ans:2200 W</p>

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2	41	<p>A BLDC motors require:</p> <p>(a) Brushes and commutator (b) Electronic controller (c) Permanent magnets exclusively (d) AC supply</p> <p>Ans:Electronic controller</p>
2	42	<p>The Servomotors are used for:</p> <p>(a) High-speed fans (b) Precise position control (c) Domestic appliances (d) Lighting</p> <p>Ans:Precise position control</p>
2	43	<p>The Stepper motors move in:</p> <p>(a) Continual rotation (b) Discrete steps (c) Only one direction (d) Variable AC cycles</p> <p>Ans:Discrete steps</p>
2	44	<p>A Permanent magnet DC (PMDC) motors are known for:</p> <p>(a) Low weight and compact size (b) Need for external field supply (c) Heavy build (d) Complex maintenance</p> <p>Ans:Low weight and compact size</p>
2	45	<p>The Speed in a stepper motor is controlled by:</p> <p>(a) Field current (b) Step frequency (c) Armature voltage (d) Load torque</p> <p>Ans:Step frequency</p>
2	46	<p>A BLDC motors are used in:</p> <p>(a) Hard disk drives (b) Mixer (c) Iron box (d) Elevator systems</p> <p>Ans:Hard disk drives</p>
2	47	<p>The Servomotors feature in:</p> <p>(a) CNC machines (b) Hair dryers (c) Refrigerators (d) Street lights</p> <p>Ans:CNC machines</p>
2	48	<p>The Stepper motors are common in</p> <p>(a) Printers (b) Large turbines (c) Electric vehicles (d) Cranes</p> <p>Ans:Printers</p>
2	49	<p>A PMDC motors are often found in:</p> <p>(a) Battery-operated toys (b) Generators (c) Rail traction (d) Power plants</p> <p>Ans:Battery-operated toys</p>
2	50	<p>The Series DC motors are used in elevator drives because of:</p> <p>(a) Constant speed (b) High starting torque (c) Simple control (d) Low initial cost</p> <p>Ans:High starting torque</p>

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3	1	<p>The primary function of a transformer is to:</p> <p>(a) Convert AC to DC (b) Change AC voltage levels</p> <p>(c) Store energy (d) Generate power</p> <p>Ans:Change AC voltage levels</p>
3	2	<p>The Transformer ratings are typically given in:</p> <p>(a) Watts (b) Volt-amps (VA)</p> <p>(c) Watts per meter (d) Amperes</p> <p>Ans:Volt-amps (VA)</p>
3	3	<p>A transformer rated 5 kVA, 230/115 V implies:</p> <p>(a) 5 kW output (b) 5 kVA output</p> <p>(c) 230 A (d) 115 kW</p> <p>Ans:5 kVA output</p>
3	4	<p>In common applications of transformers include:</p> <p>(a) Power distribution (b) Power generation</p> <p>(c) Voltage decrease (d) None</p> <p>Ans:Power distribution</p>
3	5	<p>The EMF equation of a transformer is:</p> <p>(a) $E = 4.44 f N \phi_{\text{m}}$ (b) $E = N I R$</p> <p>(c) $E = VI / Z$ (d) $E = RI^2$</p> <p>Ans:$E = 4.44 f N \phi_{\text{m}}$</p>
3	6	<p>In an ideal transformer:</p> <p>(a) Core loss is present (b) Winding resistances are zero</p> <p>(c) Leakage reactance is infinite (d) Efficiency is below 90%</p> <p>Ans:Winding resistances are zero</p>
3	7	<p>On no-load, core current is:</p> <p>(a) Zero (b) Supply current</p> <p>(c) Magnetising plus core loss current (d) Equal to load current</p> <p>Ans:Magnetising plus core loss current</p>
3	8	<p>In Load phasor diagrams vary with</p> <p>(a) Voltage rating (b) Power factor</p> <p>(c) Core material (d) Ambient temperature</p> <p>Ans:Power factor</p>
3	9	<p>At lagging power factor, current phasor:</p> <p>(a) Leads voltage (b) Lags voltage</p> <p>(c) In phase (d) Opposite to voltage</p> <p>Ans:Lags voltage</p>
3	10	<p>A No-load phasor diagram shows:</p> <p>(a) Core flux and magnetising current (b) Load current only</p> <p>(c) Leakage current (d) Short-circuit current</p> <p>Ans:Core flux and magnetising current</p>

