DIPLOMA IN MECHANICAL ENGINEERING (DME)

00297

Term-End Examination

June, 2010

BME-052 : BASICS OF THERMAL ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *All questions are* **compulsory.** *Use of calculator is permitted.*

1. Answer *any two* of the following : 2x7=14

   (a) Define a steam turbine and state its fields of application.

   (b) State the methods of increasing the thermal efficiency of a Rankine cycle.

   (c) State the First Law of Thermodynamics and prove that for a non-flow process, it leads to the energy equation $Q = \Delta U + W$

2. Answer *any two* of the following : 2x7=14

   (a) Define a steam condenser and state its fields of application.

   (b) Explain briefly the zeroth law of Thermodynamics.

   (c) Describe in brief the "bleeding of steam turbine".

3. Answer *any two* of the following : 2x7=14

(a) Derive an expression for heat loss in kJ/m^2-hr through a composite wall of layers without considering convective heat transfer co-efficients.

(b) Discuss the need for cooling towers and cooling ponds. How are cooling towers classified ?

(c) Enumerate the comparison between 'Fire-tube and Water-tube' boilers.

4. Answer *any two* of the following : 2x7=14

(a) Describe in brief the three modes of heat transfer. Which is the slowest of all ?

(b) Briefly explain the ash handling disposal circuit of a Thermal Power Plant.

(c) What do you understand by the 'Clausius Statement of second law of Thermodynamics' ?

5. Answer *any two* of the following : 2x7=14

(a) Describe in brief the various non-conventional energy sources.

(b) What are the different types of solar water heating systems ?

(c) A Carnot cycle operates between source and sink temperature of 250°C and −15°C. If the system receives 90 kJ from the source, find ;

(i) Efficiency of the system.

(ii) The net work transfer.

(iii) Heat rejected to sink.

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