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RM-7163

B. E. III (Sem. VI) (Mech.) Examination

May / June – 2010

I.C. Engine / Automotive Engineering

Time : 3 Hours] [Total Marks : 100

Instruction :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 3 (Sem. 6) (Mech.)**

Name of the Subject :

☛ **I.C. Engine / Automotive Engineering**

☛Subject Code No. : **7 1 6 3** ☛Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Answer **all** questions.

(3) Use **separate** answer books for each section.

(4) Figure to the **right** indicates marks.

(5) Uses of gas table and calculator are permitted.

(6) Assume suitable data, if required.

Q.1 A) Answer the following questions: **(10)**

1. The Thermal Efficiency of theoretical Otto-cycle _____with increase in compression ratio (increase/decrease).
2. In S.I. Engine the combustion is _____ (homogeneous, heterogeneous).
3. The exhaust gas temp. is maximum with chemically correct mixture (True/False)..
4. Define combustion.
5. Ignition lag is chemical Process.(True/False).
6. The CNG used engines have lower thermal efficiencies than those fuelled by gasoline.(True/False).
7. Define Scavenging.
8. Carburetor is used for _____ engine.(S.I. / C.I.)

9. For maximum power of S.I. engine the fuel-air mixture ratio should be _____(rich/lean)

10. In the carburetor, complete atomization and vaporization of fuel is achieved.(True / False).

B) An Oil Engine works on air standard dual cycle with compression ratio of 10. The Pressure and temperature at the beginning of compression are 1 bar and 30° C. The maximum pressure reached is 40 bars and maximum temperature is 1400° C. Determine (1) Temperature at the end of constant volume addition and (2) cut of ratio. Take Cp = 1.004 kJ/kgK and Cv = 0.717 kJ/kgK for air. **(10)**

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Q.2 Answer any Two: **(15**

(A) Derive an expression for air standard efficiency of a Diesel cycle **(8)**

$$\eta diesel = 1 - 1/(r^{\gamma}-1)\times[1/\gamma(\rho^{\gamma} - 1/\rho - 1)]$$

OR

(A) Explain the three phases of C.I. Engine combustion Process. **(8)**

(B) The following data relate to a Petrol Engine : **(7)**

Compression ratio = 7

Calorific value of fuel used = 44 Mj/kg

The air-fuel ratio = 15:1

The temperature and pressure of the charge at the end of stroke = 65°C, and 1 bar

The index of compression = 1.33

The specific heat at constant volume Cv = 0.71 + 20 × 10^{-5} T kJ/kgK, when T is in K. Determine the maximum pressure in the cylinder compare this value with that of the constant specific heat Cv = 0.71 kJ/kg.

Q.3 Answer any Two: **(15)**

A) Derived an expression for an A/F ration supplied by a simple carburetor assuming to incompressible.

B) An experimental four –stroke gasoline engine of 1.7 litre capacities is to develop maximum power at 5000 revolution per minute. The volumetric efficiency is 75% and the air – fuel ratio is 14:1. Two carburetors are to

be fitted and it is expected that at maximum power the air speed at the choke is 100 m/s. the coefficient of discharge for the venture is assumed to be 0.80 and that of main jet is 0.65. an allowance should be made for emulsion tube, the diameter of which can be taken as 1/3 of choke diameter. The gasoline surface is 6 mm below the choke at this engine condition. **Calculate the sizes of a suitable choke and main jet.** The specific gravity of the gasoline is 0.75. Pa Ta are 1 bar and 300K respectively.

C) Explain Valve Timing Diagram for 4-stroke Petrol engine.

Q.4 C) Answer the following: **(10)**

1. Define steering radius.
2. Define backlash.
3. Define carcass.
4. What are the requirements of brake?
5. Define turning radius.
6. Define breaker.
7. Define slip angle.
8. What is brake judder?
9. What is steering axis inclination?
10. Define body of auto vehicle.

D) A test on a two stroke engine gave the following results at full load: **(10)**

Speed	= 350 rpm
Net brake load	= 65 kg
Mean effective pressure	= 3 bar
Fuel consumption	= 4 kg/h
Jacket cooling water flow rate	= 500 kg/h
Jacket water temperature at inlet	= 20 °C
Jacket water temperature at outlet	= 40 °C
Test room temperature	= 20 °C
Temperature of exhaust gases	= 400 °C
Air used per kg of fuel	= 32 kg
Cylinder diameter	= 22 cm

Stroke	= 28 cm
Effective brake diameter	= 1 m
Proportion of hydrogen in fuel	= 15 %
Mean specific heat of dry exhaust gas	= 1 kJ/kg K
Mean specific heat of steam	= 2.1 kJ/kg K
Sensible heat of water at room temperature	= 62 kJ/kg
Latent heat of steam	= 2250 kJ/kg

Find indicated power, brake power and draw up a heat balance sheet for the test in kJ/min and in percentage.

Q.5 Answer any Three: **(12)**

A) What are the advantages and disadvantages of a passenger car with the engine mounted at the front and drive to front wheels.

B) Write a shot note on Constant mesh Gear Box.

C) Write short note on a Single Plate Clutch.

D) Write short note on Tubeless tyres.

Q.6 Answer any Three: **(18)**

D) Describe the master cylinder of a hydraulic braking system. In case hydraulic oil runs out, after filling fresh oil, how and why is bleeding done?

E) Explain defects of clutch.

F) Explain principle of the differential.

G) Ackerman principle of steering.