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3	11	The equivalent circuit parameters are determined via: (a) Open-circuit test (c) Load test	(b) Short-circuit test (d) Both A & B
		Ans:Both A & B	
3	12	A Open-circuit test measures: (a) Copper losses (c) Leakage reactance	(b) Core losses (d) Armature resistance
		Ans:Core losses	
3	13	A Short-circuit test is performed at: (a) Full voltage (c) Low voltage (<10%)	(b) Rated current (d) No load
		Ans:Low voltage (<10%)	
3	14	A Short-circuit test evaluates: (a) Core flux (c) Core loss	(b) Equivalent impedance (d) Magnetising reactance
		Ans:Equivalent impedance	
3	15	The leakage reactance arises due to: (a) Winding capacitance (c) Hysteresis	(b) Imperfect coupling (d) I^2R losses
		Ans:Imperfect coupling	
3	16	The Voltage regulation of a transformer indicates: (a) Voltage rise under load (c) Efficiency value	(b) Voltage change from no-load to full-load (d) Core saturation
		Ans:Voltage change from no-load to full-load	
3	17	The percentage regulation at unity power factor is: (a) Dependent on resistance only (c) Dependent on both resistance and reactance	(b) Dependent on leakage reactance only (d) Zero
		Ans:Dependent on both resistance and reactance	
3	18	If Transformers loss energy mainly due to: (a) Copper losses only (c) Copper and iron losses	(b) Core losses only (d) Mechanical friction
		Ans:Copper and iron losses	
3	19	The Copper (I^2R) losses are proportional to (a) Voltage squared (c) Frequency	(b) Load current squared (d) Core flux
		Ans:Load current squared	
3	20	The Iron losses include: (a) Eddy current and hysteresis (c) Windage	(b) Copper losses (d) Friction
		Ans:Eddy current and hysteresis	

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3	21	<p>A Transformer efficiency is maximum when:</p> <p>(a) Copper losses = iron losses (b) Core losses = mechanical losses</p> <p>(c) Copper losses = stray load losses (d) Core losses = windage losses</p> <p>Ans:Copper losses = iron losses</p>
3	22	<p>All-day efficiency considers:</p> <p>(a) Load variations throughout day (b) Steady full-load only</p> <p>(c) No load condition (d) Short-circuit operation</p> <p>Ans:Load variations throughout day</p>
3	23	<p>All-day efficiency formula uses:</p> <p>(a) Average load output over 24 hours / input energy (b) Full-load output / input at full-load</p> <p>(c) No-load output / input (d) Losses / rating</p> <p>Ans:Average load output over 24 hours / input energy</p>
3	24	<p>In the Condition for maximum efficiency at full-load:</p> <p>(a) No-load voltage is maximum (b) Copper loss = iron loss at that load</p> <p>(c) Equivalent reactance = resistance (d) Voltage regulation = 0</p> <p>Ans:Copper loss = iron loss at that load</p>
3	25	<p>At light loads, efficiency:</p> <p>(a) Increases (b) Decreases (due to fixed iron loss)</p> <p>(c) Stays constant (d) Is zero</p> <p>Ans:Decreases (due to fixed iron loss)</p>
3	26	<p>The equivalent resistance + reactance = 0.8Ω and 2.4Ω; impedance magnitude:</p> <p>(a) 2.3Ω (b) 2.56Ω</p> <p>(c) 1.6Ω (d) 3.2Ω</p> <p>Ans:2.56 Ω</p>
3	27	<p>The Open-circuit test gives 1 A at 230 V; iron loss:</p> <p>(a) 230 W (b) 430 W</p> <p>(c) Irrelevant (d) 1 W</p> <p>Ans:230</p>
3	28	<p>At 0.8 lag PF, leakage impedance drop angle (ϕ) is:</p> <p>(a) 0° (b) -36.9°</p> <p>(c) #ERROR! (d) 90°</p> <p>Ans:-36.9$^\circ$</p>
3	29	<p>At full-load current 50 A, copper loss ($R_{eq}=0.1 \Omega$):</p> <p>(a) 250 W (b) 500 W</p> <p>(c) 125 W (d) 1000 W</p> <p>Ans:250 W</p>
3	30	<p>All-day efficiency: 6 h @ full-load 10 kW, 18 h @ 2 kW, input = 150 kWh.</p> <p>Output energy:</p> <p>(a) $6 \times 10 + 18 \times 2 = 156$ kWh; efficiency = 104% (b) 120 kWh; $\eta = 80\%$</p> <p>(c) 156 kWh; $\eta \sim 104\%$ (d) 96 kWh; $\eta = 64\%$</p> <p>Ans:120 kWh; $\eta = 80\%$</p>

