B.E.Eighth Semester (Mechanical Engineering) (C.B.S.)
Elective - III : Advanced Internal Combustion (I.C.) Engine

P. Pages : 2

Time : Three Hours

0754

Max. Marks : 80

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Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Diagrams and chemical equations should be given whenever necessary.
11. Illustrate your answers whenever necessary with the help of neat sketches.
12. Use of non programmable calculator is permitted.

1.	a)	Explain construction and working of 4 stroke SI Engine, with neat sketch.	**6**
	b)	Explain wet sump lubrication system.	**7**

OR

2.	a)	State the necessity of cooling system, Explain thermosyphom cooling system.	**6**
	b)	State the factors responsible for causing mechanical friction. Explain pumping & blowby losses.	**7**

3.	a)	State the desirable characteristics of SI engine fuels.	**6**
	b)	Write short note on : a) Rating of engine fuels. b) Alternative fuels.	**7**

OR

4.	a)	Explain simple carburetor with neat sketch, state the limitations of simple carburetor.	**6**
	b)	Determine the size of fuel orifice to give A:F = 12:1. The diameter of venturi throat is 3.5 cm and vacuum at the venture is 6.9 cm of Hg. The pressure and temperature of atmospheric air are 1.013 bar and 25ºC. The nozzle lip = 5mm, Take the following data : $Cd_a = 0.9$, $Cd_f = 0.7$, $\rho_f = 760$ kg/m^3. Consider the compressibility of air.	**7**

5.	a)	Differentiate between knocking in SI & CI Engine.	**6**
	b)	State and explain the stages of combustion in a SI engine.	**7**

OR

6.	a)	State the necessity of an ignition system, explain Battery ignition system.	**6**
	b)	Define supercharging and differentiate between super charging & turbo charging for S.I. Engine.	**7**

7.	a)	Explain charge motion within the cylinder, what is swirl and squish.	**6**

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b) Explain stages of combustion in an CI engine. **7**

OR

8. a) What is delay period? What are the different factors attach on delay period. **6**

b) Explain different factors considered while designing of combustion chamber for C.I. Engine. **7**

9. a) State the factors causing NOx emission. Explain exhaust gas recirculation system. **7**

b) Explain construction and working of catalytic converter. **7**

OR

10. Write short note on : **any three.** **14**

   i)   Bharat Norms.   ii)   Stratified charge engine.

   iii) Free piston engine.   iv) Adiabatic engine.

   v)   Exhaust Emissions.

11. a) Define the following terms : **7**

   i)   Brake power.

   ii) Specific fuel consumption.

   iii) Indicated power.

   iv) Brake thermal efficiency.

b) A 4 cylinder, 4 stroke engine develops 21 KW. A morse test was conducted at constant speed of 3000 rpm and B.P. is measured, when each cylinder was cut off are 14.8, 14.5, 14.6 and 14.75 KW respectively. Find I.P. of the engine when all cylinders are developing power. Also find mechanical efficiency and brake mean effective pressure. Take bore = 7.5 cm and stroke = 9 cm. **7**

OR

12. A test on a two-stroke engine gave the following results at full load. **14**

Speed = 350 rpm.

Net brake load = 65 kg.

mep = 3 bar.

Fuel consumption = 4 kg/hr.

Jacket cooling water flow rate = 500 kg/hr.

Jacket water temperature at inlet = 20ºC.

Jacket water temperature at outlet = 40ºC.

Test room temperature = 20ºC.

Temperature of exhaust gases = 400ºC.

Air used per kg of fuel = 32 kg.

Cylinder diameter = 22 cm.

Stroke = 28 cm.

Effective brake diameter = 1 m.

Calorific value of fuel = 43 NJ/kg.

Proportion of hydrogen in fuel = 15%.

Specific heat of dry exhaust gas = 1 kJ/kg.k.

Specific heat of steam = 2.1 kJ/kg k.

Sensible heat of water at room temp. = 62 kJ/kg.

Latent heat of steam = 2250 kJ/kg.

Find B.P, I.P. and draw op heat balance sheet for the test on kJ/min and percentage basis.

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