



Maratha Vidya Prasarak Samaj's

Rajarshi Shahu Maharaj Polytechnic, Nashik

Udoji Maratha Boarding Campus, Near Pumping Station, Gangapur Road, Nashik-13.

Affiliated to MSBTE Mumbai, Approved by AICTE New Delhi, DTE Mumbai & Govt. of Maharashtra, Mumbai.

*Subject: - Electrical Material & Wiring
Practices (22328)*



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RSM POLY

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SYLLABUS

Chapter No.	Name of chapter	Marks With Option
1	Wiring Component and Safety Devices	25
2	Conductors and Electromagnetic Material	20
3	Electrical insulating Material	25
4	Electrical Wiring	18
5	Electrical Earthing Systems	14
Total Marks: -		102

BOARD THEORY PAPER PATTERN FOR EMW (22328)

Q.1		Attempt any FIVE	5*2=10
	a)	Wiring Components. Tools And Safety Devices	
	b)	Electrical Insulating Materials	
	c)	Conductors And Electromagnetic Materials	
	d)	Electrical Insulating Materials	
	e)	Electrical Insulating Materials	
	f)	Electrical Wiring	
	g)	Earthing System	
Q.2		Attempt any THREE	3*4=12
	a)	Wiring Components. Tools And Safety Devices	
	b)	Conductors And Electromagnetic Materials	
	c)	Electrical Insulating Materials	
	d)	Electrical Wiring	
Q.3		Attempt any THREE	3*4=12
	a)	Wiring Components. Tools And Safety Devices	
	b)	Insulating Materials	
	c)	Electrical Wiring	
	d)	Electrical Earthing	
Q.4		Attempt any FOUR	3*4=12



	a)	Wiring Components. Tools And Safety Devices
	b)	Conductors And Electromagnetic Materials
	c)	Conductors And Electromagnetic Materials
	d)	Electrical Wiring
Q.5		Attempt any TWO 2*6=12
	a)	Conductors And Electromagnetic Materials
	b)	Electrical Earthing
	c)	Insulating Materials
Q.6		Attempt any Two. 2*6=12
	a)	Electrical Earthing
	b)	Insulating Materials
	c)	Conductors And Electromagnetic Materials



CLASS TEST - I

PAPER PATTERN

COURSE: -Electrical Material and Wiring Practices (22328)

PROGRAMME: - Electrical Engineering

Syllabus: -

Unit No.	Name of the Unit	Course Outcome (CO)
1	Wiring Components. Tools And Safety Devices	CO-328.1
2	Conductors And Electromagnetic Materials	CO-328.2

Q.1	Attempt any FOUR	4*2=8Marks	Course Outcome (CO)
a)	Wiring Components		CO-328.1
b)	Conductors		CO-328.2
c)	Tools		CO-328.1
d)	Electromagnetic Materials		CO-328.2
e)	Conductors And Electromagnetic Materials		CO-328.2
f)	Safety Devices		CO-328.1
Q.2	Attempt anyTHREE	3*4=12 Marks	
a)	Conductors		CO-328.2
b)	Wiring Components.		CO-328.1
c)	Electromagnetic Materials		CO-328.2
d)	Tools And Safety Devices		CO-328.1

CLASS TEST - II

PAPER PATTERN

COURSE: -Electrical Material and Wiring Practices (22328)

PROGRAMME: - Electrical Engineering

Syllabus: -

Unit No.	Name of the Unit	Course Outcome (CO)
3	Electrical Insulating Materials	CO-328.3
4	Electrical Wiring	CO-328.4
5	Earthing System	CO-328.5

Q.1	Attempt any FOUR 4*2=8Marks	Course Outcome (CO)
a)	Electrical Insulating Materials	CO-328.3
b)	Electrical Wiring	CO-328.4
c)	Earthing System	CO-328.5
d)	Electrical Wiring	CO-328.4
e)	Earthing System	CO-328.5
f)	Electrical Insulating Materials	CO-328.3
Q.2	Attempt any THREE 3*4=12 Marks	
a)	Electrical Insulating Materials	CO-328.3
b)	Earthing System	CO-328.5
c)	Electrical Insulating Materials	CO-328.3
d)	Electrical Wiring	CO-328.4



COURSE OUTCOME

(CO)

COURSE:- ELECTRICAL MATERIAL AND WIRING PRACTICES (22328)

PROGRAMME: - ELECTRICAL ENGINEERING

CO.NO	Course Outcome
CO-328.1	Follow Safe Practices when undertaking electrical works.
CO-328.2	Select relevant conductors and electromagnetic/magnetic materials.
CO-328.3	Select relevant insulating materials.
CO-328.4	Perform different types of electrical wiring/cabling activities.
CO-328.5	Implement relevant Earthing system.

1. Wiring Components. Tools And Safety Devices

Position in Question Paper

Total Marks-22

Q.1. a) 2-Marks.

Q.2. a) 4-Marks.

Q.3. a) 4-Marks.

Q.4. a) 6-Marks.

Descriptive Question

1. State different types of holders used in wiring installation
2. State the types of protections provided by MCB
3. State any four IE Rules regarding electric safety
4. Write any four of the IE rules to be followed in respect of safety while working in an electrical installation system.
5. Draw and explain the use of : (i) Combination plier (ii) Tester (iii) Wire Striper(iv) Hammer
6. Explain the use of following tools in carrying out electrical wiring installation:
(i) Nose pliers (ii) Test lamps (iii) Crimping tools (iv)Cutter
7. Explain the uses of safety rubber hand gloves and rubber mats in electrical engineering
8. Explain MCB and ELCB with connection diagram supplying single phase load
9. State any two advantages of MCB over Fuse. State the standard specifications of MCB available in themarket
10. Explain the use of the following components in electrical wiring system and give specification of each (i) MCB (ii)ELCB
- 11.State the need of strictly following safety rules while working in electrical installation

MCQ Question

(Total number of Question=Marks*3=22*3=66)

Note: Correct answer is marked with **bold**.