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3	41	The Two-winding transformer vs auto: (a) Provides isolation (c) Both A & B Ans:Both A & B	(b) Uses more copper (d) Neither
3	42	For same VA rating, autotransformer is: (a) Heavier (c) Same weight Ans:Lighter	(b) Lighter (d) None
3	43	The Isolation transformer is needed when: (a) Galvanic isolation required (c) Impedance matching Ans:Galvanic isolation required	(b) Voltage conversion (d) All above
3	44	The Auto-transformer short-circuit current is: (a) Lower (c) Zero Ans:Higher	(b) Higher (d) Same
3	45	The Autotransformer used for: (a) Low voltage starters (c) Digital circuits Ans:Low voltage starters	(b) Radio isolation (d) All of above
3	46	The Maximum efficiency occurs at load current: (a) When copper = iron loss (c) At no load Ans:When copper = iron loss	(b) When copper > iron loss (d) At short circuit
3	47	All-day efficiency exceeds full-load efficiency when: (a) Heavy loads prevail (c) Equal periods Ans:Heavy loads prevail	(b) Light loads prevail (d) Loads under 50%
3	48	The Percent regulation at 0.8 lagging is: (a) Higher than at unity PF (c) Same Ans:Higher than at unity PF	(b) Lower than unity PF (d) Zero
3	49	In Polarity test is done to verify: (a) Voltage (c) Core flux Ans:Polarity match for paralleling	(b) Polarity match for paralleling (d) Impedance
3	50	The Efficiency vs load curve is: (a) Parabolic (c) Linear Ans:Bell-shaped with peak where losses are equal	(b) Bell-shaped with peak where losses are equal (d) Flat

U.NO	Q NO	QUESTIONS	
4	1	A Three-phase transformers are built using: (a) Three single-phase units (c) Both A and B	(b) A single three-legged core (d) Toroidal core only
		Ans:Both A and B	
4	2	In a delta–star (Δ –Y) connection, the phase shift is (a) 0° (c) 60°	(b) 30° (d) 120°
		Ans:30°	
4	3	The Star–star (Y–Y) connections are avoided due to: (a) Circulating currents (c) Difficulty in insulation	(b) Core saturation by DC (d) Zero phase shift
		Ans:Circulating currents	
4	4	The Delta–delta (Δ – Δ) connection (a) Gives 30° phase shift (c) Enables tapped voltages	(b) Does not provide neutral (d) Must use star-delta starter
		Ans:Does not provide neutral	
4	5	The Scott connection uses: (a) Two single-phase units (c) Both	(b) Special tap winding (d) Auto-transformer
		Ans:Both	
4	6	The Open-delta (V) connection is used when: (a) One transformer fails (c) To isolate ground faults	(b) To get higher load (d) For LV distribution only
		Ans:One transformer fails	
4	7	In Vector group “Dyn11” indicates: (a) Delta primary, star secondary with neutral, 30° lag (c) Both delta connections	(b) Both star connections (d) Delta primary, star secondary with 0° shift
		Ans:Delta primary, star secondary with neutral, 30° lag	
4	8	The Parallel operation requires matching: (a) Vector group (c) No ratio	(b) No Impedance (d) None
		Ans:Vector group	
4	9	In the Three-phase banks from single-phase units should be: (a) Identical units (c) $1.5 \times$ VA units	(b) Delta-wound only (d) Air-cooled only
		Ans:Identical units	
4	10	Why use zigzag connection? (a) Suppress harmonics (c) No Grounding	(b) balanced loads (d) None
		Ans:Suppress harmonics	

