**Roll No.** ☐☐☐☐☐☐☐☐☐☐☐☐          **Total No. of Pages : 02**

**Total No. of Questions : 09**

**B.Tech.(ME) (2012 Onwards)     (Sem.–4)**
# APPLIED THERMODYNAMICS–II
**Subject Code : BTME-404**
**M.Code : 59132**

**Time : 3 Hrs.**                                      **Max. Marks : 60**

**INSTRUCTIONS TO CANDIDATES :**
 1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
 2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
 3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

## SECTION-A

1. **Answer briefly :**

   a.  What is the difference between reciprocating and rotary air compressors?

   b.  List three different applications of rotary air compressors.

   c.  Define Isentropic Efficiency of a centrifugal compressor.

   d.  Define Degree of reaction for axial flow compressor.

   e.  How does gas turbine differ from steam turbine?

   f.  When is multistage compression used for air?

   g.  Define Prewhirl.

   h.  Name at least three shortcomings of the gas turbines.

   i.  What is Euler work?

   j.  State principle of jet propulsion.

## SECTION-B

2.  Describe with neat sketch the working of a simple constant pressure open cycle gas turbine.

3.  Discuss various performance curves of a centrifugal compressor.

4. A simple closed cycle gas turbine plant receives air at 1 bar and 15° C, and compresses it to 5 bar and then heats it to 800° C in the heating chamber. The hot air expands in a turbine back to 1 bar. Calculate the power developed per kg of air supplied per second. Take $C_p$ for air is 1 KJ/Kg K.

5. Explain the effect of intercooling in a multistage reciprocating compressor.

6. The turbojet engine requires 0.18 kg per hour per N of thrust, when the thrust is 9 KN. The aircraft velocity is 500 m/s and mass of air passing through the compressor of the turbine is 27 kg per second. Determine the air-fuel ratio, thrust power and overall efficiency of this unit

**SECTION-C**

7. Explain why aerofoil blading is needed in axial flow compressors? Define angle of attack and its effects on static pressure distribution on blades.

8. A 4 cylinder double acting compressor is required to compress 30 $m^3$/min. of air at 1 bar and 27° C to a pressure of 16 bar. Determine the size of motor required and cylinder dimensions if the following data is given :

   i) Speed of the compressor N = 320 r.p.m,

   ii) Clearance volume $V_c$ = 4%,

   iii) Stroke to bore ratio L/D = 1.2,

   iv) Mechanical efficiency = 82%

   v) Value of index n= 1.32. Assume no pressure change in suction valves and the air gets heated by 12° C during suction stroke.

9. i) Write a short note on :

   a) Turbo prop

   b) Ram jet.

   ii) Compare vane blower and root blower rotary compressors.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student**.