

MIZORAM PUBLIC SERVICE COMMISSION
DEPARTMENTAL EXAMINATION FOR JUNIOR GRADE OF M.E.S. (AE/SDO)
UNDER POWER & ELECTRICITY DEPARTMENT,
GOVERNMENT OF MIZORAM, DECEMBER-2024.

ENGINEERING PAPER – I
Common Paper for all Engineers in Electrical Wing under P&E Cadre

Time Allowed : 3 hours

FM : 100 PM : 40

Marks for each question is indicated against it.
Attempt all questions.

PART 'A' (50 MARKS)

1. Answer the following objective questions: (12×1=12)
- (a) What is the planting depth of Steel Tabular pole SP-58 in SOR 2023?
 - (b) How many year(s) of Annual Operation and maintenance charge should be included in the estimate as per General Condition of execution and maintenance of Deposit Work?
 - (c) What is the percentage of annual escalation for calculation of Operation and maintenance expense?
 - (d) What is the minimum working safe distance for 240/440V mentioned in Electricity Safety Manual?
 - (e) Name the instrument used for measuring insulation of power distribution line.
 - (f) What is the minimum Break Down Voltage required at 2.5mm gap for Transformer Oil to be used in 132kV as per Operation and Maintenance guideline for lines and Sub-Station?
 - (g) What is the minimum ground clearance for High Voltage (up to 33kV) bare conductor across the road?
 - (h) What is the full form of NERLDC?
 - (i) What is the maximum numbers of members in Central Electricity Authority including Chairperson?
 - (j) What is the maximum deviations angle of stringing of conductor/ground wire for B type lattice tower as per SOR 2023?
 - (k) What is the name of a person purchasing electricity through a transaction scheduled in accordance with the Grid Code as described in CEA (Deviation Settlement Mechanism and Related Matters) Regulations, 2014?
 - (l) What is the name of the seller those generating station based on other than wind or solar or hybrid of wind-solar resources as described in CEA (Deviation Settlement Mechanism and Related Matters) Regulations, 2014?
2. What is Temporary earthing in Transmission/Sub-transmission line? Describe the procedure and precaution of temporary earthing while working in Power Transmission and Sub-transmission line. (2+3=5)

3. Write down the list of work included in Annual Operation and maintenance charge as per General Condition of execution and maintenance of Deposit Work (7)
4. What is the major cause of Distribution Transformer failure mentioned in Operation and maintenance guidelines for Lines & Sub-Station (5)
5. What is the meaning of 'Stand alone system' as per the Electricity Act 2003 (3)
6. What are the function and responsibility of State Load Despatch Center as described in The Electricity Act 2003 (5)
7. Answer the following questions with the help of SOR 2023 analysis given
 - (a) Calculate the total weight requirement of M.S. Channel 75 x 40 x 6mm for 2 locations of double Pole and 1 location of triple Pole of 11kV line (4)
 - (b) Calculate the total amount (in Rs) required to purchase M.S Flat Iron 40mm x 6mm for 1 location of quadruple Pole of 11kV line. (3)

Given SOR Analysis:

Providing and erection of 4 nos. of MS Channel Iron 75 mm X 40 mm X 6 mm (7.14Kg per metre) double pole crossarm for three wire 11 kV overhead line conductors (triangular formation) complete with through bolts and nuts for clamping to the poles including drilling of holes for insulator pins/fitting bolts, nuts and washers etc and painting with primer and finished paint as required (for SP-29) as directed by the engineer in charge.					
Sl. No.	Description	Unit	Rate/Unit	Qty.	Amount
Materials					
1138	M.S. Channel 75 x 40 x 6 mm	kg	114	44.61	5,085.62
1141	M.S. Flat Iron 40mmx6 mm	kg	114	6.32	720.76
1321	M.S. Nut & Bolt 16 x 155 mm full thread conforming to IS : 1364-2 (1992) or any amendments up to date.	kg	162	3.67	594.86
1320	M.S. Nut & Bolt 16 x 75 mm full thread conforming to IS : 1364-2 (1992) or any amendments up to date.	kg	162	2.34	378.43
1329	Aluminium Paint	Lit	187	0.2	37.4
1331	Red Oxide Paint	Lit	138	0.2	27.6

8. Define briefly the following as mentioned in as described in CEA (Deviation Settlement Mechanism and Related Matters) Regulations, 2014. (3×2=6)
- (a) Deviation
 - (b) Scheduled drawal
 - (c) Time block

PART 'B' (50 MARKS)

9. Answer the following objective questions: (12×1=12)
- (a) What is the level of voltage classified as High Tension as per latest relevant JERC Supply Code Regulation?
 - (b) What is the timeline for releasing new electricity connections for New connection/ additional load where supply can be provided from existing network within Urban area as per JERC Supply Code latest amendment?
 - (c) How much percentage of Transformer Capacity has to be added to record maximum demand on the Low-Tension side to arrive at the equivalent High Tension demand?
 - (d) What is the interval of the Licensee shall conduct periodical inspection/testing of the meters for Low Tension single Phase meter as per JERC Supply code latest amendment?
 - (e) What is the minimum population for Class-I City as per JERC Supply Code Regulation?
 - (f) What is the full form of ABT as described in JERC Grid Code Regulation?
 - (g) What is the name of a period in a day when the electrical power demand is lowest as described in JERC Grid Code regulation?
 - (h) What is the minimum permission voltage for 132kV system as per JERC Grid Code?
 - (i) Write down the formula for calculation of load factor?
 - (j) What is the time limit for rectification of normal fuse off call in urban area within Overall standard of performance for distribution licensee?
 - (k) What is the full form of SAIFI?
 - (l) What is the response time for first consumer call in Guaranteed standard of performance?
10. Differentiate between Fixed Charge and Energy Charge as per JERC Supply Code Regulation. (6)
11. Write the procedure for providing Temporary connection as per JERC Supply Code regulation. (5)
12. Write the procedure of load enhancement as per JERC Supply Code Regulation. (5)
13. Explain the following: (5×2=10)
- (a) Captive Power Plant
 - (b) Partial Shutdown
 - (c) Peak Period
 - (d) Force outage
 - (e) Station Transformer

14. Calculate the following power system interruption index for a particular interruption data given below:

(a) Calculate SAIFI Hint: $SAIFI = \sum_{i=1}^n \frac{(A_i \times N_i)}{N_t}$ (3)

(b) Calculate SAIDI Hint: $SAIDI = \sum_{i=1}^n \frac{(B_i \times N_i)}{N_t}$ (6)

(c) Calculate MAIFI Hint: $MAIFI = \sum_{i=1}^n \frac{(C_i \times N_i)}{N_t}$ (3)

Given Data :

Name of 11kV Feeder (i)	N_i	C_i	A_i	B_i
Feeder X	520	4	3	2hr 30min 40sec
Feeder Y	350	5	5	1hr 20min 30sec
Feeder Z	250	3	2	0hr 40min 50sec

Where,

A_i = Total number of sustained interruptions (each longer than 5 minutes) on i^{th} feeder for the month.

B_i = Total duration of all sustained interruptions (each longer than 5 minutes) on i^{th} feeder for the month.

C_i = Total number of momentary interruptions (each less than or equal to 5 minutes) on i^{th} feeder for the month.

N_i = No of consumer in i^{th} feeder affected due to each interruption.

N_t = Total No. of consumer at 11kV in licensee's supply area.

n = Number of 11kV feeders in licensee's supply area (excluding agricultural feeders).

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