U.NO	Q NO	QUESTIONS
4	11	For parallel three-phase transformers, % impedance must: (a) Be equal and voltage ratio equal (b) Always be small (c) Be large and unequal (d) Match only voltage Ans:Be equal and voltage ratio equal
4	12	The Load sharing depends on (a) Impedance ratio (b) Cooling method (c) Vector group alone (d) Tap settings only Ans:Impedance ratio
4	13	A Phase shift mismatch in parallel operation leads to: (a) Circulating currents (b) Reduced flux (c) Higher efficiency (d) Lower losses Ans:Circulating currents
4	14	A Group number in IEC indicates: (a) Vector phase shift $\times 30^\circ$ (b) Winding style (c) Cooling method (d) VA rating Ans:Vector phase shift $\times 30^\circ$
4	15	The Δ -Y and Y- Δ transformers cannot run in parallel due to: (a) Different tap changers (b) Phase shift difference (c) Core size (d) Cooling mismatch Ans:Phase shift difference
4	16	A Three single-phase transformers paralleled require: (a) Tap change shifted manufacturers (b) Same polarity and ratings (c) Only same cooling (d) Delta-star ratio Ans:Same polarity and ratings
4	17	The Paralleling prevents: (a) Overloading (b) Core saturation (c) Using Scott connection (d) Explosion venting Ans:Overloading
4	18	If Unequal % impedances in parallel cause: (a) Harmonics (b) Load division by inverse ratio (c) Core vibration (d) Load balancing automatically Ans:Load division by inverse ratio
4	19	The Vector group mismatch causes: (a) Grounding issues (b) Overheating (c) Circulating current (d) All above Ans:Circulating current
4	20	In Parallel transformers improve: (a) Short circuit (b) Flexibility in maintenance (c) No capacity (d) None Ans:Flexibility in maintenance

U.NO	Q NO	QUESTIONS
4	21	<p>The Cooling extends transformer life by:</p> <p>(a) Reducing core losses (b) Maintaining insulation integrity</p> <p>(c) Reducing copper losses (d) Increasing flux</p> <p>Ans: Maintaining insulation integrity</p>
4	22	<p>The ONAN means:</p> <p>(a) Oil – Natural Air – Natural (b) Oil – Oil – Natural</p> <p>(c) Air – Air – Oil (d) Air – Natural Oil – Natural</p> <p>Ans: Oil – Natural Air – Natural</p>
4	23	<p>The OLTC cooling stands for</p> <p>(a) Oil-immersed, Load Tap Changer (b) On-line thermal cooling</p> <p>(c) Overload temperature check (d) Oil-less tap converter</p> <p>Ans: Oil-immersed, Load Tap Changer</p>
4	24	<p>A Dry-type transformers use:</p> <p>(a) Mineral oil (b) Air for cooling</p> <p>(c) Hydrogen (d) Insulating paper</p> <p>Ans: Air for cooling</p>
4	25	<p>The Forced-air cooling uses:</p> <p>(a) Fans and ducts (b) External pumps</p> <p>(c) Refrigerant (d) Hydrogen jackets</p> <p>Ans: Fans and ducts</p>
4	26	<p>The Forced-oil cooling uses:</p> <p>(a) Heat exchangers (b) Air ducts</p> <p>(c) Hydraulic radiator (d) Evaporator</p> <p>Ans: Heat exchangers</p>
4	27	<p>In ONAF means:</p> <p>(a) Oil – Natural Air – Forced (b) Oil – Onload Air Flow</p> <p>(c) Oil – Non Air-Flow (d) Oil – Neutral Air – Forced</p> <p>Ans: Oil – Natural Air – Forced</p>
4	28	<p>A HSC (Hydrogen Self Cooled) used in:</p> <p>(a) ASmall units (b) Power transformers >200 MVA</p> <p>(c) Distribution units (d) Dry transformers</p> <p>Ans: Power transformers >200 MVA</p>
4	29	<p>The Water cooling uses:</p> <p>(a) Coils or jackets (b) Fans</p> <p>(c) Air ducts (d) Forced oil</p> <p>Ans: Coils or jackets</p>
4	30	<p>The cooling rating ONAN/ONAF indicates:</p> <p>(a) Same rating always (b) Different cooling limit</p> <p>(c) Voltage type (d) Tap changer style</p> <p>Ans: Different cooling limit</p>