1. _____ use caution when working near electricity.
 - a. Always
 - b. Never
 - c. Rarely
 - d. Sometimes
2. _____ is the flow of electrons around a circuit.
 - a. Current
 - b. Electricity
 - c. Power
 - d. Voltage
3. _____ workers have little or no training working on or near electricity.
 - a. Pipeline
 - b. **Qualified**
 - c. Rescue
 - d. Unqualified
4. Electrical hazards include shock, electrical arcs and blasts, and _____ or faulty equipment.
 - a. **Broken**
 - b. Double-insulated
 - c. Polished
 - d. Secure
5. _____ is a measurement of how much energy you are using each second.
 - a. Distance
 - b. **Power**
 - c. Volume
 - d. Weight
6. Avoid working in _____ conditions.
 - a. Cold
 - b. Dry
 - c. Sunny
 - d. **Wet**
7. _____ all electrical equipment before use.
 - a. Clean
 - b. **Inspect**
 - c. Label
 - d. Organize
8. _____ gives a stray current somewhere to go and keeps workers from becoming part of the circuit.
 - a. De-energizing
 - b. Energizing
 - c. Grounding
 - d. **Guarding**
9. _____ tools are encased in plastic and prevent the user from getting electrocuted if the tool develops a short circuit.
 - a. Corded
 - b. Double-insulated
 - c. Green colored
 - d. Grounded
10. Specially designed PPE for electrical work includes _____ insulating gloves, matting, blankets, and covers.
 - a. **Plastic**
 - b. Rubber
 - c. Steel
 - d. Wood

11. One of the main functions of personal protective grounds is to provide a _____ impedance path for a short circuit.
- High
 - Low**
 - Smooth
 - Adequate
12. A Safety Electrical One Line Diagram should be used to _____ all sources of electrical energy.
- Identify**
 - Castigate
 - Evaluate
 - Modify
13. Work performed on an electrical system within reaching distance of energized components is _____ work.
- Energized**
 - Essential
 - Safe
 - Unavoidable
14. The Prohibited Approach Boundary is considered the same as making _____.
- Insulation
 - Confluence
 - Contact**
 - Pastry
15. The minimum allowable work space around electrical equipment is _____ inches deep.
- 48
 - 24
 - 30**
 - 36**
16. The secondary of a current transformer must never be _____ while energized.
- Grounded
 - Opened**
 - Examined
 - Shortened
17. Which is the "Can't Let Go" range of current flow?
- 3-9 ma
 - 9-25 ma**
 - 25-60 ma
 - 1-3 ma
18. OSHA requires the testing of a volt meter after a voltage test on voltage above _____.
- 120v
 - 208v
 - 277v
 - 600v**
19. One of the three generally recognized hazards of electrical work is _____.
- Arc Flash**
 - Cuts
 - Falls
 - Concussion
20. Gloves used for electrical protection must be electrically tested every...
- 3 months
 - 6 months**
 - 12 months
 - Never
21. Most people will begin to feel the effects of an electric shock _____.
- Between 10 and 20 milliamps**
 - Between 25 and 75 milliamps
 - At 100 milliamps
22. Voltage-rated gloves that will be reused must be tested and certified by an approved laboratory every _____.

- a. 6 months
b. 12 months
23. Tasks that _____ an electric circuit increases the chance for an electric arc to occur.
a. Open
b. Close
c. Ground
d. All of the above
24. The Arc Flash Boundary is established at the distance from a potential arc source where an unprotected worker will receive a _____ burn on exposed skin.
a. First-degree
b. **Second-degree**
c. Third-degree
25. With very few exceptions, there is no reason to perform work on energized equipment.
a. True
b. False
26. Once it is confirmed that an electrically safe work condition has been created, shock protection and arc flash protection are no longer necessary and may be removed.
a. True
b. **False**
27. Exceptions to the requirement to de-energize equipment include _____.
a. Visual inspections
b. Testing
c. Circuit identification
d. d All of the above
28. The fuse rating is usually defined in
a. Ampere
b. kilowatt
c. VA
d. All of the above
29. RCDs for protecting people have a rated tripping current (sensitivity) of not more than
a. 40 mA
b. 50 mA
c. 30 mA
d. 60 mA
30. Water heaters exceeding 3 kW shall be permanently connected to a _____ rated circuit breaker or fuse with an isolator switch and residual current device
a. 20A/30A
b. **5A/10A**
c. 10A/12A
d. None of the above
31. Which distribution system is more reliable?
a. Ring main system
b. Tree system
c. **Radial system**
d. All are equally reliable
32. Planning of electrical wiring work includes
a. Site visit
b. Determining the customer load requirement
c. Calculating the maximum load demand
d. All of the above
33. The electrical circuit in which if one of the path is broken, none of the load devices will work
a. Parallel circuit
b. **Series circuit**
c. Series-parallel circuit
d. None of the above
34. Unit of Reactive Power, Active Power and Apparent Power respectively are

- a. W, VAR and VA
b. VA, VAR and W
35. Fuse wire should be connected to
a. **Phase wire only**
b. Neutral wire only
36. If 2 switches are connected in series to a lamp/load, then
a. Any one switch need to be switched ON to energize the load
b. **Both the switches need to be switched ON to energize the load**
c. Only switch 1 need to be switched ON to energize the load
d. Only switch 2 need to be switched ON to energize the load
37. The method to interconnect a switch, a fan and a fan regulator to an electric supply is
a. Connecting each of them in parallel to one another
b. Connecting each of them in series to one another
c. Connecting fan and regulator in parallel and switch in series to them
d. **Connecting fan and regulator in series and switch in parallel to them**
38. The device used for protection from earth leakage current to prevent electric shocks is
a. Fuse
b. Circuit breaker
c. Residual current device
d. **All of the above**
39. The device that are encouraged to be used for protection against heavy lightning strikes or over voltage is
a. Surge protection device
b. Residual current device
c. **Both (a) and (b)**
d. Either (a) or (b)
40. The test done to check the healthiness of the domestic wiring is
a. Polarity test
b. Insulation resistance test
c. Continuity test
d. **All of the above**
41. Fluorescent lamps using electronic ballast or high frequency electronic ballasts
a. Do not need capacitors
b. Need capacitors
c. **Either (a) or (b)**
d. None of the above
42. For 4 core cable, the cable color for phase conductor is
a. Green
b. **Green-yellow**
c. Black
d. Blue



2. Conductors and Electromagnetic Materials

Position in Question Paper

Total Marks-10

Q.1 .b) 2-Marks.

