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16172

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.
  - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

**1. Attempt any TEN :**

**20**

- (a) State any two reasons for the necessity of transmission of electricity.
- (b) Draw simple line diagram or block diagram of A.C. supply system.
- (c) State any four properties of conductor material used for transmission line or cable.
- (d) State any four names of insulating materials used in manufacturing of cable.
- (e) Enlist various types of supports (poles) used for transmission and distribution.
- (f) Define regulation of transmission line and write formula.
- (g) Write classification of transmission line according to distance.
- (h) State assumption made while calculating performance of transmission line in 'T' network.
- (i) State any two applications of HVDC transmission system.

- (j) State why three-phase four wire supply system is preferred for secondary distribution system.
- (k) State main components of distribution system.
- (l) State types of line insulators used in Transmission and distribution.

**2. Attempt any FOUR :****16**

- (a) State any four factors that are considered while designing a distributor.
- (b) State long form of 'ACSR' conductors. State its three advantages.
- (c) State any four desirable properties of cable.
- (d) Compare RCC pole and steel tubular pole based on (i) cost (ii) life (iii) tensile strength (iv) application.
- (e) State any four reasons of failure of line insulators.
- (f) State what is skin effect ? How it can be reduce ?

**3. Attempt any FOUR :****16**

- (a) Compare on any four points primary and secondary distribution system.
- (b) A three phase transmission line system is suspended by a string of three discs. The lowest insulator voltage is 13 kV and across the next is 11 kV. Find out line voltage and string efficiency.
- (c) Define string efficiency. What does it indicates ? What will be the value of string efficiency of HVDC transmission line.
- (d) State what is proximity effect ? How it can be reduce ?
- (e) Draw figure of transposition of conductor. Why it is necessary ?
- (f) Draw equivalent circuit of medium transmission line of nominal ' $\pi$ ' network. Draw vector diagram.

**4. Attempt any FOUR :****16**

- (a) State what is corona. State its two disadvantages.
- (b) State any four possible conditions when Ferranti effect will occur.
- (c) An overhead three phase transmission line delivers 5 MW at 22 kV at 0.8 lagging power factor. The resistance and reactance of each conductor is 4 Ohm and 6 Ohm respectively. Determine sending end voltage and percentage regulation.
- (d) State effect of low power factor on efficiency and regulation of transmission line.
- (e) Draw basic block diagram for HVDC transmission line starting from generating station and end at receiving station.
- (f) State four advantages and four limitations of EHVAC transmission line.

**5. Attempt any FOUR :****16**

- (a) State generalized constants A, B, C and D of formula for nominal 'T' network.
- (b) Draw line diagram of "grid system". State its two advantages.
- (c) State why radial distribution system is used for short distance only.
- (d) State any four requirements of an ideal distribution system.
- (e) Compare Indoor and outdoor substation any four points.
- (f) Draw layout of 33/11 kV sub-station.

**P.T.O.**

**6. Attempt any FOUR :****16**

- (a) A single phase 11 kV short transmission line delivers 1000 kW power at 0.8 p.f. lagging total resistance and inductive reactance of the line are 5 Ohm and 5.6 Ohm. Determine sending end voltage and regulation.
  - (b) Write sequence of operation of isolator, earthing switch and circuit breaker while opening and closing.
  - (c) State the factors to be considered while selecting site for sub-station.
  - (d) Compare on any four points nominal 'T' and nominal ' $\pi$ ' network of medium transmission line.
  - (e) Name four important protective devices used in sub-station and mention their function.
  - (f) Compare pin type and suspension type insulator on any four points.
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