Sub Code: RME051

Paper Id: 140501 Roll No:

B.TECH
(SEM V) THEORY EXAMINATION 2019-20
I.C.ENGINES AND COMPRESSORS

Time: 3 Hours *Total Marks: 70*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a.	Give the value of compression ratio for Otto cycle, Diesel cycle and Dual cycle.
b.	What do you mean by Carburetion?
c.	Differentiate among flash point temperature, fire point temperature and self-ignition temperature.
d.	What is the significance of Octane No and Cetane No for the different fuels?
e.	Can simple plain tube carburetor use at higher altitude? If yes and no then why?
f.	How ignition system is necessary in IC engine?
g.	Differentiate between 2 ways catalytic Convertor and 3 way catalytic Convertor.

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a.	Sketch the Diesel cycle on P-V and T-S diagram and show in the relevant diagram, the heat supplied and work done in various processes. Also derive the efficiency expression.
b.	Describe the phenomenon of detonation or knocking in CI engine.
c.	Explain the different factors affecting detonation in S.I. engine.
d.	In an air-standard Otto cycle, the compression ratio is 10. The condition at the beginning of the compression process is 100 kPa and 27 °C. Heat added at constant volume is 1500 kJ/kg, while 700 kJ/kg of heat is rejected during the other constant volume process in the cycle. Specific gas constant for air = 0.287 kJ/kgK. Calculate:- **(i)** Thermal efficiency **(ii)** Mean effective pressure (in kPa) of the cycle.
e.	A single cylinder and 4 stroke cycle I.C. engine when tested, the following observations available : Area of indicator diagram = 3 sq.cm, Length of indicator diagram = 4 cm, Spring constant = 10 bar/cm, Speed of engine = 400 rpm, Brake drum diameter = 120 cm, Dead weight on brake = 380 N, Spring balance reading = 50 N, Fuel consumption = 2.8 kg/hr., Cv = 42000 kJ/kg, Cylinder diameter = 16 cm, Piston stroke = 20 cm. Find : **(i)** F.P. **(ii)** Mechanical efficiency **(iii)** bsfc **(iv)** Brake thermal efficiency.

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a)	Compare the Otto, diesel and dual cycle.
(b)	Show that for an Otto cycle shown in figure $T_4 = T_2 = \sqrt{T1.\ T3}$ for maximum Workdone.

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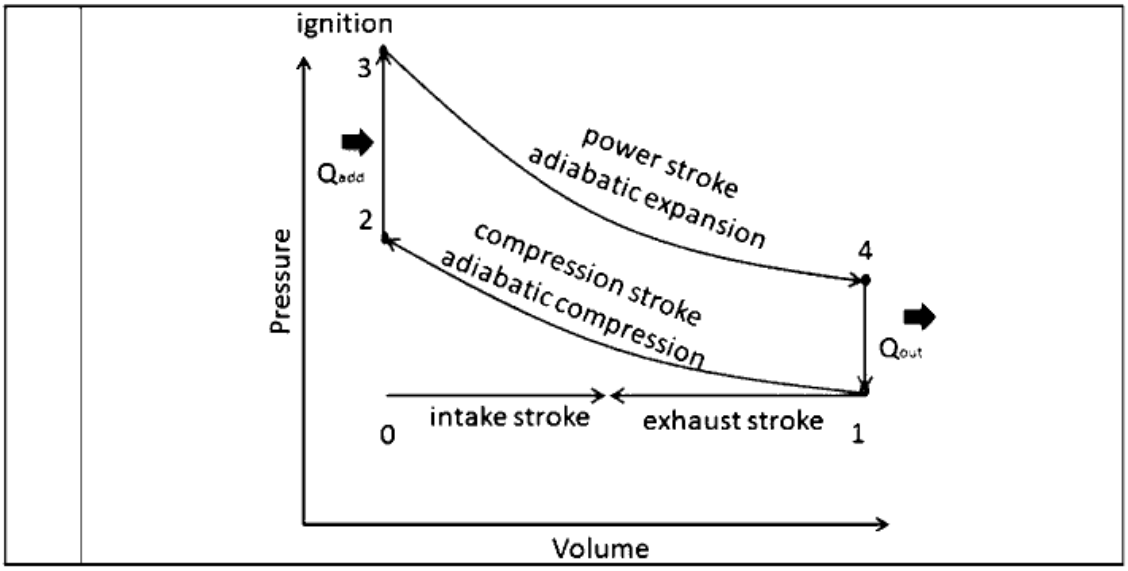

4. Attempt any *one* part of the following: 7 x 1 = 7

(a)	What is the importance of ignition system in S.I. engine? Explain different type of ignition system used in I.C. engine.
(b)	Explain the construction and working of a simple Carburettor. Also describe with suitable sketch the working of choke and idling system in case of Carburettor. https://www.aktuonline.com

5. Attempt any *one* part of the following: 7 x 1 = 7

(a)	What are the different kinds of fuel used in IC engine?
(b)	What is supercharging? Give the type of supercharger. Also explain the importance of supercharger in IC engine.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Discuss the valve timing diagram for 4 stroke SI engine.
(b)	State the functions of lubricants in IC engine. Also describe different types of lubrication system used in IC engine

7. Attempt any *one* part of the following: 7 x 1 = 7

(a)	What is single stage reciprocating compressor? Explain it with neat sketch. Also derive the expression for work input required per cycle. Neglect the clearance volume.
(b)	**(i)** Prove that in case of reciprocating compressor the condition for minimum work per kg of air delivered by its two stages with intercooling is achieved when intermediate pressure is geometric mean of suction pressure and final delivery pressure. **(ii)** A single acting reciprocating compressor (bore= 14 cm and stroke= 10 cm) having 4% clearance gives the following data obtained from performance test. Suction pressure is 0.1 bar gauge, suction temperature 20 °C, atmospheric pressure 1 bar, discharge pressure 6 bar absolute, discharge temperature 180 °C, speed 1200 rpm, shaft power 6.3 kW and mass of air delivered 1.7 kg/minute. Calculate the volumetric efficiency of the compressor.