U.NO	Q NO	QUESTIONS
4	31	<p>A conservator provides:</p> <p>(a) Air cushion for oil expansion (b) Structural support (c) Spill protection (d) VOC removal</p> <p>Ans:Air cushion for oil expansion</p>
4	32	<p>In Breather contains:</p> <p>(a) Desiccant (silica gel) (b) Fuse (c) Buchholz relay (d) Pressure valve</p> <p>Ans:Desiccant (silica gel)</p>
4	33	<p>The Explosion vent protects against:</p> <p>(a) Over-voltage (b) Tank rupture (c) Circuit fault (d) Circuit fault</p> <p>Ans:Tank rupture</p>
4	34	<p>A Buchholz relay is</p> <p>(a) Oil-level indicator (b) Gas-operated protection device (c) Pressure relief valve (d) Explosion elevation alert</p> <p>Ans:Gas-operated protection device</p>
4	35	<p>The Buchholz trips on:</p> <p>(a) Minor oil flow (b) High gas flow (fault) (c) Light vibration (d) Gas or oil surge</p> <p>Ans:Gas or oil surge</p>
4	36	<p>The Oil-level gauge shows:</p> <p>(a) Core temperature (b) Oil temperature (c) Oil level in conservator (d) Humidity</p> <p>Ans:Oil level in conservator</p>
4	37	<p>The Pressure relief device prevents:</p> <p>(a) Gas formation (b) Rupture from pressure rise (c) Oil oxidation (d) Fan failure</p> <p>Ans:Rupture from pressure rise</p>
4	38	<p>The Oil filtration monitors:</p> <p>(a) Particulate or moisture contamination (b) FT% (c) Temperature (d) Pressure</p> <p>Ans:Particulate or moisture contamination</p>
4	39	<p>A Hot-spot thermometer detects:</p> <p>(a) Core flux (b) Insulation failure (c) Local overheating (d) Moisture</p> <p>Ans:Local overheating</p>
4	40	<p>The Tap-changer diverter switch is inside:</p> <p>(a) Conservator (b) Tank (c) Breather (d) Radiator</p> <p>Ans:Tank</p>

U.NO	Q NO	QUESTIONS
4	41	<p>A ON-load tap changer (OLTC):</p> <p>(a) Changes taps under load (b) Needs power off (c) Manual only (d) Not used in power systems</p> <p>Ans:Changes taps under load</p>
4	42	<p>A OFF-load tap changer:</p> <p>(a) Changes only when de-energized (b) Changes under full load (c) Uses vacuum (d) Is automatic</p> <p>Ans:Changes only when de-energized</p>
4	43	<p>The OLTC maintains voltage during:</p> <p>(a) Unloaded condition (b) Load changes (c) Overload only (d) Emergency trip</p> <p>Ans:Load changes</p>
4	44	<p>The OLTC operates using:</p> <p>(a) Conservator (b) Relay (c) Oil-immersed diverter switch (d) None</p> <p>Ans:Oil-immersed diverter switch</p>
4	45	<p>The Tap positions change transformer:</p> <p>(a) Taps adjust voltage ratio (b) Adds windings (c) Changes cooling rating (d) Alters phase shift</p> <p>Ans:Taps adjust voltage ratio</p>
4	46	<p>The Tap-changers are sparingly:</p> <p>(a) Used (b) Used often (c) Only on LV (d) Deprecated</p> <p>Ans:Used often</p>
4	47	<p>The Off-load tap changer is safer but:</p> <p>(a) Slower voltage control (b) More complex (c) Requires vacuum (d) Not for HV</p> <p>Ans:Slower voltage control</p>
4	48	<p>The OLTC card allows:</p> <p>(a) Remote control and monitoring (b) Explosion response (c) Free tap change (d) Oil filtration</p> <p>Ans:Remote control and monitoring</p>
4	49	<p>The Maintenance of OLTC is:</p> <p>(a) Critical due to contacts and oil (b) Not needed (c) Only yearly (d) Done only before tapping</p> <p>Ans:Critical due to contacts and oil</p>
4	50	<p>A Grouping three-phase banks ensure:</p> <p>(a) No phase shift management (b) Circulating current prevention (c) No Tap changer (d) No voltage</p> <p>Ans:Circulating current prevention</p>

