

MAHARASHTRA ANIMAL AND FISHERY SCIENCES UNIVERSITY, NAGPUR
SEMESTER END THEORY EXAMINATION, B.Tech. (D.T.) Degree Course 2017-18

Semester	: II (V Dean)	Academic Year	: 2017-2018
Course No.	: DE-204	Course Title	: Thermodynamics
Credits	: 1+1=2	Total Marks	: 50
Day & Date	: Monday, 11.06.2018	Time	: 11.00 to 13.00 Hrs.

- Note :**
- 1) All questions from **Section 'A'** are compulsory.
 - 2) Solve **Any Three** questions from **Section 'B'**.
 - 3) Draw neat and well labeled diagram wherever necessary.

SECTION - 'A'

Q. 1 A) Choose the most appropriate answer from the options given below. (05)

- i) The thermal efficiency of Carnot cycle/engine is equal to
 - a) $1 - (T_h/T_c)$
 - b) $(T_h + T_c)/T_h$
 - c) $1 - (T_c/T_h)$
 - d) None of these
- ii) The four operations, namely suction, compression, expansion and exhaust, in a four-stroke cycle are completed in the number of revolutions of crank shaft equal to
 - a) One
 - b) Two
 - c) Three
 - d) None of these
- iii) Which parameter remains constant during a reversible isothermal process
 - a) Rate of heat exchange
 - b) Internal energy
 - c) enthalpy
 - d) entropy
- iv) Compression ratio of a petrol engines is in the range of
 - a) 7 to 10
 - b) 16 to 20
 - c) 2 to 3
 - d) None of these
- v) Scavenging is process of
 - a) Removal of dirt air from carburetor
 - b) Removal of burnt gases from cylinder of an engine
 - c) Removal of oxygen from carburetor
 - d) None of these

B) Define the following. (05)

- i) Enthalpy
- ii) Zeroth law of thermodynamics
- iii) Entropy of a system
- iv) Intensive property
- v) Closed system

Q. 2 A) Do as directed (05)

- i) When two systems are at different energy level and brought together, the systems exchange energy, why?
- ii) Elaborate CI.
- iii) Why work has to be done, if energy has to flow from sink (low temperature reservoir) to source (high temperature reservoir)?
- iv) State the second law of thermodynamics.
- v) Why 100% energy efficient thermodynamic systems cannot be made?

(P.T.O.)

- B) Correct the given statement. (05)
- i) The value of gas constant R is $278 \text{ J/kg } ^\circ\text{K}$.
 - ii) According first law of thermodynamics energy can be created and destroyed.
 - iii) The Zeroth law of thermodynamics gives the concept of equilibrium.
 - iv) Heat and work are point function.
 - v) In SI engines diesel is used as fuel.

SECTION – 'B'

- Q. 3 A) An insulated cylinder of 0.4 m diameter and 0.8 m length contains 10 kg of oxygen. Paddle work is done on the gas to increase its pressure from 3 bar to 6 bar. Determine the change in internal energy, work done on the gas and the change in enthalpy. $C_p = 0.91 \text{ kJ/kg K}$ and $C_v = 0.64 \text{ kJ/kg K}$. (05)
- B) With the neat diagrams explain the Carnot cycle. Write expression for the efficiency of Carnot engine. (05)
- Q. 4 A) Give detail classification of engines. (05)
- B) Explain the working of four stroke engine in detail with neat diagram. (05)
- Q. 5 A) Differentiate between petrol engine and diesel engine. (03)
- B) Write a short note on thermodynamic temperature scales. (03)
- C) Discuss the specific heat of gases. (04)
- Q. 6 A) A reversible heat engine absorbs 2500 kJ/cycle of heat from a constant temperature heat source at 2000 K , and rejects some energy as waste to a reservoir X. The work output from the engine is used to drive a reversible refrigerator; its source temperature being 300 K . The heat outflow from the refrigerator is also taken to the reservoir X. If the total heat flow into the reservoir is 3000 kJ/Cycle , make calculations for the temperature of reservoir X. (03)
- B) With the help of neat diagram explain the working of CI engines. (03)
- C) Write a short note on 'Thermodynamic Systems'. (04)
- Q. 7 Discuss the laws related to the compression and expansion of gases. (10)