Q.3 c) 4-Marks.

Q.5 b&c. 4 -Marks.

Descriptive Question

1. Draw the labeled hysteresis loop for an electromagnetic material
2. State the material used for making (1) Magnetic Core (2) Fuse element.
3. Explain the suitability of copper as an electrical conductor with reference to its mechanical and electrical properties
4. Explain the suitability of aluminum as an electrical conductor with respect to its mechanical and electrical properties.
5. Explain HRGO and CRGO. State benefits of CRGO for manufacturing of core
6. Explain with justification two uses of each of two following as an electrical conductor:
 - a) Brass
 - b) Silver

MCQ Question

(Total number of Question=Marks*3=10*3=30)

Note: Correct answer is marked with **bold**

1. The S.I. unit of power is
 - a. Henry
 - b. coulomb
 - c. watt**
 - d. watt-hour
2. The substances which have a large number of free electrons and offer a low resistance are called
 - a. insulators
 - b. inductors
 - c. semi-conductors
 - d. conductors**
3. Out of the following which is not a poor conductor?
 - a. Cast iron
 - b. Copper**
 - c. Carbon
 - d. Tungsten
4. Out of the following which is an insulating material?



-
- a. Copper
b. Gold
5. The property of a conductor due to which it passes current is called
a. resistance
b. reluctance
6. Conductance is reciprocal of
a. **resistance**
b. inductance
7. The resistance of a conductor varies inversely as
a. length
b. **area of cross-section**
8. With rise in temperature the resistance of pure metals
a. **increases**
b. decreases
9. With rise in temperature the resistance of semiconductors
a. **decreases**
b. increases
10. The resistance of a copper wire 200 m long is 21 Q. If its thickness (diameter) is 0.44 mm, its specific resistance is around
a. 1.2×10^{-8} Q-m
b. 1.4×10^{-8} Q-m
c. **1.6×10^{-8} Q-m**
d. 1.8×10^{-8} Q-m
11. Three resistances of 10 ohms, 15 ohms and 30 ohms are connected in parallel. The total resistance of the combination is
a. **5 ohms**
b. 10 ohms
c. 15 ohms
d. 55 ohms
12. An instrument which detects electric current is known as
a. voltmeter
b. rheostat
c. wattmeter
d. **galvanometer**
13. In a circuit a 33 Q resistor carries a current of 2 A. The voltage across the resistor is
a. 33 V
b. **66 v**
c. 80 V
d. 132 V
14. A light bulb draws 300 mA when the voltage across it is 240 V. The resistance of the light bulb is
a. 400 Q
b. 600 Q
c. **800 Q**
d. 1000 Q
15. The resistance of a parallel circuit consisting of two branches is 12 ohms. If the resistance of one branch is 18 ohms, what is the resistance of the other?
a. 18 Q
b. **36 Q**
c. 48 Q
d. 64 Q



27. All of the following are equivalent to watt except
- a. (amperes) ohm
 - b. joules/sec.
 - c. amperes x volts
 - d. amperes/volt**
28. A resistance having rating 10 ohms, 10 W is likely to be a
- a. metallic resistor
 - b. carbon resistor
 - c. wire wound resistor**
 - d. variable resistor
29. Which one of the following does not have negative temperature co-efficient?
- a. Aluminum**
 - b. Paper
 - c. Rubber
 - d. Mica
30. Varistors are
- a. insulators
 - b. non-linear resistors**
 - c. carbon resistors
 - d. resistors with zero temperature coefficient
31. Insulating materials have the function of
- a. preventing a short circuit between conducting wires
 - b. preventing an open circuit between the voltage source and the load**
 - c. conducting very large currents
 - d. storing very high currents
32. The rating of a fuse wire is always expressed in
- a. ampere-hours
 - b. ampere-volts
 - c. kWh
 - d. amperes**
33. The minimum charge on an ion is
- a. equal to the atomic number of the atom
 - b. equal to the charge of an electron**
 - c. equal to the charge of the number of electrons in an atom zero
34. In a series circuit with unequal resistances
- a. the highest resistance has the most of the current through it
 - b. the lowest resistance has the highest voltage drop
 - c. the lowest resistance has the highest current
 - d. the highest resistance has the highest voltage drop**
35. The filament of an electric bulb is made of
- a. carbon
 - b. aluminium
 - c. tungsten**
 - d. nickel
36. A 3 Q resistor having 2 A current will dissipate the power of
- a. 2 watts
 - b. 4 watts
 - c. 6 watts**
 - d. 8 watts
37. Which of the following statement is true?
- a. A galvanometer with low resistance in parallel is a voltmeter
 - b. A galvanometer with high resistance in parallel is a voltmeter
 - c. A galvanometer with low resistance in series is an ammeter**



- d. A galvanometer with high resistance in series is an ammeter
38. The resistance of a few meters of wire conductor in closed electrical circuit is
- practically zero
 - low
 - high
 - very high
39. If a parallel circuit is opened in the main line, the current
- increases in the branch of the lowest resistance
 - increases in each branch
 - is zero in all branches
 - is zero in the highest resistive branch
40. If a wire conductor of 0.2 ohm resistance is doubled in length, its resistance becomes
- 0.4 ohm
 - 0.6 ohm
 - 0.8 ohm
 - 1 ohm
41. Three 60 W bulbs are in parallel across the 60 V power line. If one bulb burns open
- there will be heavy current in the main line
 - rest of the two bulbs will not light
 - all three bulbs will light
 - the other two bulbs will light
42. The four bulbs of 40 W each are connected in series statement is true?
- The current through each bulb is same
 - The voltage across each bulb is not same
 - The power dissipation in each bulb is not same
 - None of the above
43. Two resistances R_1 and R_2 are connected in series across the voltage source where $R_1 > R_2$. The largest drop will be across
- R_1
 - R_2
 - either R_1 or R_2
 - none of them
44. What will be energy used by the battery if the battery has to drive 6.28×10^{18} electrons with potential difference of 20 V across the terminal?
- 5 joules
 - 10 joules
 - 15 joules
 - 20 joules
45. A closed switch has a resistance of
- zero
 - about 50 ohms
 - about 500 ohms
 - infinity
46. The hot resistance of the bulb's filament is higher than its cold resistance because the temperature co-efficient of the filament is
- zero
 - negative
 - positive
 - about 2 ohms per degree
47. Heat in a conductor is produced on the passage of electric current due to
- reactance
 - capacitance
 - impedance
 - resistance
48. The insulation on a current carrying conductor is provided



