EE 222 (R-22)

Total No. of Questions : 10] [Total No.of Pages : 02

II/IV B. Tech. DEGREE EXAMINATIONS, AUGUST - 2024

Second Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

POWER SYSTEMS - I

Time : **Three Hours** Maximum : **70** Marks

Answer ONE Question from each Unit.

All Questions carry equal marks. 5x14=70 M

UNIT - I

1. a) Explain the function of feed water heater and air pre-heater.

   b) What are the types of steam turbine ? Discuss their use and characteristics.

(OR)

2. a) Explain with neat diagram various parts and its function in nuclear power plant.

   b) Classify and explain hydroelectric plants.

UNIT - II

3. a) Derfine the following with respect to the economic aspects power generation :
   (i) Connected load (ii) Plant capacity factor.

   b) Calculate the generating cost per kWH, delivered from a generating station from the following data. Plant capacity 500 MW; annual load factor 45%; capital cost Rs. 1200×10^6; annual cost of fuel etc. Rs. 160×10^6, interest 9.2% per annum of initial value.

(OR)

4. a) The load on a power plant on a typical day is as under

Time	12-5 AM	5-9 AM	9-6 PM	6-10 PM	10-12 Mid Night
Load (MW)	20	40	80	100	20

   Plot the chronological load curve and load duration curve. Find the load factor of the plant and energy supplied by the plant in 24 hours.

   b) Define and explain the significance of the following terms with illustrations. (i) Demand factor (ii) Load facor (iii) Diversity factor and (iv) Plant factor.

P.T.O.

UNIT - III

5. a) Derive the ABCD constants for a medium transmission line which can be analyzed using Nominal p method.

   b) Using a nominal p model find the sending end voltage and regulation of a 250 km three phase line delivering 50 MVA at 0.85 p.f. lag, 132 kV, 50 Hz. The conductors are spaced 3m apart equilaterally. The conductor diameter is 1.6 cm and resistance is 0.11 O/km.

(OR)

6. a) A short three phase transmission line connected to a 33 kV, 50 Hz generating station at the sending end is required to supply a load of 10 MW at 30 kV, 0.8 pf lagging at the receiving end. If the minimum transmission efficiency is to be limited to 96%, estimate the resistance and inductance values of the line.

   b) What is Ferranti effect in a transmission line ?

UNIT - IV

7. a) What is corona ? Discuss the various factors affecting corona.

   b) A string of 6 suspension insulators is to be graded to obtain uniform distribution of voltage across the string. If the pin to earth capacitances are equal to C and the self capacitance of the top insulator is 10C. Find the mutual capacitance of the each unit in terms of C.

(OR)

8. a) Briefly describe the three main types of insulators highlighting their advantages.

   b) Derive the expression for travelling wave of a transmission lines.

UNIT - V

9. a) Explain the classification of underground cables ?

   b) What is the effect of capacitance in cables ? Derive the capacitance of single-core cable.

(OR)

10. a) Explain about insulating material used for underground cables.

    b) Explain the capacitance of three core belted type cable.