CENTRAL POLYTECHNIC COLLEGE, THARAMANI-600 113.

(An Autonomous Institution)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGG.

QUESTION BANK

EEE51010 – POWER SYSTEMS PROTETION AND UTILIZATION

U.NO	Q.NO	QUESTIONS
1	1	What is the primary significance of protective schemes in power systems? (a) Ensuring safety and stability (b) Maximizing power generation (c) Reducing transmission losses (d) oving energy efficiency **Ans:Ensuring safety and stability**
1	2	What is a fault in an electrical system? (a) A scheduled maintenance (b) An abnormal condition due to a short circuit (c) A normal operating condition (d) An equipment upgrade **Ans:An abnormal condition due to a short circuit**
1	3	Which of the following is a common cause of faults in power systems? (a) Insulation breakdown (b) Regular load fluctuations (c) Standard operating procedures (d) Planned switching **Ans:Insulation breakdown**
1	4	Which fault type is characterized by a phase-to-phase short circuit? (a) Open circuit fault (b) Phase-to-phase fault (c) Ground fault (d) Arc fault **Ans:Phase-to-phase fault**
1	5	A three-phase fault, where all three phases are shorted together is known as a (a) Single-line-to-ground fault (b) Line-to-line fault (c) Three-phase fault (d) Double-line-to-ground fault **Ans:Three-phase fault**
1	6	How do protective schemes primarily help in power systems? (a) They control energy distribution (b) They isolate faulted sections to prevent damage (c) They optimize generation schedules (d) They reduce transformer losses **Ans:They isolate faulted sections to prevent damage**
1	7	What is the primary effect of a fault in a power system? (a) Increased voltage (b) Reduced current (c) Overcurrent and voltage drop (d) Improved power factor **Ans:Overcurrent and voltage drop**
1	8	Which of the following represents a zone of protection in a power system? (a) A specific geographical area (b) A circuit breaker's operating time (c) The area covered by a specific protection device (e.g., a relay) (d) The entire power grid **Ans:The area covered by a specific protection device (e.g., a relay)**
1	9	What is the role of current transformers (CT) in protection schemes? (a) To measure voltage levels (b) To step down current for measurement and protection (c) To increase power outpu (d) To regulate system frequency **Ans:To step down current for measurement and protection**
1	10	What is the primary function of potential transformers (PT)? (a) To measure current (b) To provide system isolation (c) a) To step down voltage for accurate (d) To amplify signal strength

measurement
Ans:To step down voltage for accurate measurement

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1	11	Why is transformer protection essential? (a) It prevents overheating and severe equipment damage (b) It improves power factor (c) It increases transformer efficiency (d) It reduces installation costs **Ans:It prevents overheating and severe equipment damage**
1	12	Which equipment is most crucial for protecting transformers from internal faults? (a) Overcurrent relays (b) Differential relays (c) Distance relays (d) Under-voltage relays **Ans:Differential relays**
1	13	What is a voltage surge? (a) A gradual increase in voltage over time (b) A sudden, short-duration, increase in voltage (c) A decrease in voltage during a fault (d) A stable voltage level **Ans:A sudden, short-duration, increase in voltage**
1	14	Which of the following is a cause of over voltage in power systems? (a) Underloading (b) Lightning strike (c) Regular maintenance (d) Adhesion only **Ans:Lightning strike**
1	15	Which type of lightning stroke is considered more dangerous for electrical systems? (a) Direct stroke (b) Indirect stroke (c) Both are equally dangerous (d) Low resistance **Ans:Direct stroke**
1	16	What is the primary function of an earthing screen? (a) To provide a low-impedance path for fault current (b) To shield equipment from direct lightning strikes (c) To improve system stability (d) Neither is dangerous **Ans:To shield equipment from direct lightning strikes**
1	17	What is the function of overhead ground wires? (a) To transmit power (b) To shield the system from lightning strikes (c) To measure current flow (d) To enhance power factor **Ans:To shield the system from lightning strikes**
1	18	Lightning arresters are designed to (a) Absorb all lightning energy (b) Limit overvoltages by providing a path to ground (c) Increase voltage levels (d) To regulate voltage levels **Ans:Limit overvoltages by providing a path to ground**
1	19	What defines a gapless arrester? (a) A lightning arrester design without an air gap (b) A fuse with continuous operation (c) A type of current transformer (d) Store energy for later use **Ans:A lightning arrester design without an air gap**
1	20	How does an expulsion type arrester differ from a gapless arrester? (a) It uses gas expulsion to interrupt fault currents (b) It has a larger physical gap

(c) It is used only in low-voltage applications (d) A voltage stabilizer

Ans:It uses gas expulsion to interrupt fault currents

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1	21	What is the function of a fuse in a circuit? (a) To step up voltage (b) To step down voltage (c) To protect the circuit by interrupting the current flow during an overload or short circuit (d) It does not provide surge protection **Ans:To protect the circuit by interrupting the current flow during an overload or short circuit**
1	22	What does HRC stand for in HRC fuse? (a) High resistance capacity (b) High rupturing capacity (c) High reactive current (d) To regulate the voltage **Ans:High rupturing capacity**
1	23	What is a primary advantage of an HRC fuse? (a) Low cost (b) Fast operating speed (c) Simple construction (d) High reverse current **Ans:Simple construction**
1	24	What is a primary advantage of an HRC fuse? (a) Relay operation (b) Voltage control (c) Load shedding (d) Simple construction **Ans:Relay operation**
1	25	In protection schemes, what does “CT” stand for? (a) Control transformer (b) Current transformer (c) Charge transformer (d) Power factor correction **Ans:Current transformer**
1	26	Which type of fault is most common in power systems? (a) Three-phase fault (b) Line-to-line fault (c) Single-line-to-ground fault (d) Circuit transformer **Ans:Single-line-to-ground fault**
1	27	The zone of protection is designed to overlap to (a) Reduce cost (b) Ensure no part of the system is left unprotected (c) Simplify the protection scheme (d) Double-line-to-ground fault **Ans:Ensure no part of the system is left unprotected**
1	28	What is the primary function of a surge arrester? (a) To increase the system voltage (b) To reduce the system current (c) To protect equipment from overvoltages (d) Improve voltage regulation **Ans:To protect equipment from overvoltages**
1	29	The process of interruption followed by intentional re-energization is called? (a) Reopening (b) Restoring (c) Reclosure (d) To improve power factor **Ans:Reclosure**
1	30	In low voltage systems how many reclosures are attempted

