RK/KW/13/3144/3570

Faculty of Engineering & Technology
Seventh Semester B.E. (Mech.)/ Seventh Semester
B.E.P.T. (Mech.) Examination
ADVANCED I.C. ENGINES
(Elective—I)
Sections—A & B

Time—Three Hours]   [Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.
(2) Answer **THREE** questions from Section A and **THREE** questions from Section B.
(3) Assume suitable data wherever necessary.
(4) Illustrate your answers wherever necessary with the help of neat sketches.
(5) Use of Slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.

SECTION—A

1. (a) Explain SI Engine operating cycle on P-V diagram. Discuss the different losses that occur and depict them on the P-V diagram.   7

   (b) Explain Dry Sump lubrication System, with neat sketch.   6

2. (a) Explain the various factors affecting Mechanical friction.   7

   (b) How is the circulation accomplished in a thermo-syphon system ? What are the drawbacks of this system ?   6

3. (a) With the help of a neat sketch explain the working principle of a simple carbourettor.   6

   (b) What is meant by abnormal combustion in SI Engine ? Explain the phenomenon of knock in SI Engine.   7

4. (a) The following data is related to a petrol engine :

   Petrol consumed per hour = 7.2 kg.

   The specific gravity of the fuel = 0.75

   The temperature of air = 27°C

   The air fuel ratio = 1:15

   The diameter of choke tube = 24 mm

   The height of top of the jet above the petrol level = 4.2 mm .

   = 0.0042 m in the float chamber

   The co-efficient of discharge for air = 0.8

   The co-efficient of discharge of fuel = 0.7

   Atmospheric pressure = 1.013 bar

   Calculate the diameter of the fuel jet of a simple carbourettor.   8

   (b) Explain MPFI with neat sketch.   5

5. (a) Mention the various important considerations of good ignition system with neat sketch. Explain battery ignition system.   6

(b) Explain super charging and turbo charging in case of SI Engine.   4

(c) Explain use of alcohol as fuel in I.C. Engine.   4

SECTION–B

6. (a) Explain process and various stages of combustion in C.I. Engine.   7

(b) What is delay period ? Explain various factors affecting delay period.   6

7. (a) Explain EGR and catalytic converter.   7

(b) Explain Nox Formation in C.I. Engine.   6

8. (a) A Morse test on a 12 cylinder, two stroke compression-Ignition engine of bore 40 cm and stroke 50 cm running at 200 rpm gave the following readings :

Condition	Brake Load (Newton)
All firing	2040
1ˢᵗ Cylinder	1830
2ⁿᵈ Cylinder	1850
3ʳᵈ Cylinder	1850
4ᵗʰ Cylinder	1830
5ᵗʰ Cylinder	1840
6ᵗʰ Cylinder	1855
7ᵗʰ Cylinder	1835
8ᵗʰ Cylinder	1860
9ᵗʰ Cylinder	1820
10ᵗʰ Cylinder	1840

11ᵗʰ Cylinder	1850
12ᵗʰ Cylinder	1830
All firing	2060

The output is found from the dynamometer using the relation.

$$b_p = \frac{WN}{180}$$

where W the brake load is in Newton and the speed ; N is in rpm; calculate IP, mechanical efficiency and bmep of the engine.   9

(b) Explain Free piston engine.   5

9. In a test of an oil engine under full load condition the following results were obtained :

IP = 33 kW

Brake power = 27 kW

Fuel used = 8 kg/h

Rate of flow of water through gas calorimeter = 12 kg/min.

Cooling water flow rate = 7 kg/min.

Calorific value of fuel = 43 MJ/kg.

Inlet temp of cooling water = 15°C

Outlet temp of cooling water = 75°C

Inlet temp of water to exhaust gas calorimeter = 15°C.

Outlet temp of the water to exhaust gas calorimeter = 55°C.

Final temp of exhaust gases = 80°C.

Room temperature = 17°C.

Air fuel ratio on mass basis = 20

Mean specific heat of exhaust gas = 1 KJ/kg K.
Specific heat of water = 4.18 J/kg K.
Draw up a heat balance sheet and estimate the thermal
and mechanical efficiencies.   13

10. Write short notes on (Any **THREE**) :

(1) Scavenging.

(2) Adiabatic Engine.

(3) Effect of engine modification on pollutants from SI
Engine.

(4) Combustion chamber of CI engine.   13