PAPER ID-310791

Subject Code: RME051

Roll No: | | | | | | | | | | | | | |

B. TECH.
(SEM-V) THEORY EXAMINATION 2020-21
I.C. ENGINES AND COMPRESSORS

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

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

a.	Differentiate between Air Standard Cycles and Fuel-Air Cycles.
b.	Define Cut-off Ratio and Dead Centers.
c.	Describe the Scavenging & its requirements for 2-stroke & 4-stroke IC Engines.
d.	Mention the various types of emissions emitted by IC Engines.
e.	Explain the Crankcase Ventilation.
f.	Define Frictional Power and name various methods to compute it.
g.	What do you understand by Surging? Explain.

SECTION B

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

a.	Describe the working of 2-stroke SI Engine with the help of cycle of operation. How the 2-stroke SI Engine differs from 4-stroke SI Engine? Explain.
b.	What do you understand by Combustion? Explain the combustion process of SI Engines.
c.	Explain the construction detail and working of Fuel Injection Pump.
d.	The observations recorded after the conduct of a retardation test on a single-cylinder Diesel engine are as follows:

S. No.	Drop in Speed	Time for fall of speed at no load, t_2 (s)	Time for fall of speed. at 50% load, t_3 (s)
1	475 --> 400	7.0	2.2
2	475 --> 350	10.6	3.7
3	475 --> 325	12.5	4.8
4	475 --> 300	15.0	5.4
5	475 --> 275	16.6	6.5
6	475 --> 250	18.9	7.2

Calculate the frictional power and mechanical efficiency.

e.	A three-stage compressor is used to compress air from 1 bar to 36 bars. The compression in all stages follows the law of $p.V^{1.25} = C$. The temperature of air at inlet of compressor is 300 K. neglecting the clearance and assuming perfect inter-cooling, find the intermediate pressure and indicated power required in kW to deliver 15 m^3 of air per minute measured at inlet conditions.

SECTION C

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

(a)	An ideal Diesel cycle has bore = 16 cm, Stroke = 25 cm, clearance volume = 400 cc. The fuel injection takes place at constant pressure for 5% of stroke. Find the air standard efficiency. What will be the loss or gain in efficiency if the cut-off is delayed from 5% to 8% of stroke? It may be assumed that compression ratio remains same.
(b)	Explain the Valve Timing Diagram and Port Timing Diagram in detail.

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

(a)	Discuss the Combustion Chamber Design for SI Engines.
(b)	What is petrol injection? Explain construction detail and working of MPFI System employed.

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

(a)	What is knocking in CI Engines? How it can be controlled? Discuss.
(b)	Write short notes on (i) Exhaust Emission Control; (ii) Fuel Injector and its types

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

(a)	What is the need of Cooling System and Lubrication System? Explain Wet Sump Lubrication System in detail.
(b)	Write short notes on (i) Fuel Additives; (ii) Thermal Efficiency (Indicated and Brake)

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

(a)	Why are the compressors required? Classify them. Find the relation for Volumetric Efficiency in terms of Clearance Ratio.
(b)	Compare (i) Rotary and Reciprocating Compressors; (ii) Centrifugal and Axial compressors.