(a) One (b) Two
(c) Three (d) None
Ans:Two

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1	31	A fault which bypasses the entire load current through itself is called

(a) Metallic fault (b) Dead fault
(c) Non metallic fault (d) Four
Ans:Metallic fault

1 32 For which of the following faults, probability of occurrence is greatest
(a) L-L-G (b) L-L
(c) L-L-L (d) None
Ans:L-G

1 33 In case of any fault, if the source is ideal, then voltage drop at the generator terminal is
(a) Maximum (b) Intermediate
(c) Zero (d) L-G
Ans:Zero

1 34 Extra high voltage (EHV) lines are
(a) Axial (b) Tie
(c) 10 A Selectivity (d) No effect
Ans:Tie

1 35 In designing protection system we take into account
(a) Sensitivity (b) Speed
(c) Reclosure (d) Intermediate
Ans:Intermediate

1 36 The standard secondary current ratings of a current transformer are
(a) 5 A (b) Intermediate
(c) Undervoltage (d) None
Ans:5A

1 37 HRC fuse stands for
(a) High Rupturing Capacity fuse (b) High Resistance Circuit fuse
(c) High Recovery Current fuse (d) High Reactive Circuit fuse
Ans:High Rupturing Capacity fuse

1 38 The main purpose of an HRC fuse is
(a) Voltage regulation (b) Overcurrent protection
(c) Power factor correction (d) Frequency control
Ans:Overcurrent protection

1 39 HRC fuse is commonly used in
(a) Low current circuits (b) High voltage and high current circuits
(c) Only domestic appliances (d) Signal circuits
Ans:High voltage and high current circuits

1 40 The filler material used in HRC fuse is usually
(a) Oil (b) Quartz powder
(c) Air (d) Mica

Ans:Quartz powder

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1	41	The function of the filler material in an HRC fuse is to (a) Reduce resistance (b) Absorb arc energy (c) Increase current (d) Act as an insulator only **Ans:Absorb arc energy**
1	42	HRC fuse gives reliable protection against (a) Overvoltage (b) Overcurrent and short circuit (c) Power loss (d) Frequency variation **Ans:Overcurrent and short circuit**
1	43	Time-current characteristic of HRC fuse is (a) Inverse (b) Linear (c) Constant (d) Exponential **Ans:Inverse**
1	44	The breaking capacity of HRC fuse is (a) Very low (b) Low (c) High (d) Zero **Ans:High**
1	45	In HRC fuse, the fuse element is usually made of (a) Copper or silver (b) Aluminum (c) Iron (d) Zinc **Ans:Copper or silver**
1	46	When an HRC fuse blows, the arc formed is (a) Sustained for a long time (b) Quickly extinguished (c) Converted into spark (d) d) Not formed **Ans:Quickly extinguished**
1	47	The operating time of HRC fuse under short circuit condition is (a) Very high (b) Very low (c) Medium (d) Infinite **Ans:Very low**
1	48	HRC fuse is preferred over rewirable fuse because it is (a) Costlier (b) Slower (c) More reliable and safer (d) Bulkier **Ans:More reliable and safer**
1	49	The rated breaking capacity of HRC fuse is usually expressed in (a) Volts (b) Amperes (c) kA (kiloamperes) (d) Ohms **Ans:kA (kiloamperes)**
1	50	The inverse-time characteristic of HRC fuse means (a) Smaller current takes less time to blow (b) Higher current takes less time to blow (c) Time is independent of current (d) Fuse never blows at high current **Ans:Higher current takes less time to blow**

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2	1	Relay is a	
		(a) Electromechanical device	(b) Electronic device
		(c) Magnetic device	(d) Sense fault
		Ans:Electromechanical device	
2	2	The function of a relay is to	
		(a) Protect circuit	(b) Rated value
		(c) Supply power	(d) Measure voltage
		Ans:Protect circuit	
2	3	The operating time of instantaneous relay is	
		(a) <0.1 sec	(b) 1 sec
		(c) 2 sec	(d) 5 sec
		Ans:<0.1 sec	
2	4	Inverse time relay operates	
		(a) Faster for large faults	(b) Slower for large faults
		(c) Constant time	(d) Constant current
		Ans:Faster for large faults	
2	5	Buchholz relay is used for	
		(a) Transformer protection	(b) Generator protection
		(c) Motor protection	(d) Feeder protection
		Ans:Transformer protection	
2	6	The directional relay is used for	
		(a) Transmission line	(b) Motor
		(c) Transformer	(d) Generator
		Ans:Transmission line	
2	7	IDMT stands for	
		(a) Inverse Definite Minimum Time	(b) Instantaneous Definite Minimum Time
		(c) Inverse Delay Maximum Time	(d) Voltage rises
		Ans:Inverse Definite Minimum Time	
2	8	The operating coil of relay is connected in	
		(a) Series	(b) Parallel
		(c) Series-parallel	(d) Phase current flows
		Ans:Series	
2	9	The overcurrent relay operates when	
		(a) Current > set value	(b) Voltage > set value
		(c) Power > set value	(d) Nitrogen
		Ans:Current > set value	
2	10	Mho relay is used for	
		(a) Distance protection	(b) Overcurrent protection
		(c) Differential protection	(d) Earth fault
		Ans:Distance protection	