- a. to prevent leakage of current
b. to prevent shock
- c. both of above factors**
d. none of above factors
49. The thickness of insulation provided on the conductor depends on
- a. the magnitude of voltage on the conductor**
b. the magnitude of current flowing through it
c. both (a) and (b)
d. none of the above
50. Which of the following quantities remain the same in all parts of a series circuit?
- a. Voltage
b. Current
c. Power
d. Resistance
51. A 40 W bulb is connected in series with a room heater. If now 40 W bulb is replaced by 100 W bulb, the heater output will
- a. decrease
b. increase
c. remain same
d. heater will burn out
52. In an electric kettle water boils in 10 m minutes. It is required to boil the boiler in 15 minutes, using same supply mains
- a. length of heating element should be decreased**
b. length of heating element should be increased
c. length of heating element has no effect on heating if water
d. none of the above
53. An electric filament bulb can be worked from
- a. D.C. supply only
b. A.C. supply only
c. Battery supply only
d. All above
54. Resistance of a tungsten lamp as applied voltage increases
- a. decreases
b. increases
c. remains same
d. none of the above
55. Electric current passing through the circuit produces
- a. magnetic effect
b. luminous effect
c. thermal effect
d. chemical effect
56. Resistance of a material always decreases if
- a. temperature of material is decreased
b. (6) temperature of material is increased
c. number of free electrons available become more
d. none of the above is correct
57. If the efficiency of a machine is to be high, what should be low?
- a. Input power
b. Losses
c. True component of power
d. kWh consumed
58. When electric current passes through a metallic conductor, its temperature rises. This is due to
- a. collisions between conduction electrons and atoms**
b. the release of conduction electrons from parent atoms



- c. mutual collisions between metal atoms
d. mutual collisions between conducting electrons
59. A glass rod when rubbed with silk cloth is charged because
- a. it takes in proton
b. its atoms are removed
c. **it gives away electrons**
d. it gives away positive charge
60. Whether circuit may be AC. or D.C. one, following is most effective in reducing the magnitude of the current.
- a. Reactor
b. Capacitor
c. Inductor
d. **Resistor**
61. It becomes more difficult to remove
- a. any electron from the orbit
b. (6) first electron from the orbit
c. second electron from the orbit
d. **third electron from the orbit**
62. When one leg of parallel circuit is opened out the total current will
- a. reduce
b. increase
c. **decrease**
d. become zero
63. In a lamp load when more than one lamp are switched on the total resistance of the load
- a. increases
b. **decreases**
c. remains same
d. none of the above
66. Two lamps 100 W and 40 W are connected in series across 230 V (alternating). Which of the following statement is correct ?
- a. 100 W lamp will glow brighter
b. **40 W lamp will glow brighter**
c. Both lamps will glow equally bright
d. 40 W lamp will fuse



3. Electrical insulating Material

Position in Question Paper

Total Marks-24

Q.1 d,e) 2+2=4-Marks.

Q.2 c) 4-Marks.

Q.3 b, d) 8-Marks.

Q.5 b. -4 Marks.

Q.6 b):-4 Marks.

Descriptive Question

1. Write any two properties of good electrical insulation material
2. State gaseous and liquid insulating material. (one each)
3. State the type of insulating materials under Class Y and Class B. (any two each)
4. Define dielectric failure of electrical insulating material
5. Name one gaseous and one liquid electrical insulation material
6. Select insulating materials for following parts: (i) Insulation between heating element and base plate of electric iron. (ii) Insulation used over copper or aluminum conductor used for making coils. (iii) Transformer bushings. (iv) Insulation between transmission line and pole.
7. Explain the electrical and thermal properties of transformer oil those make it suitable as an electrical insulating medium
8. State two applications of : (i) PVC paper (ii) Porcelain with type of class based on withstand temperature is insulating material
9. Describe with reasons the failure of porcelain insulators
10. State the insulating materials used in motor. Write temperature class and withstand temperature ranges for them.
11. Explain with justification two uses of each of two following as an electrical conductor: Brass (ii) Silver
12. State failure phenomena observed in insulating material. State four reasons for failure of gaseous and solid dielectric materials
13. Explain the reasons for failure of gaseous and solid dielectric materials used in electrical engineering application
14. Compare the electrical, mechanical and thermal properties of : (i) asbestos (ii) mica (iii) porcelain as an insulating material
15. State two insulators of following types along with their areas of application: (i) Class A (ii) Class E



MCQ Question

(Total number of Question=Marks*3=20*3=60)

Note: Correct answer is marked with **bold**

- Which of the following material is not used for overhead line insulators?
 - Porcelain
 - Glass
 - PVC**
 - Steatite
- Pin type insulator is mostly subjected to which type of mechanical stress?
 - Compressive stress
 - Tensile stress
 - Both tensile and compressive stress
 - Twisting stress
- Which of the following is the main field of application of pin type insulator?
 - Distribution system**
 - Transmission system
 - Transmission and distribution system
 - EHV transmission system
- Suspension type insulator are subjected to _____
 - tensile stress**
 - compressive stress
 - tensile and compressive stress
 - depends on its use
- A transmission line consists of 9 discs of suspension insulator in each string. What is the operating voltage of the transmission line?
 - 11 KV
 - 33 KV
 - 66 KV
 - 132 KV**
- Suspension insulator are made up of _____
 - glass
 - porcelain**
 - steatite
 - epoxy resin
- Which of the following insulator is similar to pin type insulator?
 - Suspension insulator
 - Post insulator**
 - Strain insulator
 - Shackle insulator
- Which type of insulator is used where there is dead end of the line or there is a corner or a sharp curve, for high voltage line?
 - Pin type insulator
 - Shackle insulator
 - Strain insulator**
 - Stay insulator
- What is the most common cause of failure of overhead line insulators?
 - Flashover**
 - Mechanical stress
 - Porosity of materials
 - Improper verification
- If a string of suspension insulator has three units, each can withstand a maximum 11 KV and total string can withstand 25.76 KV. What is the string efficiency?



