

Total No. of printed pages = 2

**SUBJECT CODE: ME2024105**

Roll No. of candidate

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**2017**

**End Semester M.Tech. (Mechanical Engineering) Examination**

**1<sup>st</sup> Semester**

**ADVANCE INTERNAL COMBUSTION ENGINES (Elective)**

Full Marks- 70

Pass Marks- 21

Time- 3 hours

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*The figures in the margin indicate full marks.*

**PART A**

**Q.1. Answer all questions:**

**(16x1=16)**

- a) What is stoichiometric mixture?
- b) Define Octane Number.
- c) Name the three stages of combustion in SI Engines.
- d) What is GDI?
- e) What is knocking?
- f) Name the different injection systems used in IC Engines.
- g) Write the expression to find the velocity of fuel at the exit of fuel orifice.
- h) Define compression ratio.
- i) Name the different pollutants from IC Engines.
- j) What is Bharat Stage norms?
- k) What is CNG?
- l) What are the constituents of LPG?
- m) Mention two merits of alcohol as an IC Engine fuel.
- n) Mention two demerits of hydrogen as an IC Engine fuel
- o) What are lean burn engines?
- p) What is an anemometer?

## PART B

**Q.2. Answer all questions:**

**(4x3.5=14)**

- How is the solid injection system classified? With a neat sketch explain the working of a fuel feed system of CI Engine.
- With suitable diagram explain the different injection systems employed in SI Engines.
- Explain with figures the various types of combustion chambers used in CI Engines.
- What are the advantages and disadvantages of stratified charge engines?

## PART C

**Answer all questions.**

**(10x4=40)**

**Q.3.** With suitable diagram explain the various stages of combustion in SI Engines.

OR

Explain the phenomena of knock in SI Engines. What are the factors affecting knock? How can it be reduced?

**Q.4.** With suitable diagram explain the various stages of combustion in CI Engines.

OR

What is supercharging? Explain the various methods employed to super charge a CI Engine?

**Q.5.** A five-cylinder, four-stroke diesel engine develops 200 kW at 2000 rpm. The bsfc is 0.25kg/kW-h with fuel of 30<sup>0</sup>API. The fuel is injected at a pressure of 180 bar. The pressure in the combustion chamber is 40 bar. If the diameter of the fuel orifice is 0.754 mm and coefficient of velocity 0.85, determine the duration of injection in degrees of crank travel.

OR

Give a brief account of air pollution due to engines. What are the causes for HC emissions from SI engines?

**Q.6.** A four-stroke gas engine has a cylinder diameter of 30 cm and stroke 50 cm. The effective diameter of the brake is 1.5 m. the observations made in a test of the engine were as follows:

Duration of the test = 40 min, Total number of revolution =8080, Total numbers of explosions = 3230, Net load on the brake = 100 kg, Mean effective pressure = 5.8 bar, Volume of gas used =7.5 m<sup>3</sup>, Pressure of gas indicated in meter = 136 mm of water gauge, Ambient temperature = 17<sup>0</sup>C, CV of the fuel = 19 MJ/m<sup>3</sup> at NTP, Rise in temperature of cooling water = 45<sup>0</sup>C, Cooling water supplied == 180 kg. Draw up the heat balance sheet and estimate the indicated thermal efficiency and brake thermal efficiency, Assume atmospheric pressure as 760 mm of Hg.

OR

Compare LPG and Petrol as fuel for SI Engine. With suitable diagram explain the homogenous charge compression ignition engine.