U.NO	Q NO	QUESTIONS
2	11	Earth fault relay operates when (a) Neutral current flows (b) Phase current flows (c) Voltage rises (d) Supply power **Ans:Neutral current flows**
2	12	The minimum pick-up current of relay is (a) Setting value (b) Rated value (c) Fault value (d) Interrupt fault current **Ans:Setting value**
2	13	The relay used for transformer differential protection is (a) Differential relay (b) Overcurrent relay (c) Distance relay (d) Earth fault relay **Ans:Differential relay**
2	14	Static relays use (a) Electronic components (b) Mechanical parts (c) Pneumatic parts (d) Overcurrent **Ans:Electronic components**
2	15	The main part of relay is (a) Sensing element (b) Comparing element (c) Output element (d) Ionization of medium **Ans:Ionization of medium**
2	16	In IDMT relay, time decreases with (a) Increase in fault current (b) Decrease in fault current (c) Constant current (d) Vacuum **Ans:Increase in fault current**
2	17	Electromagnetic attraction relay works on (a) Magnetic force (b) Electrostatic force (c) Induction principle (d) Outdoor **Ans:Magnetic force**
2	18	Inverse definite minimum time relay is used for (a) Overcurrent protection (b) Under voltage protection (c) Over voltage protection (d) Voltage zero **Ans:Overcurrent protection**
2	19	The main purpose of a circuit breaker is to (a) Interrupt fault current (b) Supply power (c) Measure voltage (d) Differential relay **Ans:Interrupt fault current**
2	20	The medium used in air blast circuit breaker is (a) Compressed air (b) SF6 (c) Oil (d) Vacuum **Ans:Compressed air**

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2	21	SF6 circuit breaker uses (a) Sulphur hexafluoride (b) Nitrogen (c) Hydrogen (d) Air **Ans:Sulphur hexafluoride**
2	22	Vacuum circuit breakers are used up to voltage of (a) 11 kV (b) 33 kV (c) 66 kV (d) 132 kV **Ans:33 kV**
2	23	The function of isolator is to (a) Disconnect circuit (b) Interrupt current (c) Measure voltage (d) Reactive **Ans:Disconnect circuit**
2	24	Arc extinction in air blast circuit breaker is by (a) Air pressure (b) Oil cooling (c) Vacuum (d) SF6 **Ans:Air pressure**
2	25	Oil circuit breakers use (a) Transformer oil (b) Mineral oil (c) Silicon oil (d) Lubricating oil **Ans:Transformer oil**
2	26	Minimum oil circuit breakers are used for voltage up to (a) 11 kV (b) 33 kV (c) 66 kV (d) 132 kV **Ans:33 kV**
2	27	The quenching medium in vacuum circuit breaker is (a) Vacuum (b) Air (c) SF6 (d) Oil **Ans:Vacuum**
2	28	Which breaker is preferred for EHV? (a) SF6 (b) Air blast (c) Oil (d) Vacuum **Ans:SF6**
2	29	The main cause of arc in CB is (a) Ionization of medium (b) Overvoltage (c) Overcurrent (d) Earth fault relay **Ans:Ionization of medium**
2	30	The relay used for alternator protection is (a) Differential relay (b) Overcurrent relay (c) Earth fault relay (d) Distance relay **Ans:Differential relay**

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2	31	The SF6 gas is (a) Inert (b) Poisonous (c) Reactive (d) Mho relay **Ans:Inert**
2	32	The arc quenching in SF6 CB is by (a) Cooling (b) Deionization (c) Both A & B (d) Oil CB **Ans:Both A & B**
2	33	The vacuum CB is suitable for (a) Indoor (b) Outdoor (c) Both A & B (d) Insulating medium **Ans:Both A & B**
2	34	The relay which measures impedance is (a) Mho relay (b) Overcurrent relay (c) Differential relay (d) Arc quenching medium **Ans:Mho relay**
2	35	The CB which needs less maintenance is (a) SF6 CB (b) Oil CB (c) Air blast CB (d) Disconnect circuit **Ans:SF6 CB**
2	36	The arc in vacuum CB is extinguished at (a) Current zero (b) Voltage zero (c) Both A & B (d) Setting value **Ans:Current zero**
2	37	The relay which needs two inputs is (a) Differential relay (b) Overcurrent relay (c) Earth fault relay (d) Air pressure **Ans:Differential relay**
2	38	SF6 CB is used for voltage up to (a) 245 kV (b) 400 kV (c) Silicon oil (d) 400 kV **Ans:400 kV**
2	39	The overvoltage relay operates when (a) Voltage > set value (b) Current > set value (c) Power > set value (d) Distance relay **Ans:Voltage > set value**
2	40	The medium in bulk oil CB is (a) Transformer oil (b) Mineral oil (c) Both A & B (d) Impedance relay **Ans:Both A & B**

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2	41	Which relay operates with both magnitude & phase angle? (a) Mho relay (b) Impedance relay (c) Reactance relay (d) Voltage > set value **Ans:Mho relay**
2	42	The relay used for busbar protection is (a) Differential relay (b) Overcurrent relay (c) Distance relay (d) Differential relay **Ans:Differential relay**
2	43	The circuit breaker used for railway traction is (a) Air blast CB (b) Oil CB (c) SF6 CB (d) Vacuum CB **Ans:Air blast CB**
2	44	The oil used in CB acts as (a) Arc quenching medium (b) Insulating medium (c) Both A & B (d) Electrostatic force **Ans:Both A & B**
2	45	The CB with least arc energy is (a) SF6 CB (b) Air blast CB (c) Oil CB (d) Current zero **Ans:SF6 CB**
2	46	The relay used in long transmission lines is (a) Mho relay (b) Reactance relay (c) Impedance relay (d) Earth fault relay **Ans:Mho relay**
2	47	Which CB has noiseless operation? (a) SF6 CB (b) Air blast CB (c) Oil CB (d) Poisonous **Ans:SF6 CB**
2	48	The relay used for feeder protection is (a) Overcurrent relay (b) Distance relay (c) Differential relay (d) Reactive **Ans:Overcurrent relay**
2	49	The CB having shortest breaking time is (a) SF6 CB (b) Oil CB (c) Vacuum CB (d) Measure voltage **Ans:Vacuum CB**
2	50	Relay which measures phase angle is (a) Mho relay (b) Impedance relay (c) Reactance relay (d) Ionization of medium **Ans:Mho relay**

