Code No: **20EE4T01**

R20

II B. TECH II SEMESTER REGULAR EXAMINATIONS, JULY - 2022
POWER SYSTEMS-I
(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 hours Max. Marks: 70

Note: Answer **ONE** question from each unit **(5 × 14 = 70 Marks)**

UNIT-I

1. a) Draw a typical layout of a thermal power plant and describe the function of the following components. [14M]
(i) Coal and ash handling (ii) steam generating plant (iii) steam turbines (iv) feed water circuit (v) Cooling tower circuit.

(OR)

2. a) With help of diagram, explain the essential features of hydro-power plant. [9M]
b) List out the advantages and disadvantages of Hydro electric power plants. [5M]

UNIT-II

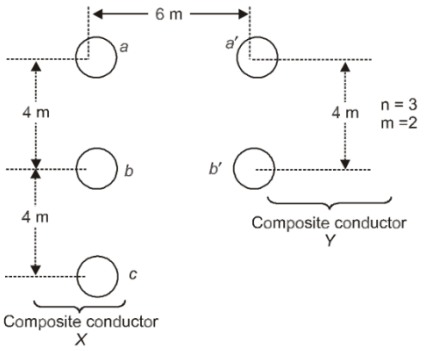
3. a) Explain the function of moderator. How is a moderator selected? Why does a breeder reactor require no moderator? [7M]
b) With help of neat diagram, explain the pressurized water reactor (PWR)? [7M]

(OR)

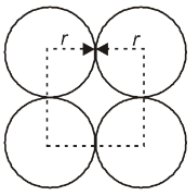
4. a) Gas power plants are peak load plants while nuclear power plants are operated to supply base load only explain. [6M]
b) Explain the following terms [8M]
(i) Photovoltaic (PV) cell (ii) PV Module (iii) PV string (IV) PV Array.

UNIT-III

5. a) Determine the inductance of a single-phase transmission line consisting of three conductors of $2cm$ radii in the 'go' conductor and two conductors of $4cm$ radii in the return, conductor, as shown in Fig-1 [10M]



b) Determine the GMR for the diagram shown below in terms of radius 'r' [4M]



(OR)

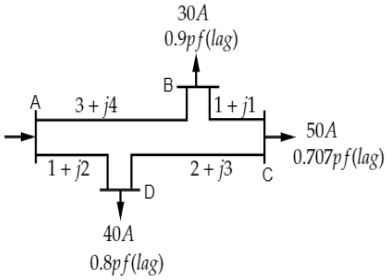
6. A three-phase 60-Hz, 125-km overhead transmission line has flat horizontal spacing with three identical conductors. The conductors have an outside diameter of 3.28 cm with 12 m between adjacent conductors. [14M]
   (i) Determine the capacitive reactance of the line per phase. Neglect the effect of the earth plane.
   (ii) Assuming that the conductors are horizontally placed 20 m above ground, determine capacitive reactance of the line per phase while considering the effect of ground. Consider the earth plane to be a perfect conductor.

UNIT-IV

7. Draw the single line diagram of 33KV/11KV substation showing all the equipment's. The station has one 33KV incoming line and two 11KV outgoing lines and two power transformers. [14M]

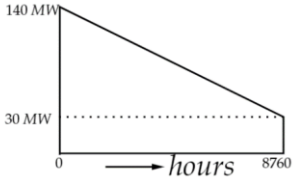
(OR)

8. a) Compare overhead and underground electrical distribution system. [7M]
   b) A 3-phase ring main ABCD, fed from one end A at 11kv supplies balanced loads of 30 A at 0.9 pf lagging at B, 50 A at 0.707 pf lagging at C and 40A at 0.8pf lagging at D, the load currents being referred to voltage at point A. Determine the currents in various sections and bus-bar voltages at B, C and D. The impedances are shown in the figure. [7M]



UNIT-V

9. a) The yearly duration curve of a certain plant can be considered as a straight line from 140MW to 30 MW as shown in fig. The power supplied with one generating unit of 95 MW capacity and two units of 45 MW capacity each. Determine: (i) Installed capacity (ii) maximum demand (iii) load factor (iv) plant capacity factor (v) utilization factor. [10M]



   b) What is the significance of load factor and diversity factor? [4M]

(OR)

10. a) What are the different systems of tariff used by electricity authority? Discuss any three of them and indicate the types of consumers where such tariffs are used. [8M]
   b) A light industry has a maximum demand of 100 KW. Two alternative tariffs are as follows: (i) A fixed charge of Rs 900 per KW plus a running charge of Rs 1.50 per unit. (ii) A charge of Rs 1.80 per unit flat. If the factory runs for 3000 hours with a load factor of 80% which tariff is economical. [6M]

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