

Roll No.

Total No. of Pages : 02

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B.Tech.(AE) (2018 Batch) (Sem.-3)
ENGINEERING THERMODYNAMICS
 Subject Code : BTAE302-18
 M.Code : 76400

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. Write briefly :

- a) What are the assumptions made for air standard cycle analysis?
- b) For the same compression ratio and heat supplied, state the order of decreasing air standard efficiency of Otto, diesel and dual cycle.
- c) What are the effects of friction on the flow through a steam nozzle?
- d) What are the differences between supersaturated flow and isentropic flow through steam nozzles?
- e) What are the advantages of multi stage compression with internal cooling over single stage compression for the same pressure ratio?
- f) Why clearance is necessary and what is its effect on the performance of reciprocating compressor?
- g) What is the difference between air conditioning and refrigeration?
- h) Name the various components used in simple vapour absorption system.
- i) What is the important psychrometric process?
- j) What is meant by adiabatic saturation temperature (or) thermodynamic wet bulb temperature?

SECTION-B

2. The following data is referred for an air standard diesel cycle compression ratio = 15. heat added= 200 KJ/Kg, minimum temperature in the cycle = 25°C. Suction pressure = 1 bar, Calculate,
 - a) Pressure and temperature at the Salient point.
 - b) Thermal efficiency
 - c) Mean effective pressure,
 - d) Power output of the cycle, if flow rate of air is 2 Kg/s
3. Steam enters a group of nozzles of a steam turbine at 12 bar and 220° C and. leaves at 1.2 bar. The steam turbine develops 220 Kw with a specific steam consumption of 13.5 Kg/Kw/ hr. If the diameter of nozzle at throat is 7 mm. Calculate the number of nozzles.
4. Briefly explain the cooling load calculation in air conditioning system.
5. What is compounding of steam turbines? Explain different methods of compounding. Explain any one method.
6. A certain gas at high pressure and high temp, first expands adiabatically. After adiabatic expansion, it is compressed isothermally to its original volume. After this, the gas is heated at const. volume, so that gas is restored to original temperature. Represent this cycle on P-V and T-S diagram.

SECTION-C

7. Derive the expression, for air standard efficiency of Brayton cycle in terms of pressure ratio.
8.
 - a) Differentiate between :
 - i. Dry bulb temperature and wet bulb temperature
 - ii. Wet bulb depression and dew point depression
 - b) Air at 16°C and 25°C relative humidity passes through a heater and then through a humidifier to reach final dry bulb temperature of 30°C and 50% relative humidity. Calculate the heat and moisture added to the air. What is the sensible heat factor?
9. A single stage single acting air compressor is used to compress air from 1.013 bar and 25° C to 7 bar according to law $PV^{1.3} = C$. The bore and stroke of a cylinder are 120 mm and 150 mm respectively. The compressor runs at 250 rpm. If clearance volume of the cylinder is 5% of stroke volume and the mechanical efficiency of the compressor is 85%. Determine volumetric efficiency, power, and mass of air delivered per minute.

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.