

MIZORAM PUBLIC SERVICE COMMISSION
DEPARTMENTAL EXAMINATION FOR JUNIOR ENGINEER
UNDER PUBLIC WORKS DEPARTMENT,
GOVERNMENT OF MIZORAM.
(JULY-2025)

ENGINEERING PAPER
(Electrical Engineering)

Time Allowed : 3 hours

FM : 100 PM : 40

SECTION - A (Multiple Choice questions) (50 Marks)

All questions carry equal mark of 1 each. Attempt all questions.

*This Section should be answered only on the **OMR Response Sheet** provided.*

1. The S.I. Unit of luminous flux is-
(a) lux (b) lumen
(c) candela (d) none of above
2. Switch is **always** placed in-
(a) neutral wire (b) live wire
(c) any of the two (d) earth wire
3. In house wiring employing looping in and looping out system, phase wire is looped in and looped out from-
(a) Socket (b) ceiling rose
(c) lamp holder (d) switch
4. In a.c. circuit, fuse is inserted only in-
(a) earth wire (b) neutral wire
(c) live wire (d) none of above
5. Suppliers fuse which is sealed is provided-
(a) before the energy meter (b) after the main switch
(c) before distribution board (d) after the energy meter
6. Fans and lamps in domestic installation are connected in
(a) series and parallel combination (b) series
(c) parallel (d) none of above
7. Two-way single pole switch controls-
(a) connection of two wires to two positions (b) connection of one wire to two positions
(c) connection of one wire to one position (d) connection of two wire to four position

8. As per recommendation of I.S.I, the maximum load of lights, fans and sockets etc that can be connected on the lighting sub-circuit is limited to-
- (a) 800w or 10 points whichever is reached first
 - (b) 900w
 - (c) 1000w
 - (d) none of above
9. In electrical instruments, electrical energy is converted to-
- (a) light energy
 - (b) mechanical energy
 - (c) chemical energy
 - (d) heat energy
10. Megger is used to measure-
- (a) breakdown voltage of insulation
 - (b) insulation resistance
 - (c) earth resistance
 - (d) none of above
11. Continuity of an electrical circuit is usually checked by –
- (a) ammeter
 - (b) voltmeter
 - (c) ohm meter
 - (d) all of the above
12. Induction type of instruments are used on-
- (a) d.c. supply only
 - (b) a.c. supply only
 - (c) both a.c. and d.c. supply
 - (d) battery supply
13. Which is better earth resistance-
- (a) 1 ohm
 - (b) 50 ohm
 - (c) 100 ohm
 - (d) 0.5 ohm
14. Electrical energy is measured in-
- (a) Ohm meter
 - (b) volt meter
 - (c) ampere meter
 - (d) energy meter
15. Resistance of 250 V,100W lamp will be-
- (a) 0.4ohm
 - (b) 25ohm
 - (c) 625ohm
 - (d) 2.4 ohm
16. Sparking occurs when a load is switched off because the circuit has-
- (a) high inductance
 - (b) high impedance
 - (c) high resistance
 - (d) high Capacitance
17. If voltage supply to the energy meter is more than the rated value, energy meter will run
- (a) slow
 - (b) fast
 - (c) neither slow or fast
 - (d) none of above
18. The main function of power transformer is
- (a) to increase or decrease the d.c. voltage
 - (b) to increase or decrease the a.c. voltage
 - (c) to convert a.c. to d.c. vice-versa
 - (d) none of all

19. Standard frequency of supply in India is-

- (a) 25Hz
- (b) 100 Hz
- (c) 50 Hz
- (d) none of above

20. Efficiency of a power transformer is of the order of-

- (a) 75%
- (b) 50%
- (c) 98%
- (d) 100%

21. The formula $\text{Power} = \sqrt{3} VI \cos \phi$ is applicable to 3-phase circuits having-

- (a) star connections
- (b) delta connections
- (c) port above connections
- (d) none of the above connections

22. Transformer breaths in when

- (a) load on it reduces
- (b) load remains constant
- (c) load on it increases
- (d) none of the above

23. Iron core of power transformer is laminated

- (a) to reduce copper losses
- (b) to reduce hysteresis losses
- (c) to reduce eddy current losses
- (d) due to (b) and (c)

24. Transformer tank is not filled with water because

- (a) it has bad cooling property but good insulating property
- (b) it has bad cooling and bad insulating property
- (c) it has good cooling property but bad insulating property
- (d) none of above

25. The function of a silica gel is to absorb moisture from the air when transformer

- (a) breaths out
- (b) breaths in
- (c) breaths in and breaths out
- (d) none of above

26. E.m.f. equation of a generator is

- (a) $\text{e.m.f.} = \frac{\phi NA}{60} \times \frac{P}{z} \text{ volts}$
- (b) $\text{e.m.f.} = \frac{\phi AZ}{60} \times \frac{P}{N} \text{ volts}$
- (c) $\text{e.m.f.} = \frac{\phi NZ}{60} \times \frac{P}{A} \text{ volts}$
- (d) none of the above

Where ϕ is flux per pole, N is speed in r.p.m., Z is number of conductor.

27. A generator is a machine which converts

P is number of pole and A is number of parallel paths

- (a) electrical energy into mechanical energy
- (b) mechanical energy into electrical energy
- (c) both (a) and (b)
- (d) none of the above

28. Megger is operated by

- (a) an external voltage source
- (b) an internal hand driven generator
- (c) internal battery
- (d) all of above

29. One-way single pole switch controls

- (a) connection of one wire to one position
- (b) connection of one wire to two positions
- (c) connection of two wire to two positions
- (d) connection of two wire to one positions

30. Two lamps each rated 100 Watts, 230 Volts when connected in series across 230 V will consume

- (a) 200 W
- (b) 50 W
- (c) 25 W
- (d) 400 W

31. Three lamps of following ratings are connected in series across 230 V supply. Which of the lamp will glow the brightest?