- c. High, highly affected
d. High, less affected
21. What is the dielectric strength of porcelain insulators?
a. **60 kV/cm**
b. 140 kV/cm
c. 50 kV/cm
d. 40 kV/cm
22. What is the other name of Polymer Insulator?
a. Moisture insulator
b. Core insulator
c. **Composite insulator**
d. Mixed insulator
23. How many classifications of overhead line insulators are there?
a. **3**
b. 4
c. 5
d. **6**
24. How many types of electrical insulators are present on the basis of voltage application?
a. **2**
b. 3
c. 4
d. 5
25. How many discs are used in suspension insulators for 220kV?
a. 3
b. 4
c. 8
d. **14**
26. What is the other name of the shackle insulator?
a. String
b. Hanging
c. **Spool**
d. Post
27. How many number of insulation classes is present with respect to electrical equipment?
a. 5
b. 6
c. **7**
d. 8
28. How many classes have their temperatures above 100°C?
a. 5
b. **6**
c. 7
d. 8
29. How many classes have their temperatures above 150°C?
a. 2
b. **3**
c. 4
d. 5
30. Which class has the lowest and the highest temperature?
a. **Class Y, Class C**
b. Class Y, Class H
c. Class H, Class C
d. Class B, Class H
31. What is the temperature of Class B?
a. 120°C
b. **130°C**
c. 155°C
d. 180°C
32. Which among the following is the example of Class Y?
a. Varnish
b. Insulation oil
c. **Paper**
d. Resins
33. Which among the following is the example of Class B?
a. **Inorganic material with adhesives**
b. Hard fiber
c. Wood



- d. Impregnated oil
34. Which among the following is an example of Class F?
- a. Paper lamination
 - b. Nitrile rubber
 - c. Asbestos
 - d. **Silicone**
35. What is the concept of power rating of machines with respect to voltage?
- a. **the required supply voltage for smooth running of the machine**
 - b. the required supply voltage for stopping the machine
 - c. the required supply voltage for speeding the machine
 - d. the required supply voltage for slowing up the machine
36. What happens if the power ratings of the machine are decided liberally?
- a. Damage occurs to the machine
 - b. Efficiency of the machine improves
 - c. Long life of the machine
 - d. **Uneconomical usage of the machine**
37. The thickness of insulation provided on the conductor in the cable depends on which among the following factor?
- a. **Operating voltage.**
 - b. Current to be carried.
 - c. Power factor.
 - d. Both (a) and (b).
38. The insulation resistance of a cable of length 10 km is $1\text{ M } \Omega$. For a length of 100 km of the same cable, what will be the insulation resistance?
- a. $1\text{ M } \Omega$
 - b. $10\text{ M } \Omega$
 - c. **$0.1\text{ M } \Omega$**
 - d. $0.01\text{ M } \Omega$.
39. What is the main drawback of using paper as the insulating material?
- a. **Is hygroscopic**
 - b. Has poor dielectric strength.
 - c. Has a very low insulation resistivity.
 - d. Has high capacitance
40. What is the limit of the conductor cross section when paper insulation is used?
- a. 50 mm^2
 - b. 250 mm^2
 - c. **600 mm^2**
 - d. 1200 mm^2
41. What is the dielectric strength of impregnated paper?
- a. **30 kV/mm**
 - b. 20 kV/mm
 - c. 15 kV/mm
 - d. 5 kV/mm
42. What is empire tape?
- a. Impregnated paper
 - b. Vulcanised rubber
 - c. Enamel insulation
 - d. **Varnished cambric**
43. What is the percentage of added materials like sulphur, zinc lead etc in vulcanised rubber?
- a. $5 - 10\%$
 - b. **$3 - 5\%$**
 - c. $4 - 8\%$
 - d. $10 - 12\%$
44. How many cores are used in a cable for the transmission of voltages upto 66 kV?



4. Electrical Wiring

Position in Question Paper

Total Marks-18

Q.1 f) 2=2-Marks.

Q.2 d) 4-Marks.

Q.3 c) 4-Marks.

Q.4 d). -4 Marks.

Q.5 b):-4 Marks.

Descriptive Question

1. Draw circuit diagram for one lamp controlled with one switch.
2. Draw a labeled circuit diagram of a one lamp control circuit using one switch.
3. Compare casing capping wiring with concealed wiring. (any four points)
4. Explain the process and need of crimping of cable joints.
5. Draw wiring diagram for connection of one lamp controlled from two places. State the application of this connection.
6. Explain with neat labeled circuit diagram the staircase wiring in which a lamp is controlled from two different locations.
7. State the procedure for laying / installation of underground cable.
8. Describe with sketches the process of laying of underground cables by the drawing in method
9. Classify wiring. State the type of wiring installation used for following applications with justification : (i) Hospital (ii) Spinning mill (iii) Milk Dairy (iv) Hotel
10. Compare the casing / capping system of electrical wiring to concealed system of electrical wiring. On the basis of look, cost, life, safety retentivity of material and suitability for locations.

MCQ Question

(Total number of Question=Marks*3=18*3=54)

Note: Correct answer is marked with **bold**

- Which among these fuse is very fast in operation?
 - Semiconductor fuses**
 - High rupturing capacity
 - Cartridge type
 - Kit Kat type
- What is / are the various types of fuse?
 - Kit Kat type
 - Cartridge type
 - Round type
 - All of these**
- What are the types of conduits available?
 - PVC conduit
 - Flexible conduit
 - Heavy gauge steel screwed conduit
 - All of these**
- What is the maximum voltage that XLPE cables can withstand?
 - 65 ° C
 - 80 ° C
 - 110 ° C
 - 130 ° C**
- Which insulating material is used for low voltage cables?
 - Impregnated paper
 - Rubber
 - Silk and cotton**
 - Vulcanised Indian rubber
- What is the maximum load that can be connected in a circuit connecting only lighting points?
 - 500 watts
 - 750 watts
 - 800 watts**
 - 1000 watts
- Which material is used for wiring continuous bus bar?
 - Aluminium**
 - Copper
 - Both (A) and (B)
 - None of these
- What is the maximum number of lighting points that can be connected in a circuit?
 - 5
 - 10**
 - 8
 - 12
- For what voltage levels are the screwed conduit circuits used?
 - Less than 250 V
 - For voltages between 250 V – 600**
 - For voltages above 600 V



d. None of these

10. Which among these is a method of wiring?

- a. Joint box
- b. Tee system

- c. Loop in system
- d. All of these

11. Why are single core cables not provided with armoring?

- a. Avoids excessive loss in the armour.
- b. Make the cable more flexible.
- c. Make the cable non hygroscopic.
- d. None of the above