U.NO	Q NO	QUESTIONS
5	1	<p>The Preventive maintenance aims to:</p> <p>(a) Fix after breakdown (b) Prevent breakdowns via scheduled checks (c) Eliminate all costs (d) Occur only on demand</p> <p>Ans: Prevent breakdowns via scheduled checks</p>
5	2	<p>The Breakdown maintenance is:</p> <p>(a) Scheduled activity (b) Reactive, after failure (c) More cost-effective (d) Predictable</p> <p>Ans: Reactive, after failure</p>
5	3	<p>The Benefit of preventive over breakdown maintenance is:</p> <p>(a) Increased downtime (b) Higher operational continuity (c) More unexpected failures (d) Higher repair costs</p> <p>Ans: Higher operational continuity</p>
5	4	<p>A Key element of preventive maintenance is:</p> <p>(a) Ignoring small faults (b) Regular inspections (c) Just in time ordering (d) Running to failure</p> <p>Ans: Regular inspections</p>
5	5	<p>The Breakdown maintenance often results in:</p> <p>(a) Lower costs (b) Increased downtime (c) Scheduled replacements (d) Better reliability</p> <p>Ans: Increased downtime</p>
5	6	<p>The Tool used for scheduled maintenance planning:</p> <p>(a) CMMS(Computerized Maintenance Management System) (b) Hammer (c) Dynamometer (d) Heat gun</p> <p>Ans: CMMS(Computerized Maintenance Management System)</p>
5	7	<p>The Maintenance of machines should be:</p> <p>(a) Ad hoc (b) Integrated with production schedule (c) Only annual (d) Performed only by vendors</p> <p>Ans: Integrated with production schedule</p>
5	8	<p>A Major goal is to improve:</p> <p>(a) Initial cost (b) Machine reliability (c) Machine obsolescence (d) Warranty coverage</p> <p>Ans: Machine reliability</p>
5	9	<p>In the Excessive sparking in commutator a rises due to:</p> <p>(a) Good contact (b) Incorrect brush position (c) Balanced armature (d) Low load</p> <p>Ans: Incorrect brush position</p>
5	10	<p>The Another sparking cause is:</p> <p>(a) Smooth surface (b) Dirty commutator segments (c) Balanced magnetic field (d) Properly tensioned brush springs</p> <p>Ans: Dirty commutator segments</p>

U.NO	Q NO	QUESTIONS	
5	11	A Brush grading is used to: (a) Prevent wear (c) Ensure proper current division Ans:Reduce sparking	(b) Control brush conductivity (d) Reduce sparking
5	12	The incorrect brush spring tension causes: (a) Low friction (c) Increased voltage Ans:Poor contact and sparking	(b) Poor contact and sparking (d) Better cooling
5	13	A Commutator segment wear shows: (a) Smooth finish (c) No discoloration Ans:Grooves or ridges	(b) Grooves or ridges (d) Even diameter
5	14	To fix grooved commutator, use: (a) Emery paper (c) More load Ans:Undercutting and re-surfacing	(b) Undercutting and re-surfacing (d) Reduce speed
5	15	The undercutting mica helps: (a) Maintain insulation under segments (c) Hinder brush travel Ans:Maintain insulation under segments	(b) Increase copper exposure (d) Prevent ventilation
5	16	The Excessive eccentricity in commutator affects: (a) Core flux (c) AC output Ans:Spark generation	(b) Spark generation (d) Transformer ratio
5	17	The Polishing commutator with fine cloth ensures (a) Roughened surface (c) Reduced insulation Ans:Smooth contact	(b) Smooth contact (d) Increased wear
5	18	The brush pull for testing spring tension uses: (a) Dial gauge (c) Spring scale Ans:Spring scale	(b) Deflection test (d) Micrometer
5	19	A Common winding defect is: (a) Turn-to-turn short (c) Proper insulation Ans:Turn-to-turn short	(b) Constant speed (d) Balanced flux
5	20	The Shorted coils may cause: (a) Lower I ² R loss (c) Even torque Ans:High local heating	(b) High local heating (d) Reduced sparking

U.NO	Q NO	QUESTIONS
5	21	To detect shorted coils use: (a) Ohmmeter (c) Stethoscope Ans:Growler
		(b) Growler (d) Tachometer
5	22	A Open-circuited coils cause: (a) Reduced back-EMF (c) Lower resistance Ans:Reduced back-EMF
		(b) Excess flux (d) No effect
5	23	In a Imbalanced winding may result in: (a) Low vibrations (c) Perfect commutation Ans:High current ripple
		(b) High current ripple (d) No impact
5	24	The Winding insulation check uses: (a) Hydro meter (c) Vernier caliper Ans:Megger (insulation tester)
		(b) Megger (insulation tester) (d) Wattmeter
5	25	The Glaze on winding surface is cleaned by: (a) Paint (c) Cleaning solvent Ans:Cleaning solvent
		(b) Sandpaper (d) Increasing voltage
5	26	The reseating loose coils involves: (a) Applying glue or varnish (c) Transferring shaft Ans:Applying glue or varnish
		(b) Sanding commutator (d) Removing all coil insulation
5	27	A Transformer oil prevents (a) Voltage drop (c) Only mechanical noise Ans:Corona discharge
		(b) Corona discharge (d) Armature commutation
5	28	The Acidity in oil leads to: (a) Improved DC voltage (c) Increased cooling Ans:Paper insulation corrosion
		(b) Paper insulation corrosion (d) Better dielectric
5	29	The Acidity test uses: (a) pH meter or titration (c) Millimeter Ans:pH meter or titration
		(b) Fourier transform (d) Stethoscope
5	30	A Breakdown voltage (BDV) test gives: (a) Viscosity (c) Acid content Ans:Dielectric strength
		(b) Dielectric strength (d) Density

