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BME-031

B.Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

00732

Term-End Examination

December, 2017

BME-031 : ENERGY CONVERSION

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. (a) Explain the different forms of energy available on earth. Classify them into two groups. Which form of energy is most widely used and why ?

(b) What is the function of a condenser in a steam thermal power plant ? Explain with the help of Rankine cycle. *5+5*

2. (a) With a neat sketch, explain the functioning of a 4-stroke petrol engine. What is the other type of engine and what advantages does it offer over a 4-stroke engine ?

(b) What are the methods of removing particulate matter from flue gases ? Describe any one of them. *5+5*

3. (a) What is wind energy ? Mention suitable locations in India where wind energy can be exploited.

   (b) Explain with a neat sketch, the principle of working of an impulse steam turbine. *5+5*

4. (a) Discuss the necessity of condensers.

   (b) How does the overall efficiency of a combined gas turbine power plant improve using reheat, regeneration and intercooling together ? *5+5*

5. (a) Explain the following laws of thermochemistry :

      (i) Hess's law of constant heat summation

      (ii) Law of Lavoisier and Laplace

   (b) Give the classification of boilers and write one example of each. *5+5*

6. Explain the following terms in connection with a hydro-electric power plant : *5×2=10*

   (a) Dam

   (b) Spillway

   (c) Penstocks

   (d) Surge Tank

   (e) Head race and Tail race

7. (a) A symmetric vane moving with a speed of V_0 is struck by a jet of velocity V at angle α with the central line. Draw the velocity diagram at entry and exit and define all velocity components.

(b) In how many different ways can solar energy be used for generating power ? Despite solar energy being free, use of solar energy power is very less. Give reasons. Describe other applications of solar energy. *5+5*

8. (a) What are the different types of coals ? Which of these coals contains maximum moisture and which contains maximum carbon ?

(b) Name the important gaseous pollutants discharged by thermal power plants. How are they controlled ? *5+5*

9. (a) Differentiate between boiler mountings and boiler accessories. Give two examples and sketch one boiler mounting.

(b) In a reaction turbine, the enthalpy drop in the fixed blade ring is 50 kJ per kg and the enthalpy drop in the moving blade ring is 25 kJ per kg. Calculate the degree of reaction of the turbine. *5+5*

10. (a) In a boiler, feed water supplied per hour is 205 kg while coal fired per hour is 23 kg. Net enthalpy rise per kg of water is 145 kJ for conversion to steam. If the calorific value of coal is 2050 kJ/kg, then compute the efficiency of the boiler.

(b) A reaction turbine discharges 3 m^3/sec of water under a head of 10 m with an overall efficiency of 92%. Calculate the power developed by the turbine. *5+5*