12. The thickness of a wire conductive copper part is identified in

- a. Wire gauge
- b. Micrometer
- c. Scale
- d. All the above

13. The type of wiring depends on

- a. Location and consumers budget
- b. Durability and cost
- c. Safety and appearance
- d. All of the above

14. The types of internal wiring used in domestic installations are

- a. Cleat wiring
- b. CTS / RTS wiring
- c. Metal / PVC coating
- d. All the above

15. type of wiring uses insulated cables supported in porcelain cleats

- a. Cleat
- b. CTS/RTS
- c. Metal
- d. PVC conduit or PVC capping

16. wiring is recommended only for temporary installations

- a. Cleat
- b. CTS/RTS
- c. Metal
- d. PVC conduit or PVC capping

17. half of cleat pair is grooved to receive the wire

- a. Top
- b. Middle
- c. Bottom
- d. All of these

18. wiring is the cheapest among all types of internal wiring used for Domestic installations

- a. Cleat
- b. CTS/RTS
- c. Metal
- d. PVC conduit or PVC capping

19. In cleat wiring, cleats shall be fixed at distances not greater than cm apart and at regular intervals

- a. 50
- b. (B) 60
- c. (C) 65
- d. (D) 70

20. Where cleated conductors cross each other, they shall be separated by an which will rigidly maintain a distance.

- a. Wooden batten
- b. Insulated bridging piece
- c. Clamps
- d. All the above



21. Cleat wiring should be always above..... from the floor level
- a. 5 m
 - b. 2 m
 - c. 3 m
 - d. 8 m
22. A bedroom may require one lamp at the dressing table controlled by a switch, and one lamp just above the bed which may require dual control by
- a. 3 One way switch
 - b. 1 Two-way switch
 - c. 2- Two way switches
 - d. 3 Two way switches
23. switches may be used to provide bright or dim lights in the same circuit through a series or parallel connections found commonly in corridors and bedrooms of hostels, hospitals, railway compartments.
- a. One way centre OFF switch
 - b. Two-way switch centre OFF switch
 - c. Both a and B
 - d. None of these
24. switch is incorporated in a circuit to keep the lamps in the OFF position irrespective of the position of the individual switches
- a. One way centre OFF
 - b. Master OFF
 - c. Two- way centre off switch
 - d. None of these.
25. is constructed from a length of flat thin sheet steel which is manufactured to form a tube?
- a. Heavy gauge screwed conduit
 - b. Light gauge conduit
 - c. Both a & b
 - d. None of these
26. Which is the most type of wirings used in domestic applications?
- a. Conduit wiring
 - b. Cleat wiring
 - c. Batten wiring
 - d. None of these
27. When cables are drawn through the conduit and terminated at the outlet or switch points, the system of wiring is called
- a. (A)Conduit wiring
 - b. (B)Cleat wiring
 - c. (C)Batten wiring
 - d. (D)None of these
28. Which is not a type of conduit wiring?
- a. Rigid steel conduits
 - b. Rigid non-metallic conduits
 - c. Flexible conduits
 - d. TRS wiring
29. Which type of conduit wiring is used for gas tight explosive proof installation?
- a. Heavy gauge screwed conduit
 - b. Light gauge conduit
 - c. Both a & b
 - d. None of these
30. conduit is the one commonly used in modern domestic commercial and industrial wirings?
- a. Seam welded conduit
 - b. Heavy gauge screwed conduit
 - c. Light gauge conduit
 - d. Both a & b



31. To relieve the strain from the terminals of pendants, lamp holders and ceiling roses.....are used.
- Cord grip
 - Underwriters knot
 - Both a & b**
 - None of these
32. Cord grip and under writers knot are used in.
- Lamp holder
 - Ceiling roses
 - Terminals of pendants
 - All of these**
33. I.....the phase or line conductor shall be looped at the switch box and neutral conductors at the point outlets
- Looping back method**
 - Looping in method using 2 plate ceiling roses and switches
 - Looping in method using 2 plate ceiling roses and switches
 - Joint box method
34. In the.....method, wherever tapping must be taken from cable, joints are made
- Looping back method
 - Looping in method using 2 plate ceiling roses and switches
 - Looping in method using 2 plate ceiling roses and switches
 - Joint box method**
35. cables are used suitable to run on teak wood battens
- TRS
 - Tough Rubber Sheathed
 - PVC sheathed
 - All of these**
- 36.....wiring is used to draw TRS cables on Teak wood
- Cleat
 - Batten**
 - PVC
 - All of these
37. The intervals between wood plugs in batten wiring should at intervals not exceeding.....cm
- 60
 - 65
 - 70
 - 75**
- 38.....are used for firmly clipping the cables in position during batten wiring
- Knot
 - Clamps
 - Link cables**
 - Cable tags
39. The load on the light and fan sub circuits should be restricted to.....
- 600 watts
 - 800 watts**
 - 700 watts
 - 1000 watts
40. Which amongst the following is not a Nominal size of conduit in mm
- 20
 - 25
 - 38
 - 50**
41. For surface wiring system, however work should begin before final finishing work like
- White washing**
 - after plating
 - after painting
 - after ignition



