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

Term-End Examination

00193

June, 2018

## BIME-002 : THERMAL ENGINEERING – I

*Time : 3 hours*                    *Maximum Marks : 70*

*Note :* *Attempt any* **seven** *questions. Use of calculator is allowed. Use of steam table is permitted.*

1. (a)  Explain Maxwell relations. What is their significance in thermal engineering ?     5

   (b)  What do you understand by Joule-Thomson coefficient ? Explain.     5

2. (a)  In context to a steam turbine, define any **two** of the following :     5

   (i)   Stage efficiency

   (ii)  Speed ratio

   (iii) Blade velocity coefficient

   (b)  Differentiate between an Impulse turbine and a Reaction turbine.     5

**3.** (a) Coal having the following composition by mass is burnt with theoretically correct amount of air :

86% C, 6% H, 5% O, 2% N, 1% S

Determine the air-fuel ratio used for combustion of coal. *5*

(b) Explain enthalpy of combustion and enthalpy of formation. *5*

**4.** (a) Dry saturated steam at 10 bar and 100 m/s enters a nozzle and leaves it with a velocity of 300 m/s at 5 bar. For 16 kg/s of steam mass flow rate, determine heat drop in nozzle and final state of steam leaving the nozzle, assuming rate of heat loss to surroundings is 10 kJ/sec. *5*

(b) With the help of T-s and h-s diagrams, explain the working of a Rankine cycle. *5*

**5.** What do you mean by High Pressure Boiler ? With a neat sketch, explain the working principle of a Benson Boiler. *10*

**6.** (a) Describe the construction and working of a Ramjet engine. *5*

(b) Explain the principle of Rocket propulsion. *5*

**7.** (a) Explain the method of regeneration used in the vapour power cycle with a T-s diagram. *5*

(b) Describe binary vapour cycles. *5*

**8.** (a) Explain air leakage in a steam condenser. *5*

(b) How are steam condensers classified ? With a neat sketch, describe the working of a surface condenser. *5*

**9.** Write short notes on any *two* of the following : *2×5=10*

(a) Carnot Cycle

(b) Adiabatic and Isothermal Compressibility

(c) Boiler Mountings

(d) Indicator Diagram

---