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3	1	The schedule speed is defined as (a) Distance between stops / time including stop (b) Distance between stops / time excluding stop (c) Distance between stops × time including stop (d) Distance travelled **Ans:Distance between stops / time including stop**
3	2	The speed at which the train runs excluding the time of stops is called (a) Schedule speed (b) Average speed (c) Running speed (d) Instantaneous speed **Ans:Running speed**
3	3	In main line service, the maximum speed is usually (a) 40–50 kmph (b) 50–60 kmph (c) 75–100 kmph (d) Constant **Ans:75–100 kmph**
3	4	The area under the speed–time curve represents (a) Acceleration (b) Retardation (c) Distance travelled (d) Higher than urban **Ans:Distance travelled**
3	5	Coasting period in speed–time curve means (a) Power is off and train runs due to momentum (b) Train is accelerating (c) Train is braking (d) Train is stopped **Ans:Power is off and train runs due to momentum**
3	6	For urban service, the distance between stops is about (a) 1–2 km (b) 5–10 km (c) 15–20 km (d) 20–30 km **Ans:1–2 km**
3	7	For suburban service, the distance between stops is about (a) 0.5–1 km (b) 2–5 km (c) 8–15 km (d) 20–25 km **Ans:2–5 km**
3	8	In trapezoidal speed–time curve, the acceleration and retardation are (a) Infinite (b) Constant (c) Zero (d) Varying **Ans:Constant**
3	9	Specific energy consumption is measured in (a) Wh/ton-km (b) Wh/km (c) Wh/hr (d) Wh/ton-hr **Ans:Wh/ton-km**
3	10	The main disadvantage of regenerative braking is (a) Energy wastage (b) High initial cost (c) Maintenance is high (d) Can be used only in DC motors **Ans:Can be used only in DC motors**

U.NO	Q NO	QUESTIONS
3	11	Adhesion in traction means (a) Ratio of tractive effort to weight on driving wheels (b) Ratio of speed to weight (c) Ratio of acceleration to weight (d) Ratio of braking effort to weight **Ans:Ratio of tractive effort to weight on driving wheels**
3	12	The unit of schedule speed is (a) km/hr (b) m/s (c) m/hr (d) km/s **Ans:km/hr**
3	13	The purpose of braking is to (a) Increase speed (b) Reduce speed or stop the train (c) Maintain constant speed (d) Mechanical braking **Ans:Reduce speed or stop the train**
3	14	Which braking method saves energy? (a) Mechanical braking (b) Regenerative braking (c) Pneumatic braking (d) Dynamic braking **Ans:Regenerative braking**
3	15	For suburban services, schedule speed is (a) Higher than urban (b) Lower than urban (c) Same as urban (d) Acceleration **Ans:Higher than urban**
3	16	In speed–time curve, the coasting reduces (a) Acceleration (b) Retardation (c) Energy consumption (d) Adhesion **Ans:Energy consumption**
3	17	The function of the traction motor is to (a) Drive the train (b) Control braking (c) Maintain adhesion (d) Distance between stops **Ans:Drive the train**
3	18	The main advantage of electric traction is (a) High efficiency (b) Low initial cost (c) No maintenance (d) Low installation cost **Ans:High efficiency**
3	19	For main line services, the coasting period is (a) Long (b) Short (c) Zero (d) Both AC and DC traction **Ans:Short**
3	20	The factor affecting schedule speed is (a) Acceleration & retardation (b) Distance between stops (c) Stop time (d) Aluminium **Ans:Aluminium**

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3	21	The voltage used in Indian Railways for electric traction is (a) 750 V DC (b) 25 kV AC (c) 3.3 kV DC (d) 1.5 kV AC **Ans:25 kV AC**
3	22	Regenerative braking is mainly used in (a) DC traction (b) AC traction (c) Both AC and DC traction (d) Steam traction **Ans:Both AC and DC traction**
3	23	The function of a pantograph is to (a) Collect current from overhead wire (b) Support the train roof (c) Store energy (d) Schedule speed **Ans:Collect current from overhead wire**
3	24	The contact wire is made of (a) Aluminium (b) Copper (c) Steel (d) Bronze **Ans:Copper**
3	25	Dead weight of train affects (a) Tractive effort (b) Braking effort (c) Schedule speed (d) Gradient **Ans:Gradient**
3	26	In electric traction, the most commonly used motor is (a) DC series motor (b) DC shunt motor (c) Induction motor (d) Universal motor **Ans:DC series motor**
3	27	The main advantage of AC series motor over DC series motor is (a) High starting torque (b) Low maintenance (c) High speed (d) Less cost **Ans:Low maintenance**
3	28	Energy consumption in traction depends on (a) Acceleration (b) Gradient (c) Load (d) Gradient **Ans:Gradient**
3	29	The gradient resistance is proportional to (a) Weight of train (b) Speed of train (c) Square of speed (d) None of the above **Ans:Weight of train**
3	30	For stopping the train, the braking effort should be (a) Less than tractive effort (b) Equal to tractive effort (c) Greater than tractive effort (d) Zero **Ans:Greater than tractive effort**

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3	31	The acceleration during starting is limited by (a) Adhesion (b) Weight (c) Gradient (d) Speed **Ans:Adhesion**
3	32	Main line service has (a) More stops (b) Fewer stops (c) No stops (d) Only one stop **Ans:Fewer stops**
3	33	Suburban services require (a) High acceleration and retardation (b) Low acceleration (c) No braking (d) Speed × time **Ans:High acceleration and retardation**
3	34	The coasting period is used to (a) Save energy (b) Increase speed (c) Reduce gradient (d) Total change in speed / total time **Ans:Save energy**
3	35	The average acceleration is (a) Total change in speed / total time (b) Distance / time (c) Speed × time (d) Quadrilateral **Ans:Total change in speed / total time**
3	36	Retardation is expressed in (a) km/hr^2 (b) m/s^2 (c) m/hr^2 (d) Pneumatic **Ans:m/s^2**
3	37	Adhesion depends on (a) Rail condition (b) Weight on driving wheels (c) Speed (d) Regenerative **Ans:Regenerative**
3	38	In steam traction, energy is stored in (a) Boiler (b) Battery (c) Flywheel (d) 20–30% of train mass **Ans:Boiler**
3	39	The most efficient braking system is (a) Regenerative (b) Mechanical (c) Pneumatic (d) Hydraulic **Ans:Regenerative**
3	40	Speed-time curve for mainline service is (a) Quadrilateral (b) Trapezoidal (c) Triangular (d) Cube of speed **Ans:Quadrilateral**