42. PVC conduits are available on m length
- a. 2
 - b. 4
 - c. 3
 - d. 5
43. conduits are used for protecting cable ends connected to a vibrating machine inter connection between switch gear and distribution boards
- a. Rigid steel conduits
 - b. Rigid non-metallic conduits
 - c. **Flexible conduits**
 - d. TRS wiring
44. conduit wiring system done on wall surfaces
- a. **Surface**
 - b. Concealed
 - c. Recessed
 - d. All the above
45. Selection of the type of conduit depends upon the.....
- a. Type of location, outdoor or indoor
 - b. Type of atmosphere and estimated cost
 - c. Expected working temperature & allowable weight of conduit runs
 - d. **All the above**
46. are used where the conduits shall be pushed right through to the interior of the fittings
- a. **Couplers**
 - b. Elbow
 - c. Bends
 - d. Tees
47. types couplers are used in straight conduit runs to assist in the inspection of the cables
- a. **Couplers**
 - b. Elbow
 - c. Bends
 - d. Tees
48. are used at sharp ends of nearby walls or roofs and wall
- a. Couplers
 - b. **Elbow**
 - c. Bends
 - d. Tees.
49. The circuit in which the current through each of the resistor or components is the same
- a. Parallel circuit
 - b. **Series circuit**
 - c. Open circuit
 - d. Closed circuit
50. Technical skill of electrician domestic solution includes
- a. Critical thinking
 - b. **Decision making**
 - c. Active listening
 - d. Installing
51. Behavioral skill of electrician domestic solution includes
- a. Instructing
 - b. Speaking/communication
 - c. **Operation and control**
 - d. Equipment selection
52. According to standard color code, _____ color is used for live wire
- a. Black
 - b. Green
 - c. **Red**
 - d. Any of the above
53. The tool used to tighten and loosen the screws is known as



- a. Hammer
b. Screwdriver
54. Fuse is a piece of wire of a material with
a. High melting point
b. Low melting point
55. One commercial unit of energy equals
a. 500 watt-sec
b. One watt-hour
c. One kilowatt-hour
d. Ten kilowatt-hour
56. Earthing is necessary to give protection against
a. Electric shock
b. Voltage fluctuation
c. Overloading
d. High temperature of the conductors
57. According to house wiring rules as per ISI specification, the switchboard should be fitted at a height of
a. 0.5 m
b. 1.5 m
c. 2.5 m
d. 3.5 m
58. The tool used for cutting, removing insulation, jointing and twisting the electric wires and cables even on Live line is
a. Hammer
b. Nose plier
c. Screwdriver
d. Combination pliers



5. EARTHING SYSTEM

Position in Question Paper

Total Marks-18

Q.1 g) 2 Marks.

Q.3 d) 4 Marks.

Q.5 b) 6 Marks.

Q.6 b) 6 Marks.

Descriptive Question

1. Define earthing related to electrical wiring system.
2. Define earthing. State its types.
3. State the procedure for testing of earth pit resistance with necessary diagrams.
4. Describe with neat circuit diagram the measurement procedure of earth resistance for an installation.
5. Explain the criteria to be applied in deciding the earthing system for an electrical installation
6. State significance of earthing. Draw and explain pipe earthing. State the values of earth resistances for : (i) Substation (ii) Residential wiring (iii) H.T. Line (iv) L.T. Line
7. Give the justification with diagram – “Earthing saves human life during Electrical faults”. State adverse effect of improper earthing system.



MCQ Question

(Total number of Question=Marks*3=18*3=54)

Note: Correct answer is marked with **bold**

1. The size of the earth or ground wire is based on the
 - a. maximum fault current carrying through the ground wire
 - b. rated current carrying capacity of the service line
 - c. depends on the soil resistance
 - d. **both (a) and (c)**
2. Earth wire or ground wire is made of
 - a. copper
 - b. aluminium
 - c. iron
 - d. **galvanized steel**
3. Average resistance of human body is
 - a. 500 ohms
 - b. **1000 ohms**
 - c. 1500 ohms
 - d. 2000 ohms
4. Generally grounding is provided for
 - a. only for the safety of the equipment
 - b. only for the safety of the operating personnel
 - c. **both (a) and (b)**
 - d. none of the above
5. Ground resistance should be designed such that
 - a. **grounding resistance should be as low as possible**
 - b. grounding resistance should be as high as possible
 - c. grounding resistance should be always zero
 - d. none of the above
6. For an EHV equipment for maintenance first it should be isolated and connected to ground because
 - a. to provide low impedance
 - b. to discharge the charging capacitance to ground
 - c. protection for operating personnel
 - d. **both (b) and (c)**
7. When earth fault occurs
 - a. **voltage potential at the earth mat increases due to grounding**
 - b. voltage potential at the earth mat decreases due to grounding
 - c. voltage potential at the earth mat remains zero irrespective of fault



- d. none of the above
8. The objective of earthing or grounding is
- to provide as low resistance possible to the ground**
 - to provide as high resistance possible to the ground
 - to provide flow of positive, negative and zero sequence currents
 - none of the above
9. Moisture content in the soil ___ the earth soil resistance
- increase
 - decrease**
 - does not affect
 - none of the above
10. Factors on which soil resistance depends
- depth of the electrode
 - moisture
 - Nacl
 - all the above**
11. When the 3-phase system is not grounded and if Single Line to Ground fault occurs, the voltage of the other two healthy phases will
- Increases**
 - Decreases
 - Remains unaffected
12. The earthing rod orientation in the pit should be:
- 45°
 - Horizontal
 - Vertical**
 - 75°
13. Ground resistance value for sensitive installations is:
- Less than 5 ohms**
 - 5 – 25 ohms
 - 50 ohm
 - 100 ohms
14. Doubling the length of the ground electrode will cause resistance to:
- Increase by 10%
 - Decrease by 10%
 - Increase by 40%
 - Decrease by 40%**
15. The easiest method for earth resistance measurement:
- Fall of potential
 - Selective measurement**
 - Stakeless measurement
 - All are equally easy
16. Which one of the following is used in earth pit:
- Aluminum and Iron
 - Graphite and Silver
 - Graphite and magnesium
 - Salt and charcoal**
17. Solid grounding is adopted for voltages below
- 100 V
 - 200 V
 - 400 V
 - 660 V**
18. The advantage of neutral earthing is
- Freedom from persistent arcing grounds



