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10ME53

**Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019**  
**Energy Engineering**

Time: 3 hrs.

Max. Marks:100

**Note:** Answer any FIVE full questions, selecting atleast TWO questions from each part.

**PART – A**

- 1
  - a. With a neat sketch, explain the “Unit System” of handling pulverized coal. (05 Marks)
  - b. Explain the working of a Spreader Stoker, with a neat sketch. (07 Marks)
  - c. Briefly explain the various steps involved in coal handling. (08 Marks)
  
- 2
  - a. Explain the Benson Boiler, with neat sketch. (06 Marks)
  - b. What is the function of Air preheaters? How they are classified? List the principal benefits of preheating air. (04 Marks)
  - c. A boiler uses 2000 kg/hr of coal. The temperature of air supplied is 300K and the average temperature of the flue gas leaving the chimney is 650K. The 33m high steel chimney produces a draught of 20mm water columns. Determine i) the quantity of air supplied per kg of coal ii) the draught in terms of column of hot gases iii) the base diameter of the chimney, assuming that 10% of theoretical draught is used for creating flow velocity of gases through the chimney. (10 Marks)
  
- 3
  - a. With a neat sketch, explain the air exhaust system in diesel engines. What care must be taken while designing exhaust system? (06 Marks)
  - b. Explain different methods used in starting diesel engines. (06 Marks)
  - c. List the important functions of the lubrication system. With a neat sketch, explain any one type of wet sump, lubrication system used in IC engines. (08 Marks)
  
- 4
  - a. Explain pumped storage hydroelectric power plant, with a neat sketch. (05 Marks)
  - b. Explain the following terms related to hydroelectric power plant :  
 i) Water hammer      ii) Surge tank. (05 Marks)
  - c. At a particular site of river for hydro power, the mean monthly discharge for 12 months from April 2009 to March 2010 is tabulated below.

Month	Discharge (Millions of m <sup>3</sup> per month)	Month	Discharge (Millions of m <sup>3</sup> per month)
April	250	October	1000
May	100	November	750
June	750	December	750
July	1250	January	500
August	1500	February	400
September	1200	March	300

- i) Draw the hydrograph for the given discharges and find the average monthly flow.
- ii) Draw the duration curve.
- iii) The power available at the mean flow of water available head is 80 meters at the site and overall efficiency of the generation is 85%. Take 30 days in a month. (10 Marks)



PART – B

- 5 a. Explain the sodium – graphite nuclear reactor , with a neat sketch. (08 Marks)  
b. Draw a neat diagram of Pressurised water reactor and list out its advantages and its disadvantages. (07 Marks)  
c. Write a short note on Radioactive Waste Disposal. (05 Marks)
- 6 a. Explain the working of a solar cell with neat sketch. List the applications of solar photovoltaic system. (09 Marks)  
b. Draw the block diagram, showing the basic components of Wind Energy Conversion System (WECS). Also list the disadvantages of WECS. (07 Marks)  
c. Write short note on Solar Radiation measurement. (04 Marks)
- 7 a. With a schematic diagram, describe the working of a liquid – dominated binary fluid geothermal power plant. (08 Marks)  
b. List the problem associate with ocean Thermal Energy Conversion. (05 Marks)  
c. What are the different techniques of harnessing tidal energy? With neat sketch, explain tidal power plant with double basin operation. (07 Marks)
- 8 a. Explain the photosynthesis process. (04 Marks)  
b. List the factors affecting biogas generation. (04 Marks)  
c. Draw a neat sketch, showing the construction of a 'floating gas holder' type biogas plant. Mention its advantages. (06 Marks)  
d. Explain down draft gasifier, with a neat sketch. (06 Marks)

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