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3	41	The retardation rate for suburban service is usually (a) 0.3 m/s² (b) 0.5 m/s² (c) 1.0 m/s² (d) 3.0 m/s² **Ans:0.5 m/s²**
3	42	Electric braking reduces (a) Brake shoe wear (b) Energy consumption (c) Both A and B (d) Tractive effort – train resistance **Ans:Both A and B**
3	43	The train resistance due to air is proportional to (a) Speed (b) Square of speed (c) Cube of speed (d) Sum of tractive effort and train resistance **Ans:Square of speed**
3	44	The mass of rotating parts is equivalent to (a) 5–10% of train mass (b) 20–30% of train mass (c) 50% of train mass (d) Diesel traction **Ans:5–10% of train mass**
3	45	The curve used for schedule speed calculation is (a) Speed–time curve (b) Load curve (c) Torque–speed curve (d) Increase speed **Ans:Speed–time curve**
3	46	The schedule speed is less than average speed due to (a) Stops (b) Gradient (c) Curves (d) 5–10% of train mass **Ans:Stops**
3	47	For urban service, the retardation rate is (a) 0.3 m/s² (b) 0.6 m/s² (c) 1.0 m/s² (d) Diesel traction **Ans:1.0 m/s²**
3	48	The purpose of using multiple units in electric traction is (a) Increase speed (b) Reduce crew (c) Save energy (d) Flywheel **Ans:Flywheel**
3	49	In electric traction, the drawbar pull is (a) Tractive effort – train resistance (b) Train resistance – tractive effort (c) Sum of tractive effort and train resistance (d) Speed **Ans:Tractive effort – train resistance**
3	50	The most energy-efficient traction system is (a) Steam traction (b) Diesel traction (c) Electric traction (d) 1.0 m/s² **Ans:Electric traction**

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4	1	What is illumination? (a) The process of converting electrical energy into heat (b) The process of converting electrical energy into light (c) The measurement of voltage (d) The control of electric motors **Ans:The process of converting electrical energy into light**
4	2	What does the term “luminous flux” refer to? (a) The intensity of light in a specific direction (b) The total amount of light emitted by a source (c) The illumination level on a surface (d) The power consumption of a light source **Ans:The total amount of light emitted by a source**
4	3	What is the unit of illuminance? (a) Lumen (b) Candela (c) Lux (d) Watt **Ans:Lux**
4	4	What is the principle of operation of an incandescent lamp? (a) Gas discharge (b) Producing light through filament heating (c) Semiconductor electroluminescence (d) Magnetic induction **Ans:Producing light through filament heating**
4	5	Which of the following is a common classification of light sources? (a) Incandescent, fluorescent, LED (b) Hydraulic, pneumatic, mechanical (c) Thermal, chemical, biological (d) Digital, analog, hybrid **Ans:Incandescent, fluorescent, LED**
4	6	What is the function of the phosphor coating inside a fluorescent lamp? (a) To increase the lamp’s lifespan (b) To improve the lamp’s efficacy (c) To convert ultraviolet light visible light (d) To reduce the lamp’s power consumption **Ans:To convert ultraviolet light visible light**
4	7	What does CFL stand for? (a) Compact Fluorescent Lamp (b) Continuous filament lamp (c) Cold fluorescent lamp (d) Colored fluorescent lamp **Ans:Compact Fluorescent Lamp**
4	8	What is a key advantage of CFLs over incandescent lamps? (a) Lower initial cost (b) Better colour rendering (c) Higher efficacy and longer lifespan (d) Instant start **Ans:Higher efficacy and longer lifespan**
4	9	What does LED stand for? (a) Light Emitting Diode (b) Liquid Electric Device (c) Low Energy Diode (d) Light Energy Detector **Ans:Light Emitting Diode**
4	10	What is a significant advantage of LEDs over other light sources? (a) Low initial cost (b) High heat generation (c) Long lifespan, high efficacy, and instant start (d) Poor colour rendering **Ans:Long lifespan, high efficacy, and instant start**

U.NO	Q NO	QUESTIONS
4	11	What is a primary application of sodium vapour lamps? (a) Residential lighting (b) Street lighting (c) Portable devices (d) Emergency lighting **Ans:Street lighting**
4	12	Which lamp type utilizes mercury vapour to produce light? (a) Fluorescent lamp (b) LED lamp (c) Mercury vapour lamp (d) Incandescent lamp **Ans:Mercury vapour lamp**
4	13	Which light source is known for its low energy consumption? (a) Incandescent lamp (b) LED (c) Mercury vapour lamp (d) Halogen lamp **Ans:LED**
4	14	What recent trend is prominent in lighting systems? (a) Increased use of incandescent bulbs (b) Integration of IoT for lighting control (c) Manual light switches (d) Decreased use of LEDs **Ans:Integration of IoT for lighting control**
4	15	Which of the following is an example of an indoor lighting scheme? (a) Flood lighting (b) Factory lighting (c) Street lighting (d) Solar lighting **Ans:Factory lighting**
4	16	What is a typical application for outdoor lighting schemes? (a) Desk lamps (b) Street lighting (c) Table lamps (d) Monitor backlighting **Ans:Street lighting**
4	17	Which lighting technology is most often used in street lighting today? (a) Incandescent lamps (b) Sodium vapour lamps (c) LED technology (d) Fluorescent lamps **Ans:LED technology**
4	18	Why is proper lighting important in factories? (a) To improve worker safety and productivity (b) To reduce energy consumption (c) To improve the aesthetics of the factory (d) To increase machine efficiency **Ans:To improve worker safety and productivity**
4	19	What is the purpose of flood lighting? (a) To illuminate small areas (b) To provide uniform illumination indoors (c) To illuminate large outdoor areas (d) To create decorative effects **Ans:To illuminate large outdoor areas**
4	20	Which technology is increasingly used to control lighting in modern systems? (a) Rheostats (b) Sensors and IoT (c) Mechanical switches (d) Manual timers **Ans:Sensors and IoT**

