

B.E. (Mechanical Engineering) Seventh Semester (C.B.S.)

**Elective - I : Power Plant Engineering**

P. Pages : 2

Time : Three Hours



**NRT/KS/19/3555**

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Solve Question 9 OR Questions No. 10.
  7. Solve Question 11 OR Questions No. 12.
  8. Due credit will be given to neatness and adequate dimensions.
  9. Assume suitable data whenever necessary.
  10. Use of steam table, Mollier diagram is permitted.

1. a) What is load curve? give its significance. 4
- b) A generating unit of 10 MW capacity supplies the following loads: 10
- i) Domestic consumers with maximum demand of 6 MW at a load factor of 20%
  - ii) Small industrial load with maximum demand of 3.6 MW at a load factor of 50%
  - iii) Street light load with maximum demand of 400KW at 30% load factor.
- Find overall cost of energy per kWh for each type of consumer using following data.
- Capital cost of the plant = Rs. 10,000 per kW  
total running cost = Rs. 36,00,000 per year.  
Annual rate of interest and depreciation on  
Capital cost = 10%

**OR**

2. a) The yearly duration curve of certain plant can be considered as a straight line from 20 MW to 3 MW. To meet this load, three turbine generator units, two rated at 10 MW and one at 5 MW are installed 8
- Determine
- i) Installed Capacity
  - ii) Plant factor
  - iii) Maximum demand
  - iv) Load factor
  - v) Utilization factor.

- b) Explain the principle of economic scheduling. 6

3. In a thermal power plant steam expands from 150 bar, 550°C to 0.1 bar. Find out extraction point for four regenerative heaters. What would be the amount of bleeding steam in each case. 13

**OR**

4. a) Explain with neat sketch modern pulverized coal fired thermal power plant. 7
- b) Write a short note on combined cycle power plant. 6

5. a) Explain pulverized fuel firing and list its advantages and disadvantages. **6**  
 b) Discuss fluidized bed combustion. What are the advantages and limitation of FBC? **7**

**OR**

6. a) What is the principal of an electrostatic precipitator? With the help of neat diagram, Explain electrostatic precipitator. **7**  
 b) With the help of neat diagram, explain the working of two types of Air preheater. **6**
7. a) A hydro-electric installation has a catchment area 64 sq.km and the run-off is 70%. The average rainfall per year is 1300 mm and the head is 450m. Find the available power if the rainfall is 80% **8**  
 b) Discuss factors affecting the run off. **6**

**OR**

8. a) The run off data of a river at a particular site is tabulated as below. **10**

Month	Mean discharge (Millions m <sup>3</sup> )	Month	Mean discharge (Million's m <sup>3</sup> )
Jan	30	July	80
Feb	25	Aug	100
Mar	0	Sept	110
April	0	Oct	65
May	10	Nov	45
June	90	Dec	30

- i) Draw the hydrograph and flow duration curve.  
 ii) Find the power developed if the head available is 90 m and overall efficiency of generations 85%
- b) Explain the function of surge tank in hydraulic power plant. **4**
9. a) Write a short note on **6**  
 i) Binding energy ii) Fuel Burn up.  
 b) Draw the neat sketch of Pressurize Water Reactor (PWR) and explain the role of pressurizer in PWR. **7**

**OR**

10. Each fission of U-235 yields 190 MeV of useful energy. Assuming that 85% of neutrons absorbed by U-235 cause fission, the rest being absorbed by non fission capture to produce an isotope U-236, Estimate the fuel consumption of U - 235 per day to produce 3000 MW of thermal power. **13**
11. a) Explain with neat sketch closed and open cycle gas turbine power plant along with its advantages and disadvantages. **7**  
 b) Draw and explain typical diesel engine power plant. **6**

**OR**

12. Write a short note on **13**  
 i) MHD power generation ii) Solar thermal power generation  
 iii) Wind power generation.

\*\*\*\*\*