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BME-058

DIPLOMA IN MECHANICAL ENGINEERING (DME)

00850

Term-End Examination

June, 2014

BME-058 : POWER PLANT ENGINEERING

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any **five** questions. Assume if any data is missing. Use of scientific calculator is permitted.*

1. (a) What are the basic coal ingredients and how do they affect the furnace design ? Explain. 7

(b) What are the factors considered in selecting a site for a thermal power plant ? 7

2. (a) What is a cooling tower ? How are the cooling towers classified ? Explain any one of them with a neat sketch. 7

(b) Explain the effects of air leakage in a condenser. 7

3. (a) A single stage steam turbine is provided with nozzles from which steam is released at a velocity of 1000 m/s at an angle of 24° to the direction of motion of blades. The blade angles at inlet and outlet are equal. The spped of the blade is 400 m/s.

Find :

(i) inlet blade angle.

(ii) force exerted on blades in the direction of their motion.

(iii) power developed in kW for steam flow rate of 40,000 kg/hr. Assuming the steam enters and leaves the blades without shock. *9*

(b) How are turbines classified ? Explain clearly the difference between Impulse and Reaction turbine. *5*

4. (a) Explain the construction and working of nuclear power plant. *7*

(b) What are the advantages and disadvantages of diesel power plant ? *7*

5. (a) A gas turbine has an overall pressure ratio of 5 : 1 and a maximum cycle temperature of 550° C. The turbine drives the compressor and an electric generator, the mechanical efficiency of the drive being 97%. The ambient temperature is 20°C and the isentropic efficiencies of the compressor and turbine are 0·8 and 0·83 respectively. Calculate the power output in kW for an air flow of 15 kg/s. Calculate the thermal efficiency and work ratio. Neglect changes in kinetic energy and the loss of pressure in combustion chamber. *9*

(b) What is cavitation ? How can it be avoided ? *5*

6. (a) What is a Kaplan turbine ? How does it differ from a Propeller turbine ? *6*

(b) Describe methods of governing of impulse turbine. *8*

7. (a) Enumerate various types of loads. What is the significance of load curves ? *7*

(b) List the various costs which form the total cost of a power station. *7*

8. Write short notes on any ***two*** of the following : *7+7*

(a) Capital (or) fixed cost

(b) Dry sump lubrication system

(c) Power plant economics