- (a) 15 W 230 V lamp
- (b) 100 W 230 V lamp
- (c) 60 W 230 V lamp
- (d) 200 W 230 V lamp

32. 25mm conduit size means that

- (a) the mean diameter of the conduit is 25mm
- (b) the external diameter of the conduit is 25mm
- (c) the internal diameter of the conduit is 25mm
- (d) none of the above

33. The unit of e.m.f is

- (a) Watt
- (b) Volt
- (c) Ampere
- (d) Kilowatt-hour

34. Ohm's law states that

- (a) $I=V.R$
- (b) $V=I.R$
- (c) $R=V.I$
- (d) none of above

Where 'I' is current in ampere, 'V' is voltage in volts and 'R' is resistance in Ohm

35. The power in a 3-phase delta connection is

- (a) $\sqrt{3}V_2 I_{ph} \cos \Phi$
- (b) $\sqrt{3}V_2 I_2 \cos \Phi$
- (c) $3 V_{ph} I_2 \cos \Phi$
- (d) none of above

36. In two W meter method, if the power factor is unity, then,

- (a) $W_1 > W_2$
- (b) $W_1 < W_2$
- (c) $W_1 = W_2$
- (d) none of above

37. The maximum permissible voltage drop from supply terminals to any point in the installation for light wiring is

- (a) 3%+1V
- (b) 2%+1V
- (c) 4%+2V
- (d) none of above

38. The maximum permissible voltage drop from supply terminals to any point in the installation for power wiring is

- (a) 7.5%
- (b) 5%
- (c) 4%
- (d) none of above

- 39.** The minimum size of single core copper conductor used for power socket wiring is
- (a) 1.5mm^2 (b) 2.5mm^2
(c) 6.0mm^2 (d) 4.0mm^2
- 40.** According to I.E. rules, the voltage fluctuation in residential buildings should not be more than
- (a) 2% of declared supply voltage for residential building
(b) 3% of declared supply voltage for residential building
(c) 6% of declared supply voltage for residential building
(d) none of above
- 41.** Voltage drop allowed in the wiring from consumer's board at any point inside the house should be
- (a) 2% of declared supply voltage plus one volt (b) 3% of declared supply voltage plus one volt
(c) 4% of declared supply voltage plus one volt (d) none of above
- 42.** According to I.E. rules, the earth resistance for low and medium voltage systems should be
- (a) less than 1 ohm (b) less than 3 ohm
(c) less than 4 ohm (d) less than 5 ohm
- 43.** The speed for a residential elevator is between
- (a) 1.5-2.5 m/s (b) 0.5-2.5 m/s
(c) 1.0-2.0 m/s (d) none of above
- 44.** The standard door width for hospital elevators are
- (a) 1,100mm (b) 1,300mm
(c) 1,200mm (d) 1,400mm
- 45.** The standard pit depth of elevator is in between
- (a) 1,200-1,400mm (b) 1,000-1,500mm
(c) both (a) and (b) (d) none of above
- 46.** The standard lift door height for a hospital is
- (a) 2,100mm (b) 2,200mm
(c) 2,000mm (d) 2,300mm
- 47.** 1(one) horse-power is equal to
- (a) 546 W (b) 656 W
(c) 746 W (d) none of above
- 48.** 1(one) Ton of refrigeration is equal to
- (a) 15,000 BTU/hr (b) 13,000 BTU/hr
(c) 12,000 BTU/hr (d) none of above
- 49.** Refrigeration and air -conditioning involve heat transfer using
- (a) water (b) ice and water
(c) refrigerants (d) none of above

50. The electric motor helps the elevator car to

- | | |
|----------------------|-------------------|
| (a) move downward | (b) move upward |
| (c) both (a) and (b) | (d) none of above |

Section - B (50Marks)

*This Section should be answered only on the **Answer Sheet** provided.*

Marks for each question is indicated against it.

1. Explain what is meant by the following terms. Name and define the units of these quantities. (6)

(a) luminous intensity	(b) luminous flux
(c) luminous flux	(d) illumination.
2. State and explain the laws of illumination (4)
3. An office 30mx15m is illuminated by 25W LED batten lamp of lumen output 2500 lumens. The average illumination required at the work place is 200lux. Calculate the number of lamps required to be fitted in the office. Assume co-efficient of utilisation to be 0.7 and depreciation factor 1.25. (3)
4. In staircase lighting, one light point is to be controlled by two switches placed at two different places so that the light can be switched on and off by either switch. Draw a schematic and wiring diagram using looping-in method of wiring (6)
5. What is a transformer? Define the working principles of a transformer and how it is rated? (5)
6. What is a generator? Define the working principles of a generator. Mention the two types of alternators and their main parts. (5)
7. Explain why it is necessary to provide earthing in domestic electric installation. (5)
8. Mention the application of Surface conduit and recessed conduit (concealed Conduit) wiring and their advantages. (4)
9. Explain briefly how testing is done in new electrical installation of the following:- (6)

(a) Testing insulation resistance
(b) Testing polarity of single pole switch
(c) Testing for earth continuity path

10. A large commercial building has an electrical installation load as mentioned below with 3-phase 4 wire power supply.

- (i) 20 w LED batten light.....80 nos.
- (ii) 35 LED panel light.....60 nos.
- (iii) 12 w LED b22 lamp.....40 nos
- (iv) Independent Light socket 6 ampere 20 nos.
- (v) 16 ampere socket..... 9 nos

Calculate:-

- (a) Number of sub-circuits **(2)**
- (b) Full load current and specification of main distribution board **(2)**
- (c) Each Circuit load current **(2)**

* * * * *