



# BRAINWARE UNIVERSITY

Term End Examination 2023  
Programme – Dip.ME-2019/Dip.ME-2021  
Course Name – Heat Transfer & IC Engine  
Course Code - DME404  
( Semester IV )

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Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

## Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) \_\_\_\_\_ is the basic requirement of a good combustion chamber.
- a) Low volumetric efficiency.
  - b) High compression ratio.
  - c) Low compression ratio.
  - d) High power output and high thermal efficiency.
- (ii) choose Maximum torque is generated by an engine when \_\_\_\_\_
- a) it runs at lowest speed.
  - b) it develops maximum power.
  - c) it consumes maximum fuel.
  - d) it runs at maximum speed.
- (iii) Select For a given temperature  $T_1$ , as the difference between  $T_1$  and  $T_2$  increases, the COP of a carnot heat pump \_\_\_\_\_
- a) increases.
  - b) decreases.
  - c) first increases, then decreases.
  - d) none of the mentioned.
- (iv) Select A Dual Cycle is a combination of \_\_\_\_\_
- a) Otto cycle and Diesel cycle.
  - b) Otto cycle and Stirling cycle.
  - c) Brayton cycle and steam cycle.
  - d) None of the mentioned.
- (v) Identify Which law of the thermodynamics provides basis for measuring the thermodynamic property?
- a) First law.
  - b) Zeroth law.
  - c) Second law.
  - d) Third law.
- (vi) Select The unit of temperature in S.I. units is
- a) Celsius.
  - b) Fahrenheit.
  - c) Kelvin.
  - d) Rankine.
- (vii) Select a system is said to be an open system when
- a) there is exchange of energy and mass across the boundary.
  - b) there is exchange of only energy across the boundary.
  - c) there is exchange of only mass across the boundary.
  - d) there is no exchange of energy and mass across the boundary.

- (viii) Select a system is achieved a state of "Thermodynamic Equilibrium", if
- a) The system has achieved its thermal and mechanical equilibrium, simultaneously..  
 b) The system has achieved its chemical and mechanical equilibrium, simultaneously..  
 c) The system has achieved its thermal, chemical, and mechanical equilibrium, simultaneously..  
 d) The system has achieved its mechanical equilibrium..
- (ix) select Which one of the following is extensive property?
- a) Temperature.  
 b) Pressure.  
 c) Total energy.  
 d) Specific enthalpy.
- (x) Identify When heat is transferred form hot body to cold body, in a straight line, without affecting the intervening medium, it isreferred as heat transfer by
- a) conduction.  
 b) convection.  
 c) radiation.  
 d) conduction and convection.
- (xi) Identify When heat is Transferred by molecular collision, it is referred to as heat transfer by
- a) conduction.  
 b) convection.  
 c) Radiation.  
 d) Scattering.
- (xii) Heat transfer in liquid and gases takes place by
- a) conduction.  
 b) convection.  
 c) radiation.  
 d) conduction and convection.
- (xiii) Classify Which of the following is the case of heat transfer by radiation
- a) blast furnace.  
 b) heating of building.  
 c) cooling of parts in furnace.  
 d) heat received by a person from fireplace.
- (xiv) Select Metals are good conductors of heat because
- a) their atoms collide frequently.  
 b) their atoms-are relatively far apart.  
 c) they contain free electrons.  
 d) they have high density.
- (xv) Choose The ratio of the volume of charge admitted at N.T.P. to the swept volume of the piston is called \_\_\_\_\_
- a) mechanical efficiency.  
 b) overall efficiency.  
 c) relative efficiency.  
 d) volumetric efficiency.

### Group-B

(Short Answer Type Questions)

3 x 5=15

2. state PMM1 (3)  
 3. Explain Radiation heat transfer. (3)  
 4. Explain the term Stefan's Bolts Mann law? (3)  
 5. Explain four-stroke engine? (3)  
 6. Explain the term break specific fuel consumption (3)

OR

Explain disel engine valve timing diagram (3)

### Group-C

(Long Answer Type Questions)

5 x 6=30

7. Describe work done in Isobaric process (5)  
 8. Distinguish between Absorptivity & Transmittivity of radiation. (5)  
 9. Define emissivity, absorptivity and reflectivity (5)  
 10. Explain the Dual cycle on P-V and T-S planes and order the various processes. (5)  
 11. Explain the P - v & T - s diagram for Otto cycle and Diesel cycle and Dual cycle for the same compression ratio and heat rejection, compare the efficiency. (5)  
 12. Explain the same compression ratio and heat supplied, Identify the order of decreasing air standard efficiency of Otto, Diesel and Dual cycles. (5)

**OR**

The compression ratio in an air-standard Otto cycle is 8. At the beginning of compression process, the pressure is 1 bar and the temperature is 300 K. The heat transfer to the air per cycle is 1900 kJ/kg of air. Calculate Thermal efficiency (5)

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