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15ME71

## Seventh Semester B.E. Degree Examination, Jan./Feb. 2021 Energy Engineering

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

### Module-1

- 1 a. What is pulverized coal? Explain with neat sketch overfeed and underfeed principle of coal firing. (12 Marks)
- b. List the advantages and limitations of pulverized coal. (04 Marks)

OR

- 2 a. With neat sketch explain the working principle of Benson boiler. (08 Marks)
- b. Define draught and explain the operation of induced draught system with neat sketch. (08 Marks)

### Module-2

- 3 a. Draw the layout of Diesel engine power plant and explain its operation. (06 Marks)
- b. Describe the different methods of starting the Diesel engine. (06 Marks)
- c. Mention the application of Diesel engines in power field. (04 Marks)

OR

- 4 a. Explain briefly about
  - i) Surge tank
  - ii) Water hammer effect. (08 Marks)
- b. The runoff data of a river at a particular site is tabulated below :

Month	Mean in discharge per month in million of m <sup>3</sup>
Jan	40
February	25
March	20
April	10
May	0
June	50
July	75
August	100
September	110
October	60
November	50
December	40

- i) Draw the flow duration curve
  - ii) Also draw hydrograph and find the mean flow (08 Marks)

### Module-3

- 5 a. Explain with neat sketch working principle of solar pond electric power plant. (08 Marks)
- b. What is Solar radiation? Explain the working principle of pyranometer with neat sketch. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.



**OR**

- 6 a. What is photovoltaic cell? Explain the principle of photo-voltaic conversion. (08 Marks)  
b. Calculate the Local Apparent Time (LAT) corresponding to 13.30hrs (IST) on July 16, 1998 at Delhi (28°35' N 77°23'E). The equation at the time correction on July 16 is (–6) minutes. Indian Standard Time (IST) use the local civil time corresponding to 82°5'E longitude. Also calculate the declination. (08 Marks)

**Module-4**

- 7 a. Explain the method of harnessing wind energy using the horizontal axis wind machine with neat sketch. (08 Marks)  
b. Explain the method of harnessing tidal energy using the double basin system. (08 Marks)

**OR**

- 8 a. A horizontal shaft, propeller type wind turbine is located in area having the following wind characteristics.  
i) Total power density in wind steam  $W/m^2$   
ii) Maximum possible obtainable power density in  $W/m^2$   
iii) Actual obtainable power density in  $W/m^2$  assume 40% efficiency  
iv) Total power from the wind turbine of 120m diameter. (08 Marks)  
b. Mention the difference between vertical and horizontal wind turbines. (08 Marks)

**Module-5**

- 9 a. Explain with neat sketch working principle of KVIC biogas digester. (08 Marks)  
b. What is anaerobic digestion? What are the factors which affect biodigestion. (08 Marks)

**OR**

- 10 a. Briefly explain Alkaline Fuel cell and Molten carbonate fuel cells. (08 Marks)  
b. Write short notes on Geothermal energy and state the advantages and limitations (08 Marks)

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