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10ME53

Fifth Semester B.E. Degree Examination, June/July 2019

Energy Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1
 - a. What is meant by 'overfeed' and 'under feed' principles of firing of coal? (02 Marks)
 - b. Explain the working principle of over feed stoker of coal with neat sketch. (07 Marks)
 - c. What are the salient features of 'chain grate stoker'? (06 Marks)
 - d. Name the different type of pulverised coal burners and describe working of tangential coal burner. (05 Marks)
- 2
 - a. What are functions of a boiler? Explain the working principle of 'Benson' boiler with neat figure and state the important features of this boiler. (08 Marks)
 - b. What are the functions of boiler mountings and accessories? (02 Marks)
 - c. State the functions of the 'chimney' and determine the height of the chimney by using the following data :-
15 kg of air supplied in the combustion chamber of a boiler using 600 kg/hr. Temperature of flue gases and ambient are 237°C and 32°C respectively. If the minimum draught required is 9.5 mm of water. (10 Marks)
- 3
 - a. State the field application of diesel engine power plant. (05 Marks)
 - b. State the importance of lubricating and cooling systems in diesel engine power plant. (05 Marks)
 - c. Describe the working of wet sump lubrication system. (05 Marks)
 - d. What are the different methods used for starting of diesel engine of power plant and explain the electric starting method. (05 Marks)
- 4
 - a. Define the following terms: (i) Hydrograph (ii) Mass curve (iii) Flow-duration curve and state the importance each. (06 Marks)
 - b. Run-off data of a river at a particular site for twelve months is tabulated below. Determine the power developed in MW, if the head available is 80 m, the whole water is utilized and the overall efficiency of the power generation is 85%. Assume each month of 30 days.

Runoff data table:

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Runoff (Mm ³) per month	40	25	20	10	0	50	75	100	110	60	50	40

Note: Mm³ - Millions of meter cube.

- c. Explain the working principle of pumped storage plant (hydroelectric). (07 Marks)

PART - B

- 5
 - a. What are the isotopes? What is meant by radioactive decay? (05 Marks)
 - b. Describe the nuclear fission process. (05 Marks)
 - c. Name the important components of nuclear reactor and state the functions of each. (05 Marks)
 - d. Explain briefly the working principle of liquid metal cooled reactor with neat sketch. (05 Marks)

- 6 a. Define the terms, global radiation, beam radiation and sunshine hours and name the instruments used to measure solar radiations and sunshine hours. (04 Marks)
- b. Explain the working of photo voltaic cell with neat sketch. (06 Marks)
- c. For horizontal axis 'wind turbine' show that the available wind power, $P_a = \frac{1}{8} \pi D^2 V^3 \rho$. Discuss the factors which are influencing on wind power where D = diameter of rotor, V = velocity, ρ = density of the air. (05 Marks)
- d. State the functions of the following components of horizontal axis wind turbine:
- | | |
|------------------------------------|---------------|
| i) Blade | ii) Rotor |
| iii) Yaw drive | iv) Pitch |
| v) Low speed and high speed shafts | vi) Generator |
| vii) Nacelle | viii) Hub |
- (05 Marks)
- 7 a. Define the terms Tidal Range and tidal energy and explain the working of single basin and single effect tidal scheme power plant. (08 Marks)
- b. Mention the important machines developed to harness the wave energy and describe the working of Heaving float type machine. (06 Marks)
- c. What is meant by ocean thermal energy? Mention the salient features of closed cycle ocean thermal energy conversion plant (Anderson cycle). (06 Marks)
- 8 a. What is meant by anaerobic digestion? State the components of floating drum (KVIC) type biogas plant and state the function of each. (08 Marks)
- b. What are the objectives of energy plantation? Mention any five species recommended for plantation. (04 Marks)
- c. What is a producer gas? Describe the working of updraft gasifier with neat figure. (08 Marks)

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