## VI. DESCRIPTIVE TYPE QUESTIONS:

1) List out the various types of Maintenance schedules for Equipment used in Power Maintenance?
2) Explain the following Schedule Maintenance

   A Fortnightly of CLS Panel

B Yearly of Sub-Station
C Quarterly of Pumps
D Yearly of D.G.Sets
E Half Yearly of Earth Electrode
f Yearly of Transformers
g Monthly of AC (split & Window)
h Monthly of Water coolers
I Monthly of Solar Geyser

3) Design & List out the materials required for Electrification of the following:
   a LC Gate including Road lighting
   b Dy.SS Room
   c VIP Lounge at station
   d ORH (Double bed room)
   e Booking Office at 'B' Class
   f Running Room 6 beds.
4) Define the Energy Audit and Conduct the Energy Audit of
   a Sanchalan Bhavan
   b Any Coaching Depot
   c Hospital
5) What are the Energy Conservation measures to be adopted at home and work place?
6) Explain Procedure for working on 11KV OH Lines?
7) What are the Safety measures to be adopted for
   (i) Working on (11KV) HT installations.
   (ii) Working in the Vicinity of 25KV OH traction line.
8) What are the Fire Prevention measures to be adopted for –
   i) Transformers
   ii) Batteries
   and also Internal wiring of -
   a) Air-conditioners
   b) Switch Boards
   c) SDB's
9) Explain how the efficiently of Pumps is measured.
10) What are the major parameters to be observed in OH Power line crossings?
11) Explain the procedure for taking a person on IOD?
12) What are the various types of electrical accidents and explain the preliminary First aid to be given in case of Electrical accidents.
13) What are the requirements and tests for obtaining EIG approval of a newly erected 11KV sub. Station of 250 KVA capacity?
14) What are the Electrical Safety precautions to be taken at home, workplace and surroundings?
15) What are the activities carried out by SC Division during Energy Conservation Week of 14$^{th}$ Dec – 21$^{st}$ Dec 2011?
16) Explain - (1) SOB
   (2) Technical Circular
   (3) Safety Circular
   (4) AC Message
   (5) Safety Meeting

17) Explain the precautions to be taken while recording measurements for contract works?

18) What are the documents proforma to be attached with Joint Measurements of contractor works? Explain briefly about out each one of them/

19) What are the Points to be noted while placing of indents and passing of materials and bills as circulated by Sr.DEE/M/SC.

## VII. PROBLEMS:

1) **An inductive circuit has a resistance of 2.0 Ohms in series with an inductance of 0.015 henry? Find (a) Current (b) power Factor (c) Power consumed? When connected across 200 Volts, 50 Hz. Supply mains?**

Ans Given data

R = 2.0 Ohms , L = 0.015

V = 200V, f = 50 Hz.

Formula used

$Z = \sqrt{R^2 + X_L^2}$

$X_L = 2 \prod f L$

$I = V/Z$

$P.F = R/Z$

Power = VI Cos ¢ (P.F)

$X_L = 2 \times 22/7 \times 50 \times 0.015 = 4.714$ Ohms.

$Z = \sqrt{(2)^2 + (4.174)^2}$

$= \sqrt{26.22} = 5.121$ Ohms.

(a) $I = V/Z = 200/5.121 = 39.05$ Amps.

(b) Power Factor $= R/z = 2/5.121 = 0.39$

(c) Power Consumed $P = VI \cos\emptyset$

$= 200 \times 39.05 \times 0.39$

$= 3045.9$ Watts.

2) **Calculate the Line and Phase current of AC, 3 phase, 400 Volts, 7.5 B.H.P.? Motor with a power factor of 0.8 and efficiency 90%, when the winding is connected (a) in star (b) in Delta?**

Ans Given Data

$V_L = 400$ Volts , 3 Phase

BHP = 7.5, P.F = 0.8

$\eta = 90\%$

Formula used -

Efficiency $\eta = Output/I_{input}$ or Input $= Output/\eta$

Power $P = \sqrt{3}\ V_L\ I_L \cos\emptyset$

BHP $= 7.5 \times 746$ Watts.

$= 5595$ Watts.

Input (P) $= Output/\eta = 5595/0.9$

$P = 6216.66$ Watts.

$P = \sqrt{3}\ V_L\ I_L \cos\emptyset$

$6226.66 = \sqrt{3} \times 400 \times I_L \times 0.8$

$I_L = \underline{6216.66}$

$$\sqrt{3} \times 400 \times I_L \times 0.8$$

$I_L$ = 11.2 Amps.

(a) In star Line current = Phase current

Therefore $I_{Ph}$ = 11.2 Amps.

(b) In Delta Phase current

$I_{Ph} = I_L / \sqrt{3} = 11.2 / \sqrt{3} = 6.4$ Amps.

3) **A 250 KVA, 11000/400 Volts Delta / Star 3 phase transformer has load of 100 Amps. Find the line current on primary?**

Ans Given Data

Primary Voltage $V_P$ = 11000 Volts

Secondary Voltage Vs = 440 / $\sqrt{3}$ (Since star connected)

Secondary Voltage Is = 100 Amps.

Power = 250,000 VA

Formula : Vs/ Is = Ip/ Is

$$\frac{440/\sqrt{3}}{11{,}000} = \frac{Ip}{400}$$

$$\frac{440/\sqrt{3}}{11{,}000} \times 100 = \frac{40}{11 \times \sqrt{3}}$$

= 2.09 Amp.

4) **Find the diameter of copper wire in mm, if the resistance of 1.5 Kilometer wire is 7.2 Ohms? (Specific Resistance of copper is 1.7 x $10^{-6}$ Ohm/$cm^3$)**

Ans Given Data

Length = 1.5 Km

= 15,000 cm

Resistance = 7.2 Ohms.

$\rho = \frac{1.7}{10^6} = 1.7 \times 10^{-6}$

We Know $R = \rho L/a$

$7.2 = 1.7 \times 10^{-6} \times 1{,}50{,}000 / a$

$a = 1.7 / 1{,}00{,}000 \times 1{,}50{,}000 / 7.2$

= 0.035 sq.cm.

Now $a = \pi d^2 / 4$

$0.035 = 22 / 7 \times (d)^2 / 4$

$d = \sqrt{0.035 \times \frac{7}{22} \times 4}$ = 0.21 cm.

5) **Find the capacity of pump (HP) to pump the water at the rate of 20 Gallons per minute, from the bore well of 250 ft. depth to the over head tank of height 100 ft. Neglect all friction losses. Take specific gravity of the water as '1' and take efficiency of the pumps as 60%?**

Ans: Given Data

Discharge (Q) = 20 Gallons per minutes (GPM

Depth of bore well = 250 ft.

Height of the water tank = 100 ft.

Specific gravity of water (S.G) = 1.0

Efficiency of the pump ($\eta$) = 60% = 0.6

Pump capacity in Horse Power(HP) = $\frac{Q \times \text{Head} \times \text{Specific Gravity}}{3960 \times \eta}$

Total Head = Depth of bore well + Height of the Tank

(in feet) = 250 +100 = 350 Feet.

$$\text{Pump Capacity in HP} = \frac{Q \times \text{Head} \times \text{Specific Gravity}}{3960 \times \eta}$$

$$= \frac{20 \times 350 \times 1.0}{3960 \times 0.6}$$