U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: VII**
Branch: Mechanical Engineering **Duration: 3 hrs.**
Course Code: 20ME7DEPPE **Max Marks: 100**
Course: Power Plant Engineering **Date: 28.02.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may suitably be assumed.

UNIT - I

1 a) Explain proximate and ultimate analysis of coal. **06**

b) With a neat sketch explain the working of Velox boiler. **07**

c) Explain the working of chain grate stoker. **07**

OR

2 a) Prove that for natural Draught $h = 353H\left[\frac{1}{\text{Ta}} - \frac{m+1}{m}\frac{1}{\text{Tg}}\right]$ with suitable meaning for h and H. **07**

b) Calculate the mass of flue gases flowing through the chimney when the draught produced is equal to 1.9cm of water. Temperature of flue gases is 290° C and ambient temperature is 20° C. The flue gases formed per kg of fuel burnt are 23kg. Neglect the losses and take the diameter of the chimney as 1.8m. **07**

c) Draw the sketches of forced, natural and balanced draught system. **06**

UNIT - II

3 a) Draw the layout of diesel engine power plant. **06**

b) Explain thermostat and evaporative cooling in diesel engine power plant. **06**

c) Explain different methods to start diesel engine power plant. **08**

UNIT - III

4 a) The runoff data of a river at a particular site is obtained in following table **12**

Month	Mean discharge in millions of m^3
Jan	30
Feb	25
Mar	20
Apr	0
May	10
Jun	50
Jul	80
Aug	100
Sept	110
Oct	65
Nov	45
dec	30

a) Draw the hydrograph and find the mean flow
b) Draw the flow duration curve

Find the power developed if the head available is 90m and the overall efficiency of generation is 86%. Assume each month is of 30 days duration.

b) Explain the working of surge tanks and draft tubes. **08**

OR

5 a) Explain the neutron life cycle. **08**

b) Explain the working of a PWR. **06**

c) Explain the working of a BWR. **06**

UNIT - IV

6 a) Illustrate the terms: diversity factor, plant capacity factor and plant use factor. **06**

b) Explain the effect of variable load on power plant operations. **06**

c) The peak load on a power plant is 60MW.the loads having max demands of 30MW,20MW, 10MW, and 14MW are connected to the power plant. The capacity of the plant is 80MW. The annual load factor is 0.5. Estimate i) The average load on the power plant, ii) The energy supplied per year iii) The demand factor d) The diversity factor **08**

UNIT - V

7 a) What are Supercritical CO_2 Power Cycles? **08**

b) Discuss with help of neat sketch simple closed-loop Brayton Cycle. **06**

c) With the help of sketch, explain waste-to-heat recovery cycle. **06**

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