4638

BOARD DIPLOMA EXAMINATION, (C–14)
MARCH/APRIL—2017
DEEE—FIFTH SEMESTER EXAMINATION

POWER SYSTEMS—II (T&D)

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. What are the requirements of conductor material of an overhead transmission line?

2. What is the need of transposition of overhead transmission line?

3. Compare single-phase AC system with two-wire DC system for the volume of copper required.

4. What are the types of HVDC systems?

5. List any four types of line supports and also mention for which voltage they are used.

6. Compare pin and suspension insulators in any four aspects.

7. Define the following in underground cable :

(a) Insulation

(b) Bedding

(c) Serving

8. List the equipments used in substation.

9. Define the following :

(a) Feeders

(b) Distributors

(c) Service mains

10. What are the advantages of doubly fed distributor over singly fed distributor?

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PART—B 10×5=50

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Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. An overhead 3-phase transmission line delivers 5 MW at 22 kV at 0·8 lagging power factor. The resistance and reactance of each conductor are 4 and 6 respectively. Determine—

(a) sending end voltage;

(b) percentage regulation;

(c) total line losses;

(d) transmission efficiency.

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12. A 3-phase 50 Hz transmission line 100 km long delivers 20 MW at 0·9 pf lagging and at 110 kV. The resistance and reactance of the line per phase per km are $0·2\ \Omega$ and $0·4\ \Omega$ respectively while capacitance admittance is $2·5 \times 10^{-6}$ mho/km/phase. Calculate *(a)* the current and voltage at the sending end and *(b)* efficiency of transmission by using nominal T-method.

13. *(a)* Explain the methods of reducing the corona in overhead lines. 5

(b) Explain the radial and ring main distribution systems with neat sketch. 5

14. An overhead line at river crossing is supported from two towers at heights of 40 m and 90 m above water level, the horizontal distance between the towers being 400 m. If the maximum allowable tension is 2000 kg, find the clearance between the conductor and water at a point midway between the towers. Weight of the conductor is 1 kg/m.

15. *(a)* Explain the methods to improve the string efficiency.

(b) A 3-phase overhead transmission line is being supported by three disc insulators. The potentials across top unit and middle unit are 8 kV and 11 kV respectively. Calculate—

(i) ration of capacitance between pin and earth to the self-capacitance of each unit;

(ii) the line voltage;

(iii) string efficiency.

16. *(a)* Classify the cables based on various parameters. 5

(b) A single-core cable 5 km long has an insulation resistance of $0·4\ M\Omega$. The core diameter is 20 mm and the diameter of the cable over the insulation is 50 mm. Calculate the resistivity of the insulation material. 5
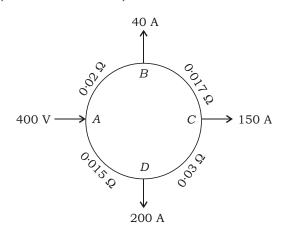
17. Explain the single-bus bar and duplicate bus bar systems with neat sketch.

18. A two-wire DC ring main fed at A, and at points B, C and D load is tapped as shown in the figure below. Calculate the potentials at these points. The resistances of the both conductors are $AB = 0 \cdot 02 \ \Omega$, $BC = 0 \cdot 017 \ \Omega$, $CD = 0 \cdot 03 \ \Omega$ and $DA = 0 \cdot 015 \ \Omega$:

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