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BIME-002

B.Tech. – VIEP – MECHANICAL ENGINEERING (BTMEVI)

00852

Term-End Examination

December, 2017

BIME-002 : THERMAL ENGINEERING – I

Time : 3 hours *Maximum Marks : 70*

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

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1. (a) Why is excess air to be supplied in a C.I. engine ? Why is starting a diesel engine difficult in cold weather conditions ?

(b) Distinguish between detonation and diesel knock. *5+5*

2. What is the Joule-Thomson coefficient ? Why is it zero for an ideal gas ? *10*

3. What is the effect of reheat on (a) the specific output, (b) the cycle efficiency, (c) steam rate, and (d) heat rate of a steam power plant ? *10*

4. (a) What is a binary vapour cycle ?

   (b) What are topping and bottoming cycles ? *5+5*

5. (a) What do you understand by choking in nozzle flows ?

   (b) Show that the discharge through a nozzle is maximum when there is a sonic condition at its throat. *5+5*

6. Show that the efficiency of the Brayton cycle depends only on the pressure ratio. *10*

7. (a) Explain the effects of (i) intercooling, and (ii) reheating on Brayton cycle.

   (b) With the help of flow and T-s diagram, explain the air standard cycle for a jet propulsion plant. *5+5*

8. (a) What are the functions of boiler mountings ? Can a boiler work without mountings ?

   (b) How do boiler accessories differ from mountings ? *5+5*

9. (a) Define a steam turbine and state its field of application. Enumerate the energy losses in stream turbines.

   (b) Explain the difference between an impulse turbine and a reaction turbine. *5+5*

10. The air enters the compressor of an open cycle constant pressure gas turbine at 1 bar, 20°C. The pressure of air at the end of compression is 4 bar. The maximum temperature in the cycle is 700°C. If the air flow rate is 3 kg/s, determine the power developed and thermal efficiency.

(C_p= 1 kJ/kg K, ν = 1·4) *10*