- b. Over voltages due to lightning can be discharged to earth
c. Simplified design earth fault protection
d. **All of the above**
19. In a star connected system without neutral grounding, zero sequence currents are
a. **Zero**
b. Phasor sum of phase currents
c. Same as r.m.s. value of phase currents
d. Same as peak value of phase currents
20. What is the specification of GI earth plate?
a. a. 60 cm * 60 cm * 3 mm
b. **60 cm * 60 cm * 6 mm**
c. 60 cm * 60 cm * 4 mm
d. 60 cm * 60 cm * 5 mm
21. What is the amount of charcoal and salt needed for GI Pipe earthing?
a. Charcoal 5 kg, salt 8 kg
b. Charcoal 10 kg, salt 8 kg
c. **Charcoal 10 kg, salt 10kg**
d. None
22. Which IE rule is applicable to service mains?
a. Rule 30
b. Rule 33
c. Rule 77
d. **All of these**
23. Which among these is a demerit of underground service mains?
a. Ugly appearance
b. Frequent fault occurrence
c. **Costly**
d. All of these
24. For what range is the underground service lines used?
a. **Distance more than 25 m**
b. Distance more than 100 m
c. Distance less than 1 km
d. Distance more than 1 km
25. What is the diameter of the GI pipe through which the earth wire needs to be taken out?
a. **13 mm diameter**
b. 15 mm diameter
c. 19 mm diameter
d. 6 mm diameter
26. What should be the value of earthing resistance for large power stations?
a. 1 Ω
b. **0.5 Ω**
c. 2 Ω
d. 5
27. What type of earthing is used by transmission lines?
a. Plate earthing
b. Rod earthing
c. **Strip earthing**
d. Both (a) & (c)
28. What is the dimension of the copper strips used for the strip earthing?
a. 25 mm * 4 mm
b. 25 mm * 3 mm
c. 30 mm * 4 mm
d. **30 mm * 3 mm**
29. Which type of earthing is also called as 'fire earthing'?



-
- a. Plate earthing
b. Rod earthing
30. What is earthing?
a. **connecting electrical machines to earth**
b. providing a connection to the ground
c. the electrical machines to source
d. providing a source of current
31. What is an earth electrode?
a. **electrode that is connected to earth**
b. material used for earthing
c. electrode connected to the circuit
d. electrode which is connected to the mains
32. Earth electrode provides _____
a. high resistance
b. medium resistance
c. **low resistance**
d. very high resistance
33. How is the condition of an earth electrode measured?
a. by measuring the voltage
b. by measuring the current
c. by measuring the power
d. **by measuring resistance**
34. In a three phase system, the neutral is _____
a) **earthed**
b) connected to low voltage
c) connected to high voltage
d) not connected
35. After earthing, the different parts of an electrical machinery are at _____
a) infinite potential
b) intermediate potential
c) **zero potential**
d) undefined potential
36. Connection of the various parts of a circuit to earth has a _____
a) medium resistance
b) high resistance
c) very high resistance
d) **very low resistance**
37. Specific resistance of soil is _____
a) **changes from soil to soil**
b) is constant
c) depends on the circuit connected to it
d) depends on the supply voltage
38. Total Load on a lighting sub circuit shall be Watts
a. 500
b. **800**
c. 1000
d. 3500
39. The minimum distance between two pipe earth electrode shall be:
a. **5 m**
b. 1 m
c. 10 m
d. 0.1 m



40. For pipe earthing, the minimum length of the pipe-electrode should be not less than
.....
- a. 2.5 m
 - b. 3 m
 - c. 3.5 m
 - d. 4 m
41. Best system of wiring is;
- a. CTS wiring
 - b. **Conduit wiring**
 - c. Cleat wiring
 - d. Wooden casing and capping
42. The type of wiring system best suitable for cold storage is:
- a. Metal conduit wiring
 - b. CTS wiring
 - c. Wooden casing and capping
 - d. **PVC conduit wiring**
43. The length of flexible conduit used for connection in between the terminal boxes of motors and starters, shall not exceed:
- a. 75 cm
 - b. 2 m
 - c. **1.25 m**
 - d. 2.5 m
44. Minimum space required in front of a main switchboard is :
- a. 0.76 m
 - b. **0.91 m**
 - c. 1.5 m
 - d. 0.229 m
45. Permissible value of earth resistance in domestic earthing is:
- a. **5 Ω**
 - b. 8 Ω
 - c. 3 Ω
 - d. 6 Ω
46. What is the recommended level of height, the socket outlet should be permitted in the bathrooms?
- a. 120 cm
 - b. 140 cm
 - c. **130 cm**
 - d. 150 cm
47. The IS Code of the practice of earthing is:
- a. 4029
 - b. 6389
 - c. **3043**
 - d. 2309
48. Earth wire or ground wire is made of
- a. Iron
 - b. Galvanized steel
 - c. Copper
 - d. Aluminum
49. The power consumed by an electrical device is 1000W at 250V. What is the resistance in the device?
- a. 60 ohm
 - b. 250000 ohm
 - c. 4 ohm
 - d. **62.5 ohm**
50. The capacitance of a parallel plate capacitor increases with
- a. **larger plate area and shorter distance between plates**
 - b. smaller plate area and shorter distance between plates
 - c. smaller plate area and higher applied voltage
 - d. larger plate area, larger distance between plates and higher applied voltages
51. It is fatal to touch a live wire as
- a. The voltage may cause burns to the skin



- b. **Current may flow through the human body**
c. Current main cause burns to the skin or inside the body
d. It may cause damage to the heart and nerve system
52. The size of earth wire is determined on the basis of
a. Voltage capacity of service line
b. **Current carrying capacity of service line**
c. Atmospheric condition
d. None of above
53. Isolated neutral system has disadvantage of
a. Voltage oscillations
b. Difficulty in earth fault relay
c. Persistent arcing ground
d. **All of above**
54. Isolated neutral transmission system is not recommended as
a. System insulation is over stressed due to over voltages
b. Insulation over stress may lead to its failure resulting in Phase to phase fault
c. System is not adequately protected against earth fault
d. **All of above**
55. Advantage of neutral earthing is
a. Safety to personnel
b. Reduction of earth fault current
c. **Elimination of arcing ground**
d. None of above
56. Grounding is done generally at
a. Receiving end
b. **Supply end**
c. Either at receiving end or at a supply end
d. None of above
57. Solid earthing is done for voltage below
a. 400 V
b. 600 V
c. **33 KV**
d. 66 KV
58. Resistance earthing is employed for voltage below
a. **3.3 kV and 11 kV**
b. 11 kV and 33 kV
c. 33 kV and 66 kV
d. 66 kV and 132 kV
59. Earthing of transformer neutral through reactance will improve its
a. **Transient stability**
b. Steady state stability
c. Both (a) and (b)
d. None of above