U.NO	Q NO	QUESTIONS
5	31	As oil degrades, BDV: (a) Increases (b) Decreases (c) Remains constant (d) Is irrelevant Ans:Decreases
5	32	In a Recommended BDV is: (a) >20 kV (b) >40 kV for 5 mm gap (c) 5 kV only (d) 0.4 kV Ans:>40 kV for 5 mm gap
5	33	A Oil filtration removes: (a) AC harmonics (b) Moisture and particulates (c) Magnetic flux (d) Varnish Ans:Moisture and particulates
5	34	A Oil-in-paper contact indicates: (a) Fully dry oil (b) Moisture ingress (c) Neutral oil state (d) Increased dielectric Ans:Moisture ingress
5	35	The Oil testers commonly measure: (a) Density and acetic acid (b) BDV and acid number (c) pH and color (d) Current Ans:BDV and acid number
5	36	A Oil sampling should be from: (a) Tank sides (b) Bottom following procedure (c) Tunnel (d) Top only Ans:Bottom following procedure
5	37	In the Earthing prevents: (a) Overvoltage on load (b) Hazardous potential on equipment (c) Power factor drop (d) Load imbalance Ans:Hazardous potential on equipment
5	38	The Earthing resistance ideally is: (a) Very high (b) Very low (<1 Ω) (c) Moderate (d) Negative Ans:Very low (<1 Ω)
5	39	The Earth electrode can be (a) Plate or rod (b) Brush (c) Overload coil (d) Commutation bar Ans:Plate or rod
5	40	The Three-terminal fall-of-potential test measures: (a) Voltage only (b) Earth resistance (c) Current only (d) Frequency Ans:Earth resistance

U.NO	Q NO	QUESTIONS	
5	41	A Zurich method involves: (a) Two earth sets (c) Dusting Ans:Three-point test	(b) Three-point test (d) Direct injection
5	42	The Megaohmmeter used for measuring: (a) Earth resistance (c) pH Ans:Insulation resistance	(b) Insulation resistance (d) Moisture
5	43	The Digital earth tester includes: (a) Low-ohm range and test voltages (c) Vibration sensor Ans:Low-ohm range and test voltages	(b) Frequency meter (d) Venting system
5	44	The Good earth system reduces: (a) Spark length (c) Copper loss Ans:Touch voltage	(b) Touch voltage (d) Magnetic noise
5	45	The Earth must be retested: (a) Annually or after modifications (c) Only when new equipment installed Ans:Annually or after modifications	(b) Never (d) Weekly
5	46	A Commutator resurfacing is done via: (a) On-armature lathe (c) V-belt car park Ans:On-armature lathe	(b) Hydraulic press (d) Air blower
5	47	The Brush grading ensures: (a) Uniform wear and minimal sparking (c) Copper deposition Ans:Uniform wear and minimal sparking	(b) High spring tension (d) Increased oil retention
5	48	The Remedy for oil acidity includes: (a) Replace or neutralize oil (c) Higher tap setting Ans:Replace or neutralize oil	(b) Increase load (d) Add water
5	49	The Proper earthing improves: (a) Voltage regulation (c) Load torque Ans:User safety and fault clearance	(b) User safety and fault clearance (d) Mechanical strength
5	50	A Transformer oil BDV tested under (a) Wet conditions (c) In-line under load Ans:Standard electrode and gap conditions	(b) Standard electrode and gap conditions (d) High-frequency test

