C20-EE–403

7446

BOARD DIPLOMA EXAMINATION, (C-20)

NOVEMBER/DECEMBER—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) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. Define short, medium and long transmission lines.

2. State the factors affecting corona.

3. State proximity effect.

4. List six major components of HVDC systems.

5. List the various types of insulators used for overhead transmission lines.

6. Define sag. List factors affecting it.

7. State the function of arcing horn in a string insulator.

8. Draw a neat sketch of H-type cable and label the parts.

9. State any three relative merits of outdoor substations.

10. Define feeder and distributor.

PART—B

8×5=40

Instructions : (1) Answer **all** questions.

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

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

11. *(a)* Explain corona effect in transmission lines and explain the methods of reducing corona.

(OR)

(b) Consider a short 3-φ transmission line having an impedance of $(2 + j4)\ \Omega$ per phase. The sending and receiving end voltages of the line are 138 kV and 132 kV respectively. If the receiving end pf is 0·85 lagging, then determine power output and sending end power factor.

12. *(a)* Derive an expression for sag in overhead lines when the supports are at equal levels and the tension is governed by the conductors weight and wind.

(OR)

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

(ii) the line voltage;

(iii) string efficiency

13. *(a)* *(i)* Classify the underground cables on the basis of number of conductors.

(ii) Assume that a single-conductor belted cable has a conductor diameter of 2 cm and an inside diameter of sheath of 5 cm. Its insulation resistance is given as 275 MΩ/km. Find the dielectric resistivity of the insulation.

(OR)

(b) (i) Define an underground cable.

(ii) Derive an equation for the insulation resistance of a cable.

14. (a) State the purpose of the following equipments used in a substation.

(i) Bus bars

(ii) Insulators

(iii) Transformers

(iv) Switch gear

(OR)

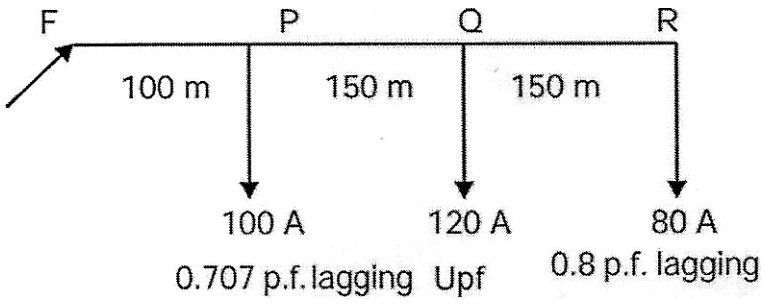
(b) (i) Classify substations based on service requirement and constructional features.

(ii) Explain substation's auxiliary supply.

15. (a) List the steps involved in the voltage drop calculation in AC single-phase distributor. Draw a vector diagram taking receiving end voltage as reference to illustrate the calculations.

(OR)

(b) Determine the total voltage drop of a single-phase distributor as shown in the figure below. The impedance is (0·25 + *j*0·125) per kilometer run (go and return).



PART—C

10×1=10

Instructions : (1) Answer the following question.

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

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

16. Electric power that is produced in generating stations is delivered to end consumers by allowing it to pass through transmission and distribution lines. What are the differences that can be observed between transmission and distribution parts of AC power system with regard to construction, operation and maintenance?

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