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**[5057]-236**

**S.E. (Electrical) (Second Semester) EXAMINATION, 2016**

**POWER SYSTEM-I**

**(2012 COURSE)**

**Time : Two Hours**

**Maximum Marks : 50**

**N.B. :-** (i) Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4,  
Q. No. 5 or Q. No. 6, Q. No. 7 or Q. No. 8.

(ii) Neat diagrams must be drawn wherever necessary.

(iii) Figures to the right indicate full marks.

(iv) Assume suitable data if necessary.

1. (a) Explain in brief various incentives and penalties offered by MSEDCL to various types of consumers. [6]

(b) A string of suspension insulator consists of 4 units. The capacitance between each link pin and earth is 1/10th of the self-capacitance of a unit. The voltage between the line conductor and earth is 100 kV. Find the voltage distribution across each unit and string efficiency. [6]

P.T.O.

*Or*

2. (a) A consumer has an annual maximum demand of 250 kW at 40% load factor. If the tariff is Rs. 100 per kW to maximum demand plus 20 paise per kWh, then find overall cost per kWh. [6]
- (b) Explain in brief the necessity and working of the following equipments used in power plant : [6]
- (i) Protective relays
- (ii) Power transformers.
3. (a) Derive an expression for loop inductance of a single phase-two wire overhead line with conductors separated by distance 'd' meter and radius of each conductor as 'r' meter. [6]
- (b) Draw the cross-sectional view of single core cable and explain its construction also state the properties of a good insulating material. [7]

*Or*

4. (a) What is meant by transposition of conductor in an overhead line ? Calculate the inductance per phase per km of a 33 kV, 50 Hz, three phase, three conductor lines with conductor spacing of 1.4 m and diameter of each conductor 1.5 cm for the following configurations : [7]
- (i) Equilateral spacing
- (ii) Horizontal spacing, Assume transposed lines.

- (b) Derive an expression for sag of transmission line when supports are at unequal level. [6]
5. (a) Drive an expression for capacitance per phase per km of three phase line when conductors are arranged in the form of equilateral triangle of sides ' $d$ ' meter. [6]
- (b) A 30 km long, single phase 11 kV line has two parallel conductors each 4.5 mm in diameter and 2.5 m apart. The height of conductors above ground is 7 m. Find total capacitance and charging current of line considering effect of earth. [6]
- Or*
6. (a) Derive an expression for capacitance of single phase transmission line considering effect of earth. [6]
- (b) Determine capacitance per phase per km and capacitive reactance of 3 phase, 33 kV well transposed line operating at 50 Hz with 1.5 cm diameter conductors arranged at a distance of 1.5 m assuming : [6]
- (i) Equilateral triangular spacing
- (ii) Horizontal spacing with transposition
7. (a) Classify transmission lines based on voltage, length and line parameters. [7]
- (b) Explain effect of load power factor on regulation and efficiency. [6]

*Or*

8. (a) Express the relationship for the sending end voltage and current in terms of receiving end voltage and current for a medium length transmission line with nominal 'T' method of representation. Draw the phasor diagram. [7]
- (b) A 66 kV, 3-phase, 50 Hz, 150 km long overhead transmission line is open circuited at receiving end. Each conductor has a resistance of  $0.25 \Omega/\text{km}$ , an inductive reactance of  $0.5 \Omega/\text{km}$  and has capacitive admittance of  $0.04 \times 10^{-4} \text{ S}/\text{km}$ . [6]
- (i) Draw the nominal  $\Pi$  equivalent circuit and indicate the value of each parameter.
- (ii) Calculate receiving end voltage if sending end voltage is 66 kV.