ELECTRICAL MACHINES -1

UNIT NO	PART B/C	Q.NO	PART B AND PART C QUESTIONS
1	B	1	State Faraday's laws of electromagnetic induction.
1	B	2	List the types of DC generators based on excitation.
1	B	3	State the effect of armature reaction in DC generator
1	B	4	List the main parts of DC generator.
1	B	5	Give the causes for failure of voltage build-up in a shunt generator.
1	B	6	Apply Fleming's Right-Hand Rule to determine the direction of induced EMF.
1	B	7	Draw the characteristics of a shunt generator to explain voltage variation with load.
1	B	8	Apply the EMF equation to explain what happens to generated voltage if speed is increased.
1	B	9	List the applications of DC generators
1	B	10	Compare lap and wave winding.
2	B	1	State the significance of DC motors in various industries and automation.
2	B	2	Draw the speed–torque characteristic of a DC shunt motor.
2	B	3	State why starters are required in DC motors.
2	B	4	Draw a neat diagram of a DC motor and label its main parts.
2	B	5	Give the applications of DC motor based on its types.
2	B	6	Apply field control method and draw the speed control characteristic of a DC shunt motor.
2	B	7	Write a note on DC servo motor.
2	B	8	Draw a neat diagram of a PMDC motor and state one application.
2	B	9	Draw the torque–speed characteristics of a stepper motor.
2	B	10	List the types of DC motors based on excitation
3	B	1	Compare core and shell type transformer
3	B	2	State why transformers are rated in kVA and not kW
3	B	3	Draw the no-load phasor diagram of a transformer
3	B	4	State the condition for maximum efficiency of a transformer.
3	B	5	Describe the losses in transformers
3	B	6	Write the expression of efficiency of transformer on load
3	B	7	Draw and apply the load phasor diagram of a transformer at lagging power factor
3	B	8	List the condition for parallel operation of transformers
3	B	9	State the applications of autotransformer.
3	B	10	Write the expression for EMF equation of a transformer
4	B	1	State why three-phase transformers are preferred over three single-phase transformers.
4	B	2	List the types of construction used in three-phase transformers
4	B	3	List the common three-phase transformer connections
4	B	4	Draw and state the advantage of a Delta–Star transformer connection.
4	B	5	Draw the vector group symbol of a Dyn11 transformer.
4	B	6	State the purpose of transformer cooling.
4	B	7	List the various transformer cooling methods.
4	B	8	State the function of a conservator in a transformer.
4	B	9	Draw the diagram of off load tap changer.
4	B	10	Draw the diagram of air blast cooling method of three phase transformer.
5	B	1	State the importance of electrical machine maintenance.
5	B	2	Mention the typical causes of breakdown

5	B	3	How the transformer oil is maintained?
5	B	4	State the defects in commutator
5	B	5	Give the functions and requirements of brushes.
5	B	6	List the common defects in DC armature winding
5	B	7	State the purpose of transformer oil.
5	B	8	List the tests conducted on transformer oil.
5	B	9	State the purpose of earthing in electrical installations.
5	B	10	List the methods used for measuring earth resistance.
1	C	1	Derive the Emf equation of DC generator.
1	C	2	Draw and explain the load characteristics of DC generator.
1	C	3	Discuss the armature reaction effect in dc generator with suitable diagram
1	C	4	Describe the constructional parts of a DC generator and state the function of each part.
1	C	5	Discuss the process of commutation in DC generators.
2	C	1	Explain the construction and working of a 3-point starter with neat sketch.
2	C	2	Discuss the operation of a DC motor with necessary diagram.
2	C	3	Explain any two methods of speed control of DC series motor.
2	C	4	Apply speed-torque characteristics to select a suitable DC motor for crane and hoist application
2	C	5	Explain the construction and working of BLDC motor with neat sketch.
3	C	1	Explain the principle of stepper motor and state its advantages.
3	C	2	Describe the constructional parts of a transformer and state the function of each.
3	C	3	With neat sketch, explain the working of auto transformer and state its advantages.
3	C	4	Compare two winding transformer and autotransformer.
3	C	5	Derive the Emf equation of Transformer
4	C	1	Discuss the different types of three-phase transformer connections and their features.
4	C	2	Explain any two cooling methods used in power transformers with suitable sketch.
4	C	3	Explain the operation of on load tap changer with neat sketch.
4	C	4	Discuss the function of a Buchholz relay and breather to explain how internal faults in transformer are detected.
4	C	5	Draw and explain the connections diagram of three phase transformer
5	C	1	Describe the methods used for measurement of earth resistance.
5	C	2	Discuss the causes of sparking in commutator and state any two remedies.
5	C	3	Explain the resurfacing of commutator with relevant sketch.
5	C	4	Explain the working of transformer oil tester with neat sketch.
5	C	5	Discuss about the procedure and advantages of preventive maintenance.