This question paper contains 4 printed pages.

3085 *Your Roll No.* .....

MEM **J**

Paper— ME.601

I.C. ENGINES

Time : 3 hours *Maximum Marks* : 100

(Write your Roll No. on the top immediately on receipt of this question paper.)

Answer any five questions.
All questions carry equal marks.

1. (*a*) Define and explain ignition lag in a spark ignited gasoline engine. With the help of suitable sketches explain different stages of combustion in spark ignition engines.

   (*b*) Explain the following terms:

   (*i*) Self ignition temp of fuel

   (*ii*) Turbulence in SI engine

   (*iii*) Equivalence ratio and its importance in SI engines

   (*iv*) Formation of CO in SI engines. 10,10

2. (*a*) What is meant by delay period in compression ignition engines?

P. T. O.

(*b*) Explain the influence of following factors on delay period:

(*i*) Fuel quality

(*ii*) Injection pressure

(*iii*) Compression ratio

(*iv*) Injection timing

(*v*) Swirl rate. 5,15

3. (*a*) What are the criteria for selection of IC engine fuel? What are the advantages and disadvantages of using gaseous fuels over liquid fuels in IC engines?

(*b*) Define and explain octane number. A fuel having octane rating of 80 by motor method, what does it mean? How would it differ from research method?

(*c*) Define and explain the terms:

(*i*) Knock in SI engines

(*ii*) Sensitivity of SI engine fuels

(*iii*) Trace and light knock. 7,7,6

4. (*a*) What are the advantages and disadvantages of using ethanol in SI engines?

What is meant by E-85? Why is E-85 preferable fuel than neat ethanol in SI engines?

(*b*) With the help of a neat sketch, explain how Compressed Natural Gas (CNG) can be used in existing SI engines in dual fuel mode. Explain the modifications required for optimum performance, if CNG is to be used in an existing SI engine in dedicated mode. 8,12

5. (*a*) What are methods of increasing power in IC engines? Explain thermodynamic cycle of a supercharged IC engine.

(*b*) What is the effect of supercharging on following parameters in SI and CI engines?

(*i*) Power output

(*ii*) Fuel consumption

(*iii*) Mechanical efficiency

(*iv*) Particulate and smoke emissions

(*v*) CO, HC, and NO_X emissions. 8,12

6. (*a*) Define and explain:

(*i*) Scavenging of 2-stroke engine

(*ii*) Scavenging efficiency and Trapping efficiency

(*iii*) Loop scavenging.

(*b*) Discuss theoretical scavenging processes.

P. T. O.

(c) What is meant by wet sump lubrication? Explain how lubrication of different engine parts is done using splash system of wet sump lubrication. 6,6,8

7. (a) Describe Honda CVCC engine and explain its advantages and disadvantages over other types of engines. 10

(b) Why is rich mixture required during idling, cold starting and for maximum power? Explain how the power and the thermal efficiency of SI engine vary with air-fuel ratio at full load. 10

8. Write short notes on:

(i) Knock in CI engines 10

(ii) Free piston engine. 10