U.NO	Q NO	QUESTIONS
4	21	What is the role of sensors in modern lighting control? (a) To manually switch lights on and off (b) To detect ambient conditions and adjust lighting automatically (c) To increase power consumption (d) To change light color only **Ans:To detect ambient conditions and adjust lighting automatically**
4	22	What is one benefit of using IoT in lighting control systems? (a) Increased energy wastage (b) Remote monitoring and adjustment (c) Reduced automation (d) Fixed lighting schemes **Ans:Remote monitoring and adjustment**
4	23	Which lamp type is most commonly used for energy saving in commercial spaces? (a) Fluorescent lamps (b) Halogen lamps (c) Incandescent lamps (d) LED lamps **Ans:LED lamps**
4	24	What is the main disadvantage of incandescent lamps? (a) High energy consumption (b) Complex circuitry (c) High efficiency (d) Low operating temperature **Ans:High energy consumption**
4	25	The unit of luminous flux is: (a) Candela (b) Lux (c) Lumen (d) Watt **Ans:Lumen**
4	26	Lumen is the unit of: (a) Luminous intensity (b) Luminous flux (c) Illuminance (d) Luminance **Ans:Luminous flux**
4	27	The unit of illumination is: (a) Candela (b) Lumen (c) Lux (d) Watt **Ans:Lux**
4	28	Which lamp works on the principle of incandescence? (a) LED (b) CFL (c) Incandescent Lamp (d) Sodium Vapour Lamp **Ans:Incandescent Lamp**
4	29	Sodium vapour lamp emits which colour light? (a) White (b) Blue (c) Yellow (d) Green **Ans:Yellow**
4	30	Mercury vapour lamp emits: (a) Greenish-white light (b) Bluish-white light (c) Yellow light (d) Red light **Ans:Greenish-white light**

U.NO	Q NO	QUESTIONS
4	31	Fluorescent lamps require which auxiliary device to start? (a) Inverter (b) Starter (c) Transformer (d) Rectifier **Ans:Starter**
4	32	CFL stands for: (a) Compact Flame Lamp (b) Common Fluorescent Light (c) Compact Fluorescent Lamp (d) Control Fluorescent Lamp **Ans:Compact Fluorescent Lamp**
4	33	What is the source of LED? (a) Light (b) Sun light (c) Water (d) Heat **Ans:Light**
4	34	Which lighting system is most energy efficient? (a) Incandescent (b) Fluorescent (c) CFL (d) LED **Ans:LED**
4	35	Recent trends in lighting include: (a) Halogen lamps (b) Mercury vapour lamps (c) Smart LED systems (d) Gas discharge lamps **Ans:Smart LED systems**
4	36	Indoor lighting is mainly used for: (a) Streets (b) Homes and Offices (c) Gardens (d) Tunnels **Ans:Homes and Offices**
4	37	Factory lighting requires: (a) Low illumination (b) Coloured lighting (c) High illumination and uniformity (d) Decorative lighting **Ans:High illumination and uniformity**
4	38	Outdoor lighting includes: (a) Office lighting (b) Kitchen lighting (c) Street and garden lighting (d) Living room lighting **Ans:Street and garden lighting**
4	39	Flood lighting is used for: (a) Home lighting (b) Vehicle lights (c) Large area illumination (d) Emergency lighting **Ans:Large area illumination**
4	40	Street lighting uses: (a) Incandescent lamps (b) CFLs (c) Fluorescent lamps (d) Sodium vapour or LED lamps **Ans:Sodium vapour or LED lamps**

U.NO	Q NO	QUESTIONS
4	41	Sensor-based lighting control helps in: (a) Increasing power use (b) Manual control (c) Energy saving (d) Decreasing automation **Ans:Energy saving**
4	42	Which sensor is used for automatic light control? (a) Pressure sensor (b) Motion sensor (c) Temperature sensor (d) Proximity sensor **Ans:Motion sensor**
4	43	IoT in lighting stands for: (a) Light over Time (b) Lighting over Internet of Things (c) Load of Transformers (d) Lumen of Time **Ans:Lighting over Internet of Things**
4	44	Illuminance depends on: (a) Source frequency (b) Resistance (c) Distance and angle from source (d) Voltage only **Ans:Distance and angle from source**
4	45	Which is not a light source? (a) Sun (b) LED (c) Lamp (d) Transformer **Ans:Transformer**
4	46	Efficacy of a lamp is measured in: (a) Lux (b) Lumens per watt (c) Candela (d) Watts per hour **Ans:Lumens per watt**
4	47	Typical lifespan of LED is: (a) 1000 hours (b) 2000 hours (c) 50000 hours (d) 500 hours **Ans:50000 hours**
4	48	Which is a gas discharge lamp? (a) LED (b) Incandescent (c) Sodium vapour lamp (d) Halogen **Ans:Sodium vapour lamp**
4	49	The primary function of a ballast in fluorescent lamp is: (a) Emit light (b) Limit current (c) Increase brightness (d) Store energy **Ans:Limit current**
4	50	Which of these has shortest lifespan? (a) LED (b) CFL (c) Mercury vapour (d) Incandescent lamp **Ans:Incandescent lamp**

U.NO	Q NO	QUESTIONS
5	1	Induction heating requires (a) High pressure (b) Conductive material (c) Vacuum (d) Thermocouple **Ans:Conductive material**
5	2	Which method of heating is suitable for non-metallic materials? (a) Arc heating (b) Induction heating (c) Dielectric heating (d) Resistance heating **Ans:Dielectric heating**
5	3	Resistance heating works on the principle of (a) Electromagnetic induction (b) Joule's law of heating (c) Thermionic emission (d) Electrolysis **Ans:Joule's law of heating**
5	4	Induction furnace uses principle of (a) Radiation (b) Electromagnetic induction (c) Thermocouple (d) Conduction **Ans:Electromagnetic induction**
5	5	Which type of arc furnace operates without direct connection to the metal charge? (a) Direct arc furnace (b) Indirect arc furnace (c) Resistance furnace (d) Coreless induction furnace **Ans:Indirect arc furnace**
5	6	Which is a solid-state welding method? (a) Arc welding (b) Laser welding (c) Ultrasonic welding (d) Resistance welding **Ans:Ultrasonic welding**
5	7	What is Ultrasonic Welding? (a) Welding using high-frequency sound waves (b) Welding using high-intensity light beam (c) Welding using resistance heating (d) Welding using electric arc **Ans:Welding using high-frequency sound waves**
5	8	What Induction Furnace? (a) It uses a laminated core (b) It does not have a magnetic core (c) It is used for low-temperature heating (d) Operates at high frequency without direct connection **Ans:Operates at high frequency without direct connection**
5	9	Which is NOT a type of electric furnace? (a) Arc furnace (b) Induction furnace (c) Steam furnace (d) Resistance furnace **Ans:Steam furnace**
5	10	Which of the following is NOT a type of electric welding? (a) Resistance welding (b) Arc welding (c) Ultrasonic welding (d) Gas welding **Ans:Gas welding**

