PAPER ID-310784

Roll No:

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

Time: 3 Hours   *Total Marks: 100*

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

SECTION A

1. **Attempt *all* questions in brief.** **2 x 10 = 20**

a.	What will be the future of IC engines?
b.	Is combustion in CI engines homogeneous or heterogeneous and why?
c.	What do you understand by indirect injection system?
d.	When does an engine need supercharging? How is it done?
e.	Can alcohol be used for CI engines? Explain.
f.	Define physical delay and chemical delay.
g.	List any 4 assumptions made in thermodynamic analysis of CI engine Combustion process.
h.	Indicate any 2 limitations of vegetable oil as a CI engine fuel.
i.	What are the various pollutants present in combustion products?
j.	What is the effect of atmospheric conditions on the output of a compressor?

SECTION B

2. **Attempt any *three* of the following:** **10x3=30**

a.	The airflow to a four-cylinder, four-stroke oil engine is measured by a 5 cm diameter orifice having a coefficient of discharge of 0.6. The engine having bore 10 cm and stroke 12 cm runs at 1200 r.p.m. Pressure drop across orifice is 4.6 cm of water and, ambient temperature and, pressure are 17^0C and 1 bar respectively. calculate the volumetric efficiency based on free air condition.
b.	Give a detailed comparison between homogeneous charge compression ignition engine, lean burn engine & stratified charge engines.
c.	Explain the variation of spray characteristics with pressure variation in diesel injector.
d.	Show how the chemical reaction of fuel takes place with oxygen during proper combustion & quantity of heat liberated.
e.	What is difference between reciprocating and centrifugal compressor? Explain the effect of intercooling on the performance of reciprocating compressor. Obtain expression foe optimum pressure ratio with one stage, intercooling.

SECTION C

3. **Attempt any *one* part of the following:** **10x1=10**

a.	What is the basic difference between Otto cycle & Diesel cycle? Deduce the expression of thermal efficiency, work done and mean effective pressure for Diesel cycle.
b.	A four-stroke, eight-cylinder engine is tested while running at 3600 r.p.m. The inlet air temperature is $^0C5$ and the pressure is 760 mm of Hg. The total piston displacement volume is 4066 cm^3. The air-fuel ratio of the engine is 14: 1 and b.s.f.c. is 0.38 kg/kwh. Dynameter reading shows a power output of 86 kW. Find the volumetric efficiency of the engine.

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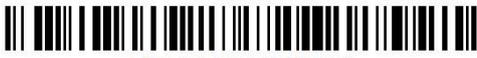
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4. **Attempt any *one* part of the following:** **10x1=10**

a.	What is delay period & what are the factors that affect the delay period?
b.	List the different operating conditions of an automobile SI engine and indicate the relevant air fuel ratios needed?

5. **Attempt any *one* part of the following:** **10x1=10**

a.	Discuss the variables affecting delay period in CI engines, in detail. Justify your answer with reason.
b.	Describe the various stages of combustion in a CI engine with the(P-θ) diagram.

6. **Attempt any *one* part of the following:** **10x1=10**

a.	Explain the fuel characteristics of alcohols, CNG, LPG & hydrogens?
b.	What do you understand by terms "Dopes & Additives"? Why are these using in engine fuels?

7. **Attempt any *one* part of the following:** **10x1=10**

a.	Write short note on "Surging and choking in compressor".
b.	Calculate the isothermal efficiency of a single stage single acting compressor of reciprocating type having air admitted at 2 bar and 17^0 C and being compressed following polytropic process with index 1.3. The compressor's delivery pressure is 15 bar, and it runs at 5 r.p.s. The L/D ratio is 2.0 and mechanical efficiency of compressor is 0.95. Air is admitted at 1 m^3/min in compressor.