GANPAT UNIVERSITY

B. Tech. Semester: VII (Mechanical) Engineering
CBCS Regular Examination November – December-2013
Subject: 2ME 705/3 INTERNAL COMBUSTION ENGINE

Time: 3 Hours   Total Marks: 70

Instruction: 1. Attempt all Question
               2. Don't write anything on the question paper.
               3. Use of non programmable scientific calculator is permitted.
               4. Assume required data if necessary.

SECTION I

Que. – 1   A test on 4 stroke engine, the following results are observed: 12

Speed = 400 rpm and brake load = 65 kg

Mean effective pressure = 3 bar

Mass of fuel consumption = 4 kg/hr

Cooling water flow rate = 500 kg/hr

Water inlet temperature = 20ºC

Water outlet temperature = 40ºC

Temperature of exhaust gas = 400ºC

Air fuel ratio = 32

Cylinder diameter = 22 cm

Length of stroke = 28 cm

Brake diameter = 1 m

Calorific value = 42000 kJ/kg

Proportion of hydrogen in fuel is 15%

Specific heat of dry exhaust = 1 kJ/kg K

Specific heat of steam = 2.1 kJ/kg K

Latent heat of steam = 2250 kJ/kg

Specific heat of water = 4.187 kJ/kg K

Room temp is 20°C

Find the I.P., B.P., and draw the **heat balance sheet** for test in **kJ/min** and **%**.

OR

Que. – 1 (a)   A 4- cylinder 4-stroke SI engine has a compression ratio 8 and bore and stroke are 100   7
mm and the volumetric efficiency of each cylinder is 75%, engine operated at a speed
is 48000, with an A/F = 15. And the calorific value of fuel is 4200 kJ/kg, density of
air is 1.12 kg/m³, the mean effective pressure inside the cylinder is 10 bar. And the
mechanical efficiency 80%. Determine finds out I.P., B.P. And thermal efficiency.

         (b)   Explain clearly the terms per-ignition, detonation and diesel knock.   5

Que. – 2 (a) What is delay period? Mention the various factors affecting the delay period. Discuss any four of them.

(b) Define the following terms in relation to an internal combustion engine with their significance.
  (i) Brake specific fuel consumption
  (ii) Brake mean effective pressure
  (iii) Brake thermal efficiency
  (iv) Volumetric efficiency

OR

Que. – 2 (a) Make a detailed comparison of S.I and C.I engines with respects to basic cycle, fuel, introduction of fuel in the cylinder, ignition, compression ratio, speed, efficiency and weight. 6

(b) Discuss the emission from S.I and C.I engines. On what factors do these emissions depend? Discuss how these emissions can controlled. 5

Que. – 3 (a) With a suitable P-0 diagram explain the stages of combustion in C.I. Engines. 4

(b) Explain the effect of following factors on delay period. 4
(i) Compression ratio. (ii) Fuel.

(c) With a neat sketch explain the functions of MPFI system. 4

SECTION-II

Que. – 4 (a) Given a neat sketch of the magneto ignition system for a four cylinder engine and describe how does it work? 6

(b) What does a catalyst perform in a catalytic convertor? Discuss the oxidation and reduction reaction that are taking place in a convertor. Why it is preferred to use unleaded petrol in cars equipped with a catalytic convertor system? 6

OR

Que. – 4 (a) What is ignition lag? Describe the effect of following engine variable on ignition lag: 6
(i) Mixture ratio. (ii) Electrode gap. (iii) Initial temperature and pressure.

(b) What is Stochiometric or Chemical correct A/F ratio? And also determined equivalence ratio (Ø). 6

Que. – 5 A single cylinder four stroke diesel engine running at 1500 RPM uses 2.5 kg of fuel per hour. The specific gravity of fuel is 0.88; the injection period is equal to 25° of crank angle. The injection pressure is 150 bar. And cylinder pressure is 30 bar. Find the diameter of injector or orifice if Cd = 0.88. 11

OR

Que. – 5 (a) What is supercharging? Explain the thermodynamic cycle for a supercharged I.C engine Which engine is more suitable for supercharging –spark ignition engine or compression ignition engine? Why? 6

(b) What are the main advantages and disadvantages of the CI engine compared to the SI engine ? In this light discuss the field of application of the two engines. 5

Que. – 6 (a) Why the C.I engine is called a quality governed engine? 4

(b) With a neat sketch explain an Eddy current dynamometer. 4

(c) During Mores test of on a 4 cylinder engine, following measurement of brake power as taken at constant speed. When all cylinders are firing BP=3037kw, When first cylinder is not running BP=2102 KW, When second cylinder is not firing BP=2102 KW, When the third cylinder is not firing BP=2100 KW, When forth cylinder is not firing BP=2098 KW, Then find the mechanical efficiency. 4

END OF PAPER

2/2