U.NO	Q NO	QUESTIONS
5	11	High frequency heating is commonly used for (a) Cooking (b) Surface hardening (c) Refrigeration (d) Lighting **Ans:Surface hardening**
5	12	Eddy Current Heating is most effective for (a) Non-conductive materials (b) Magnetic Materials (c) Conductive materials (d) Insulating materials **Ans:Conductive materials**
5	13	Which type of electric furnace uses an electric arc to generate heat? (a) Resistance Furnace (b) Arc Furnace (c) Induction Furnace (d) Dielectric Furnace **Ans:Arc Furnace**
5	14	Resistance furnaces produce heat by (a) Arc discharge (b) Joule heating (c) Nuclear fusion (d) Conduction only **Ans:Joule heating**
5	15	Electric arc furnaces operate at (a) Low temperature (b) Very high temperature (c) Room temperature (d) Moderate temperature **Ans:Very high temperature**
5	16	Electric welding joins metals by (a) Riveting (b) Soldering (c) Heating and pressure (d) Chemical reaction **Ans:Heating and pressure**
5	17	Arc welding uses heat from (a) A resistance element (b) An electric arc between an electrode and the workpiece (c) Ultrasonic vibrations (d) Infrared radiation **Ans:An electric arc between an electrode and the workpiece**
5	18	In dielectric heating, the heat is produced by (a) Magnetic field (b) Dielectric loss (c) Electric resistance (d) Convection **Ans:Dielectric loss**
5	19	Which type of electric heat uses electromagnetic induction to generate heat? (a) Resistance heating (b) Infrared heating (c) Induction heating (d) Dielectric heating **Ans:Induction heating**
5	20	Arc welding uses (a) Chemical arc (b) Electric arc (c) Solar arc (d) Heat exchanger **Ans:Electric arc**

U.NO	Q NO	QUESTIONS
5	21	What is Infrared Heating? (a) Heating using high-frequency sound waves (b) Heating using resistance elements (c) Heating using electromagnetic radiation (d) Heating using chemical reactions **Ans:Heating using electromagnetic radiation**
5	22	What is welding? (a) A process of cooling materials (b) A process of joining materials by fusion (c) A process of separating materials (d) A process of cleaning materials **Ans:A process of joining materials by fusion**
5	23	Which electric heating method generates heat through circulating eddy currents? (a) Eddy current heating (b) Resistance heating (c) Dielectric heating (d) Arc heating **Ans:Eddy current heating**
5	24	What type of material is typically heated using Dielectric Heating? (a) Metals (b) Insulators (c) Conductors (d) Semiconductors **Ans:Insulators**
5	25	Which type of electric furnace uses heat generated by passing current through a resistance element? (a) Arc Furnace (b) Resistance Furnace (c) Induction Furnace (d) Dielectric Furnace **Ans:Resistance Furnace**
5	26	Which welding method gives deep penetration and fast welding? (a) Arc welding (b) Laser welding (c) Ultrasonic welding (d) Resistance welding **Ans:Laser welding**
5	27	Key difference between Direct and Indirect Arc Furnace (a) Direct arc furnaces are smaller (b) Direct arc furnaces heat the charge directly with the arc, while indirect arc furnaces radiate heat onto the charge (c) Direct arc furnaces are more efficient (d) Direct arc furnaces use less power **Ans:Direct arc furnaces heat the charge directly with the arc, while indirect arc furnaces radiate heat onto the charge**
5	28	Indirect arc furnace has arc formed (a) In the charge (b) Between electrodes (c) Inside insulation (d) None of these **Ans:Between electrodes**
5	29	Electric heating is preferred over other methods because it is (a) Costlier (b) Slower (c) Cleaner and controllable (d) Noisier **Ans:Cleaner and controllable**
5	30	Induction Furnaces heat material through (a) Resistance heating (b) Arc heating (c) Electromagnetic induction (d) Infrared heating **Ans:Electromagnetic induction**

U.NO	Q NO	QUESTIONS
5	31	Coreless induction furnace is best for (a) Batch melting (b) Small quantity precise melting (c) Plastic heating (d) Arc welding **Ans:Small quantity precise melting**
5	32	Dielectric heating is also known as (a) Microwave heating (b) Capacitive heating (c) Magnetic heating (d) Infrared heating **Ans:Capacitive heating**
5	33	Infrared heating is used for (a) Welding metals (b) Drying paints (c) Heating water (d) Lighting **Ans:Drying paints**
5	34	Which heating method gives uniform heat? (a) Arc heating (b) Resistance heating (c) Induction heating (d) Laser heating **Ans:Resistance heating**
5	35	In resistance welding, heat is generated by (a) An electric arc (b) The resistance of the materials to the flow of current (c) Ultrasonic vibrations (d) Laser beam **Ans:The resistance of the materials to the flow of current**
5	36	In Arc heating, heat is generated by (a) Infrared radiation (b) Electrical arc (c) Resistance (d) Induction **Ans:Electrical arc**
5	37	The frequency used in dielectric heating is typically (a) 50 Hz (b) 500 Hz (c) 10 MHz or higher (d) 1 Hz **Ans:10 MHz or higher**
5	38	Which of the following is NOT a method of electric heating? (a) Resistance heating (b) Induction heating (c) Arc heating (d) Solar heating **Ans:Solar heating**
5	39	Laser beam welding uses (a) Electric arc (b) High-intensity laser (c) Infrared (d) Plasma **Ans:High-intensity laser**
5	40	Key difference between Direct and Indirect Core Type Induction Furnaces (a) Direct core type furnaces use less power (b) Direct core type furnaces have a magnetic core that passes through the charge, while indirect core type furnaces do not (c) Direct core type furnaces are smaller (d) Direct core type furnaces are a characteristic feature of Coreless Induction Furnace **Ans:Direct core type furnaces have a magnetic core that passes through the charge, while indirect core type furnaces do not**

