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06ME54

Fifth Semester B.E. Degree Examination, December 2010
Energy Engineering

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting at least TWO questions from each part.***
2. Use of thermodynamic data handbook is permitted.

PART – A

1 a. With a neat sketch, explain the working of spreader stoker. State the limitations of it. **(10 Marks)**

b. Draw a line diagram of pneumatic ash handiing system and explain its working. Mention its advantages. **(10 Marks)**

2 a. What are the advantages of high pressure boiler? With a neat sketch, explain the working of Benson boiler. **(10 Marks)**

b. Find the draught produced in mm of water by a chimney 40m high and discharging 20 kg of flue gases per kg of fuel burned in the combustion chamber. The temperature of the flue gases and ambient air are 270°C and 23°C respectively. Assuming the diameter of the chimney as 1.5m and 30% of the theoretical draught is lost in friction, find the mass of the flue gases passing through the chimney per minute. **(10 Marks)**

3 a. Draw a line diagram to show the layout of diesel power plant. Describe it in brief. **(10 Marks)**

b. State the applications of diesel engines in power field. List at least six advantages and four disadvantages of diesel power plant. **(10 Marks)**

4 a. How are the hydro-electric power plant classified? With a neat sketch, explain the pumped storage plant. **(10 Marks)**

b. The runoff data of a river at a particular site is tabulated below:

Month	Mean discharger per month (millions of cu m)	Month	Mean discharger per month (millions of cu m)
January	40	July	75
February	25	August	100
March	20	September	110
April	10	October	60
May	0	November	50
June	50	December	40

i) Draw a hydrograph and find the mean flow.
ii) Draw the flow duration curve.
iii) Find the power in MW available at mean flow if the head available is 80m and overall efficiency of generation in 85%. Take each month of 30 days. **(10 Marks)**

PART – B

5 a. Draw a schematic sketch of a PWR , label all the parts, state the function of each component. Mention its advantages. **(10 Marks)**

b. Explain the following :
   i) Reactor shielding
   ii) Radio active waste disposal. **(10 Marks)**

6 a. What are the main applications of the solar pond? Explain with the help of a neat diagram, a solar pond electric power plant. **(10 Marks)**

b. Wind at 1 standard atmospheric pressure and 15°C has velocity of 15 m/s. The turbine has diameter of 120m and its operating speed in 40 rpm at maximum efficiency. Calculate
   i) The total power density in the wind stream.
   ii) Maximum obtainable power density assuming $\eta = 35\%$.
   iii) Total power and torque. **(10 Marks)**

7 a. Name the components of the tidal power plants. With a neat sketch, explain the closed cycle OTEC. **(10 Marks)**

b. What are the factors considered for selecting a suitable site for tidal power plants? List six advantages and four disadvantages of geothermal energy over other energy forms. **(10 Marks)**

8 a. What is meant by anaerobic digestion? What are the factors which affect biodigestion? Explain any two, in brief. **(10 Marks)**

b. How are the gasifiers classified? With a schematic diagram, explain the working of downdraft gasifier. **(10 Marks)**

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