



C16-EE-503

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BOARD DIPLOMA EXAMINATION, (C-16)

JANUARY/FEBRUARY—2022

DEEE - FIFTH SEMESTER EXAMINATION

POWER SYSTEMS - II (T, D AND P)

Time : 3 hours]

[Total Marks : 80

PART—A

3×10=30

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

1. State any three reasons for transmission of electric power at high voltage.
2. State Kelvin's law for transmission lines.
3. State the three advantages of hotline technique.
4. State three advantages of HVDC transmission systems.
5. State any three causes for failure of insulators.
6. State the parts of a underground cable.
7. State the need for substation earthing.
8. Classify distribution systems based on functions.
9. What are the requirements of a good distribution system?
10. Write short note on Pilot-Wire protection system.

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PART—B

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

- 11.** (a) State the factors affecting corona and the methods to reduce corona. 5
- (b) A 3-phase overhead transmission line delivers 5 MW at 22 kV at 0.8 p.f. lagging. The resistance and reactance per phase are 4Ω and 6Ω respectively. Calculate (i) percentage regulation, (ii) efficiency. 5
- 12.** (a) Explain the effect of charging currents in transmission lines. State Ferranti effect. 4
- (b) A 50Hz, 3-phase transmission line 30km has a total series impedance of $(40+j125)$ ohms and shunt admittance of 10^{-3} mho. The load is 50 MW at 220 kV with 0.8 lagging power factor. Find the sending end voltage, current and power factor (Use nominal T-representation). 6
- 13.** (a) Compare Pin and Suspension Insulators in five aspects. 5
- (b) An Insulator string consists of 3-units, each having a safe working voltage of 15 kV. The ratio of self-capacitance to shunt-capacitance of each unit is 8 : 1. Find the maximum safe working voltage of string and the string efficiency. 5
- 14.** (a) State the factors to be considered for the design of transmission and distribution lines. 5
- (b) Define Sag and derive the equation for Sag when the supports are at the same level. 5

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- 15.** (a) State the requirements of underground cables. 4
- (b) Find the insulation resistance per kilometer of cable having conductor diameter of 2 cm and internal sheath diameter of 3.5 cm. The resistivity of the cable is $6 \times 10^{12} \Omega \text{ m}$. 6
- 16.** (a) Draw a neat sketch of plinth mounted substation and label the parts. 5
- (b) Draw the earthing layout of 132 KV/33 KV-11 KV substation and label the parts. 5
- 17.** A single-phase AC distributor AB 350 m long is fed from end A and loaded as follows. 10
- (i) 100 A at 0.707 p.f. lagging 250 m from point A
- (ii) 200 A at 0.8 p.f. lagging 350 m from point A
- The total resistance and reactance of the distributor are 0.2Ω per km and 0.1Ω per km. Calculate the voltage at sending end when the load p.f. refer to the voltage at far end of 230 V.
- 18.** (a) Explain time distance relay protection of transmission lines. 5
- (b) Explain the protection of parallel feeders using directional relays with neat diagram. 5

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