U.NO	Q NO	QUESTIONS
5	41	Coreless induction furnace is free from (a) Heat losses (b) Magnetic field (c) Core (d) Temperature rise **Ans:Core**
5	42	Eddy current heating is based on (a) Electrolysis (b) Magnetic fields inducing currents (c) Conduction (d) Radiation **Ans:Magnetic fields inducing currents**
5	43	Resistance welding is suitable for (a) Wood (b) Sheet metals (c) Plastics (d) Concrete **Ans:Sheet metals**
5	44	Which type of welding utilizes focused beam of light to melt and fuse materials? (a) Arc Welding (b) Resistance Welding (c) Ultrasonic Welding (d) Laser Beam Welding **Ans:Laser Beam Welding**
5	45	What is an electric furnace? (a) A device for cooling material (b) A thermally insulated chamber for high-temperature heating using electricity (c) A device for generating electricity (d) A type of welding machine **Ans:A thermally insulated chamber for high-temperature heating using electricity**
5	46	Core type induction furnace contains (a) No core (b) Magnetic core (c) Carbon plates (d) Electrodes **Ans:Magnetic core**
5	47	Arc furnaces are used in (a) Cooking (b) Steel melting (c) Textile drying (d) Plastic molding **Ans:Steel melting**
5	48	Direct arc furnace has arc between (a) Electrodes (b) Electrode and charge (c) Coils (d) Heating plate **Ans:Electrode and charge**
5	49	Infrared heating is a type of (a) Contact heating (b) Radiant heating (c) Immersion heating (d) Magnetic heating **Ans:Radiant heating**
5	50	Which heating method uses electric arc to generate heat? (a) Resistance heating (b) Arc heating (c) Induction heating (d) Infrared heating **Ans:Arc heating**

PART B & C QUESTIONS

UNIT NO	PART B/C	Q.NO	QUESTION
1	B	1	Describe the significance and need for protective schemes in power system.
1	B	2	Why a fuse is is needed in an electrical system?
1	B	3	Describe the causes of faults.
1	B	4	Write a note on symmetrical and unsymmetrical faults.
1	B	5	Draw the diagram of L-L fault.
1	B	6	Write any four applications of current Transformer.
1	B	7	Compare direct and indirect stroke.
1	B	8	Write the causes of over voltage.
1	B	9	Describe earthing screen.
1	B	10	State the harmful effects of lightning.
2	B	1	Describe the important functions of circuit breaker in a power system.
2	B	2	Describe the basic function of static relay.
2	B	3	Draw the diagram of instantaneous relay.
2	B	4	State the classification of relay based on time.
2	B	5	Compare primary and backup protection.
2	B	6	List the advantages of using relays in a power system.
2	B	7	Describe about HVDC breaker.
2	B	8	Distinguish between directional and non-directional relay.
2	B	9	Give the types of circuit breakers used in modern power system
2	B	10	State the methods of arc interruption in circuit breaker.
3	B	1	Give the speed control method of AC motors.
3	B	2	Give the advantages of Electric traction.
3	B	3	State any three factors governing the selection of electric motors for industrial applications.
3	B	4	Write a note about catenary and droppers in OHE system.
3	B	5	Mention the different systems of track electrification.
3	B	6	Give the list of over head equipments.
3	B	7	List out the types of enclosures.
3	B	8	Write a note on MEGLEV.
3	B	9	Describe the importance of regenerative braking.
3	B	10	Give the importance of Multiple unit control in traction system.
4	B	1	Draw the diagram of incandescent light.
4	B	2	Describe about outdoor lighting schemes.
4	B	3	Draw the diagram of fluorescent lamps.
4	B	4	Define reduction and absorption factor.
4	B	5	Write a note on street lighting.
4	B	6	Why are energy-saving lamps preferred nowadays?
4	B	7	State the applications of LED lamp.
4	B	8	Write the expression for Depreciation factor.
4	B	9	Describe the importance of smart lighting system
4	B	10	Draw the diagram of CFL lamp.
5	B	1	State the advantages of electric heating.

5	B	2	State the importance of indirect resistance heating.
5	B	3	Give the methods of electric heating.
5	B	4	Draw the diagram of direct arc furnace.
5	B	5	Write about carbon arc welding
5	B	6	Describe the drawbacks of direct core type induction furnace
5	B	7	List the advantages and disadvantages of laser beam welding.
5	B	8	Give the types of arc welding
5	B	9	Mention the advantages of Ajax Wyatt vertical core type furnace.
5	B	10	Write the advantages of eddy current heating
1	C	1	Explain the direct stroke method with suitable diagram.
1	C	2	Explain the types of faults occur in power system with neat sketch.
1	C	3	Explain the operation of expulsion type lightning arrester with neat diagram.
1	C	4	Draw and explain the Working principle of HRC fuses.
1	C	5	Draw and explain the working of gapless arrester.
2	C	1	Draw and explain the Working of an instantaneous relay and label its parts.
2	C	2	Explain the schematic diagram and characteristics of inverse time relay.
2	C	3	Explain the construction and working of vacuum circuit breaker with neat sketch.
2	C	4	Discuss the construction and working of plain break oil circuit breaker.
2	C	5	With neat sketch, explain the construction and working of SF6 circuit breaker.
3	C	1	Explain the different types of electric drives with a neat sketch.
3	C	2	Discuss the factors governing the selection of an electric motor for industrial purpose.
3	C	3	Explain the speed time curve for different services for traction system
3	C	4	Explain the applications of traction motors for particular services
3	C	5	Explain the working of bow and pantograph collectors with a neat diagram.
4	C	1	Draw and explain the sodium vapour lamp with neat sketch.
4	C	2	Draw and explain the working of mercury vapor lamp.
4	C	3	Discuss about the lighting schemes.
4	C	4	Explain the concept of lighting control using sensors and IoT.
4	C	5	Discuss the recent trends in lighting system.
5	C	1	Explain electric heating methods with suitable sketch.
5	C	2	Discuss about dielectric and eddy current heating method.
5	C	3	Explain the operation of direct and indirect induction arc furnaces.
5	C	4	Explain the principle of operation of Ultrasonic welding with neat sketch.
5	C	5	Explain the principle of laser beam welding with neat sketch.