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C09–EE–606

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BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2014

DEEE—SIXTH SEMESTER EXAMINATION

POWER SYSTEM—II

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. Compare between solid and stranded conductors (in any six aspects).

2. State *(a)* Ferranti effect and *(b)* Corona effect.

3. Write any three advantages and three disadvantages of HVDC transmission.

4. What are the disadvantages of loose spans?

5. Define *(a)* flashover and *(b)* puncture of insulators.

6. List the equipment used in substations.

7. Determine the insulation resistance of a single-core cable of length 3 km and having a radius of 12·3 cm with insulation thickness of 10·2 cm and specific resistance of insulation of 5 10^{12} ohm-cm.

8. What are feeder, distributor and service main?

9. What is the necessity of busbar protection?

10. Define a surge and draw its waveform.

PART—B

10×5=50

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. *(a)* Derive an expression for inductance of a single-phase transmission line. 6

(b) A single-phase line has two parallel conductors 2 meters apart. The diameter of each conductor is 1·2 cm. Calculate the loop inductance per km of the line. 4

12. A 3-phase, 50-Hz, 100-km overhead transmission line delivers 20 MW at 0·9 p.f. lagging at a line voltage of 66 kV. The resistance and inductive reactance of the line per phase/km are 0·1 ohm and 0·5 ohm respectively, while susceptance/phase/km is 10 ^{5} siemen. Calculate *(a)* sending end current, *(b)* sending end voltage (line-to-line), *(c)* sending end power factor and *(d)* transmission efficiency. Use nominal method. 10

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

(b) Compare overhead lines with underground cables (in any five aspects). 5

14. *(a)* Derive an expression for sag in overhead lines when the supports are at different levels and the tension is governed by the conductor weight only. 5

(b) An overhead transmission line spanning over a river is supported at two ends by towers at 45 m and 75 m. Find the clearance between the conductor and water at a point midway between the towers. The tension is limited to 2500 kg. The weight of the conductor is 0·9 kg/m and distance between the towers is 300 meters. 5

15. *(a)* Define string efficiency. Explain the methods of improving string efficiency. 5

(b) A 3-phase, 33-kV transmission system each conductor is suspended by a string of three similar insulators, the mutual capacitance of which across units is 9 times the shunt capacitance between unit and earthed framework. Calculate the voltage across each insulator. 5

16. A single-phase a.c. distributor AB 250 m long is fed from end *A* and loaded as follows :

(i) 120 A at 0·8 p.f. lagging 100 m from point *A*

(ii) 100 A at 0·707 p.f. lagging 250 m from point *A*

The resistance and reactance of the distributor are 0·25 and 0·125 per km. Calculate the voltage at sending end when the load p.f. refer area to voltage at far end of 230 V. 10

17. *(a)* Explain protection of transmission lines using definite distance relays. 5

(b) Explain protection of ring mains with a neat diagram. 5

18. *(a)* Explain thyrite-type lightning arrester with a neat diagram. 5

(b) Explain Peterson coil grounding with a neat diagram. 5

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