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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(EE) PT (Sem.-3)

**POWER SYSTEM - I (Transmission & Distribution)**

Subject Code : BTEE-405

M.Code : 72165

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A****1. Write briefly :**

- (a) What is skin effect?
- (b) A Conductor consists of seven identical strands each having a radius of  $r$ . Determine the factor by which  $r$  should be multiplied to find the self GMD of the conductor.
- (c) A load of three impedances each  $(6+j9)$  is supplied through a line having an impedance of  $(1+j2)$  ohm. The supply voltage is 400V, 50Hz. Determine the power input & output when the load is delta connected.
- (d) What are the uses of transposition of power lines?
- (e) State Kelvin's law.
- (f) What is meant by surge impedance?
- (g) Give a comparison between AC and DC distribution system.
- (h) What is meant by capacitance grading of a cable?
- (i) What is purpose of using intersheath in a cable?
- (j) What is the use of synchronous phase modifiers?



### SECTION-B

- Q2. A three phase 50 Hz transmission line has conductors of factor  $90 \text{ mm}^2$  and effective diameter of 1 cm and are placed at the vertices of an equilateral triangle of side 1m. The line is 20 km long & delivers a load of 10 MW at 33 kV and 0.8 power factor. Neglect capacitance and assume temperature of  $20^\circ\text{C}$ . Determine the voltage regulation of line.
- Q3. A transmission line conductor at a river crossing is supported between two towers at height of 50 & 80 m above water level. The horizontal distance between the towers is 300 m. If the tension in the conductor is 2000 Kg, find the clearance between the conductors and water at a point midway between the towers. Weight of conductor = 0.844 Kg/m. Assume that the conductor takes the shape of parabolic curve.
- Q4. Explain the necessity of a stringing chart for a transmission line and show how such a chart can be constructed?
- Q5. State the classification of cables according to voltage and discuss their general construction.
- Q6. What is void formation in a cable and how does this effect the performance of a cable?

### SECTION-C

- Q7. A 50 Hz three phase transmission line is 280 km long. It has total series impedance of  $35 + j140$  ohms and a shunt admittance of 930 mho. It delivers 40 MW at 220 kV at 0.9 pf lagging. Find the sending end voltage, Voltage regulation, transmission efficiency and A, B, C, D constants using long line rigorous solution.
- Q8. Drive an expression for the capacitance per phase of a three phase line with equilateral and transposed unsymmetrical spacing.
- Q9. A 3 phase transmission line 160 km long transmits a load of 90 MW at 0.8 power factor Lagging. The line voltage at the receiving end is 230 kV. The constant of the line are as follows :

$$A = D = 0.9785 \angle 0.3^\circ \quad B = 85.2 \angle 77.47^\circ \quad C = 0.000503 \angle 90.1^\circ$$

Construct the receiving end and sending end circle diagrams for the transmission line and calculate the sending end voltage, current, power factor, regulation and efficiency of the transmission line.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**