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

Total No. of Questions : 18

B.Tech. (AE) (2012 to 2017) (Sem.–3)
APPLIED THERMODYNAMICS
Subject Code : BTAE-302
M.Code : 54110

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTION 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

Write briefly :

1. What is the role of intercooler in multi stage compression?

2. What is the effect of clearance volume on swept volume of a reciprocating compressor?

3. What is slip factor?

4. What is degree of reaction?

5. Define the term jacketing.

6. What is thrust power?

7. Name the main components of axial compressor.

8. How axial compressor is different from centrifugal compressor?

9. Classify various jet propulsion engines.

10. What is work ratio?

SECTION-B

11. Explain the construction and working of roots blow compressor.

12. Compare the reciprocating and centrifugal compressors.

13. Prove that efficiency of Brayton cycle depends on the pressure ratio only.

14. Explain the effect of reheat and regeneration on the efficiency and output of gas turbine.

15. Explain various methods of achieving isothermal efficiency in reciprocating compressor.

SECTION-C

16. A reciprocating air compressor has cylinder with 24 cm bore and 36 cm stroke. Compressor admits air at 1 bar, 17°C and compresses it up to 6 bars. Compressor runs at 120 rpm. Considering compressor to be single acting and single stage determine mean effective pressure and the horse power required to run compressor when it compresses following the isothermal process and polytropic process with index of 1.3. Also find isothermal efficiency when compression is of polytropic and adiabatic type.

17. Jet propulsion engine has compressor with pressure ratio 4 and compressed air enters into combustion chamber where combustion occurs so as to yield temperature of 500°C at turbine inlet. Actual temperature at inlet to combustion chamber is 10% more than that of isentropic compressor temperature rise. Exhaust from turbine is expanded up to atmospheric pressure of 1 bar. The ambient temperature is 285 K. Determine, (i) power required to drive compressor, (ii) air fuel ratio if calorific value of fuel is 43100 kJ/kg, (iii) static thrust developed per kg of air per second.

18. Differentiate between axial and centrifugal 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.