

C20-EE-403

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BOARD DIPLOMA EXAMINATION, (C-20)

JUNE/JULY—2022

DEEE – FOURTH SEMESTER EXAMINATION

POWER SYSTEMS-II (TRANSMISSION AND DISTRIBUTION)

Time : 3 hours ]

[ Total Marks : 80

**PART—A**

3×10=30

- Instructions :** (1) Answer **all** questions.  
(2) Each question carries **three** marks.  
(3) Answer should be brief and straight to the point and shall not exceed five simple sentences.

1. Define Ferranti effect.
2. State the need of transposition in transmission lines.
3. State any three applications of hot line technique.
4. List any six HVDC projects in India.
5. List any six requirements of overhead line insulators.
6. List the various types of insulators used for overhead transmission lines.
7. State any three factors influencing the selection of line support.
8. Define insulation resistance of a cable and write its formula.
9. State the need of substation auxiliary supply.
10. State any three disadvantages of radial distribution system.

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**PART—B**

8×5=40

- Instructions :** (1) Answer **all** questions.  
(2) Each question carries **eight** marks.  
(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

- 11.** (a) Define voltage regulation. Derive an approximate formula for voltage regulation of a short transmission line with the help of a neat phasor diagram.

**( OR )**

- (b) A three-phase transmission line of 100 km long delivers 40 MW of power to a load at 110 kV and a 0.85 p.f. lagging. The resistance and reactance of the line conductors are  $0.3 \Omega / \text{km}/\text{phase}$  and  $0.5 \Omega / \text{km}/\text{phase}$  respectively, while capacitive admittance is  $2.5 \times 10^{-6} \text{ mho}/\text{km}/\text{ph}$ . Determine sending end voltage, sending end current and the efficiency of transmission. Use nominal- $\pi$  method of representation.

- 12.** (a) (i) State any four disadvantages of loose span.  
(ii) Compare pin and suspension type insulators in any four aspects.

**( OR )**

- (b) A transmission line is having a span of 180 m between level supports. The conductor has a cross-sectional area of  $2 \text{ cm}^2$  and the ultimate strength is  $6000 \text{ kg}/\text{cm}^2$ . The specific gravity of the conductor material is  $8.5 \text{ gm}/\text{cm}^3$ . If the ice coating of 0.8 cm is considered, calculate the maximum sag of the conductor. Take safety factor as 4 and density of ice is  $910 \text{ kg}/\text{m}^3$ .

- 13.** (a) (i) Define a cable.

**( OR )**

- (b) (ii) Classify the underground cables based on (1) number of conductors, (2) voltage rating, (3) insulation and (4) methods

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of improving dielectric stress.

14. (a) Define a substation and state the relative merits of indoor substation.

( OR )

- (b) What is the need of a substation and classify substations on various factors.

15. (a) State the relative advantages and disadvantages of (i) radial and (ii) ring distribution systems.

( OR )

- (b) A single-phase distributor 2 km long supplies a load of 140 A, 0.9 p.f. lagging at its far end and 90 A, 0.8 p.f. lagging at its midpoint. Both power factors are referred to the voltage at the far end. The resistance and reactance per km (go and return) are  $0.5 \Omega$  and  $0.1 \Omega$  respectively. Calculate the voltage at sending end, if the voltage at far end is maintained at 230 V.

### PART—C

10×1=10

- Instructions :** (1) Answer the following question.  
(2) The question carries **ten** marks.  
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

- \* 16. What is the effect of shunt capacitance on voltage distribution across various discs of a string of suspension insulator having three identical discs and how it affects string efficiency.

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