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Total No. of Pages : 02

Total No. of Questions : 18

**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****Write briefly :**

1. What is the law of mass action?
2. What is the heat of reaction?
3. What is the effect of regeneration in Rankine cycle?
4. Write basic component of a steam power plant.
5. What is biggest loss in steam power plant, how it can be minimised?
6. Draw vapor compression cycle on PH and TS chart.
7. What is dry and wet compression?
8. Draw diesel cycle on PV and TS chart.
9. Define WBT, DBT and Relative humidity.
10. Write steady flow energy equation for nozzle.

**SECTION-B**

11. Determine the adiabatic flame temperature when liquid octane at 25°C is burned with 300% theoretical air at 25°C in a steady flow process.
12. Steam at 20 bar, 360°C is expanded in steam turbine to 0.08 bar. It then enters a condenser, where it is condensed to saturated liquid water. The pump feeds back the water into the boiler, assuming ideal process, calculate net work per kg of steam and cycle efficiency.
13. A diesel engine has a compression ratio of 14 and cut-off takes place at 6% of the stroke. Find the air standard efficiency.
14. Write briefly about the properties of an ideal refrigerant.
15. Prove the efficiency of Brayton cycle depends on pressure ratio only.

**SECTION-C**

16. A supersonic wind tunnel nozzle is to be designed for M=2, with a throat section, 0.11 m<sup>2</sup> in area. The supply pressure and temperature at the nozzle inlet, where the velocity is negligible are 70 kPa and 37°C respectively. Compute the mass flow rate, exit rate and the fluid properties at the throat and exit, take  $\gamma = 1.4$ .
17. Atmospheric air at 1.0132 bar has a DBT of 32°C and WBT of 26°C. Calculate (a) partial pressure of water vapour, (b) specific humidity, (c) dew point temperature, (d) relative humidity, (e) degree of saturation, (f) density of air in the mixture, (g) density of vapour in the mixture, and (h) enthalpy of the mixture.
18. With the help of neat sketch discuss the working of vapour absorption cycle.

**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.**