

# MIZORAM PUBLIC SERVICE COMMISSION

## DEPARTMENTAL EXAMINATIONS FOR JUNIOR ENGINEER (ELECTRICAL) UNDER POWER & ELECTRICITY DEPARTMENT, NOVEMBER, 2016

### ENGINEERING PAPER (WITHOUT BOOKS)

Time Allowed : 3 hours

FM : 100 PM : 40

*Marks for each question is indicated against it.*

*Attempt all questions.*

**1. Choose the correct answer**

**(20×1=20)**

- (a) The basic unit of electric charge is
- |                 |                |
|-----------------|----------------|
| (i) Ampere-hour | (ii) Watt-hour |
| (iii) Coulomb   | (iv) Farad     |
- (b) The unit of Resistivity is
- |               |                |
|---------------|----------------|
| (i) Ohm       | (ii) Mho       |
| (iii) Siemens | (iv) Ohm-metre |
- (c) One kWh of energy equals nearly
- |              |               |
|--------------|---------------|
| (i) 1000 W   | (ii) 860 kcal |
| (iii) 3186 J | (iv) 735.5 W  |
- (d) The capacitance of a Capacitor is NOT influenced by
- |                        |                               |
|------------------------|-------------------------------|
| (i) plate thickness    | (ii) plate area               |
| (iii) plate separation | (iv) nature of the dielectric |
- (e) According to Faraday's Laws of Electromagnetic Induction, an emf is induced in a conductor whenever it
- |   |
|---|
| (i) lies in a magnetic field                                |
| (ii) cuts magnetic field                                    |
| (iii) moves parallel to the direction of the magnetic field |
| (iv) lies perpendicular to the magnetic flux                |
- (f) A dead storage battery can be revived by
- |                              |  |
|------------------------------|--|
| (i) a dose of $H_2SO_4$      | (ii) adding so-called battery restorer |
| (iii) adding distilled water | (iv) none of these                     |
- (g) The capacity of a cell is measured in
- |                |                  |
|----------------|------------------|
| (i) Watt-hours | (ii) Watts       |
| (iii) Ampere   | (iv) Ampere-hour |
- (h) Electric power is almost exclusively generated, transmitted and distributed by three phase system because it
- |  |  |
|--|--|
| (i) is more efficient                        | (ii) uses less material for a given capacity |
| (iii) costs less than single phase apparatus | (iv) all of these                            |
- (i) Transformer cores are laminated in order to
- |                               |                                 |
|-------------------------------|---------------------------------|
| (i) simplify its construction | (ii) minimize eddy current loss |
| (iii) reduce cost             | (iv) reduce hysteresis loss     |

- (j) An ideal transformer is one which has
- (i) a common core for its primary and secondary windings
  - (ii) no losses and magnetic leakage
  - (iii) core of stainless steel and windings of pure copper wire.
  - (iv) interleaved primary and secondary windings
- (k) No-load test on a transformer is carried out to determine
- (i) Copper loss
  - (ii) Core loss
  - (iii) Total loss
  - (iv) Insulation resistance
- (l) The efficiency of a transformer is maximum when
- (i) it runs at half load
  - (ii) it runs at full load
  - (iii) its Copper loss equals Iron loss
  - (iv) it runs slightly overload
- (m) When a 400Hz transformer is operated at 50Hz, its kVA rating is
- (i) reduced to 1/8
  - (ii) increased 8 times
  - (iii) unaffected
  - (iv) increased 64 times
- (n) Ceiling fan uses
- (i) Split phase motor
  - (ii) Capacitor start-capacitor run motor
  - (iii) Universal motor
  - (iv) Capacitor start motor
- (o) Brushes of D.C. machines are made of
- (i) carbon
  - (ii) soft copper
  - (iii) hard copper
  - (iv) all of these
- (p) In aluminium conductors, steel core is provided to
- (i) compensate for skin effect
  - (ii) neutralize proximity effect
  - (iii) reduce line inductance
  - (iv) increase the tensile strength
- (q) A circuit is disconnected by isolators when
- (i) line is energized
  - (ii) there is no current in the line
  - (iii) line is on full load
  - (iv) circuit breaker is not open
- (r) Pin type insulators are generally not used for voltages beyond
- (i) 1 kV
  - (ii) 11 kV
  - (iii) 22 kV
  - (iv) 33 kV
- (s) In the cables, sheaths are used to
- (i) prevent the moisture from entering the cable
  - (ii) provide enough strength
  - (iii) provide proper insulation
  - (iv) none of these
- (t) The skin effect of a conductor will reduce as the
- (i) resistivity of conductor material increases
  - (ii) permeability of conductor material increases
  - (iii) diameter increases
  - (iv) frequency increases

2. Write short notes on any four (4)

(4×5=20)

- (a) Corona
- (b) Ferranti effect
- (c) Buchholz Relay
- (d) Circuit Breaker

- (e) Power Factor (f) Slip

3. Write the full form of the following: (5×1=5)

- (a) ACSR (b) MDI  
(c) HRC (d) BEE  
(e) SF6

4. Attempt *any three (3)* (3×10=30)

- (a) Make a list of materials required for construction of 100kVA, 11/0.433kV DT Sub station.  
(b) What is Earthing? Explain the method of Pipe Earthing with suitable diagram mentioning all dimensions.  
(c) Draw a single line diagram of 1x6.3 MVA, 33/11kV Sub Station showing required equipments like Isolators, PT, CT, Circuit Breakers, LA, etc. with four (4) nos. of 11kV outgoing feeders.  
(d) Name four (4) factors to be considered while selecting the site for hydroelectric power plant. State the advantages and disadvantages of hydroelectric power plant.

5. Attempt *any four (4)* (4×5=20)

- (a) What are the essential conditions for parallel operation of Transformers?  
(b) Name four (4) Non-conventional source of energy.  
(c) State the Faraday's Laws of Electrolysis.  
(d) What are the advantages of Diesel Engine Power Plant?  
(e) Write down the working principle of Current Transformer with suitable diagram.

6. Fill in the blanks. (5×1=5)

- (a) As per The CEA (Measures relating to Safety and Electric Supply) Regulations, 2010 the minimum clearance above ground for overhead line below 650V across a street is \_\_\_\_\_ meters and the horizontal clearance between the nearest conductor of voltages exceeding 650V upto and including 11kV shall be \_\_\_\_\_ meters.  
(b) The ratio of average load to maximum demand is called \_\_\_\_\_  
(c) The Electricity Act, 2003 extends to the whole of India except the state of \_\_\_\_\_  
(d) As per the Intimation of Accidents (Form and Time of Service of Notice) Rules, 2005 If any electrical accident occurs, any authorized person not below the rank of Junior Engineer shall send to the Inspector a telegraphic report within \_\_\_\_\_ hours and a report in writing in Form A within \_\_\_\_\_ hours of the knowledge of occurrence of fatal and all other accidents.

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