

Total No. of Questions – [8]

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G.R. No.

Paper Code - U228-153 (RE-ES)

MAY 2019/ENDSEM - RE-EXAM

S. Y. B. TECH. (MECHANICAL ENGINEERING) (SEMESTER - II)

COURSE NAME : INTERNAL COMBUSTION ENGINES

COURSE CODE : MEUA22173

(PATTERN 2017)

Time: [2 Hours]

[Max. Marks: 50]

(*) Instructions to candidates:

- 1) Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8
- 2) Figures to the right indicate full marks
- 3) Use of Steam Table, Mollier Diagram is allowed
- 4) Use of scientific calculator is allowed
- 5) Use suitable data where ever required

Q.1 a) Compare Otto, Diesel and Dual cycle with the help of $p - V$ and $T - s$ diagram for same maximum pressure and heat addition. 6

OR

b) In an engine working on the Diesel cycle the ratios of the weights of air and fuel supplied is 50 : 1. The temperature of air at the beginning of the compression is 60°C and the compression ratio used is 14 : 1. What is the ideal efficiency of the engine? Calorific value of fuel used is 42000 kJ/kg. Assume $C_p = 1.004$ kJ/kg K and $C_v = 0.717$ kJ/kg for air. 6

Q.2 a) Explain unit injector system used in Diesel engine for fuel injection. 6

OR

b) Write short note on modified splash lubrication system. 6

Q.3 a) Explain detonation in SI engine with diagram and how to reduce detonation? 6

OR

b) Discuss the effect of the following engine variables on flame propagation in SI engine.

- a) Fuel – air ratio
- b) Turbulence
- c) Engine load

6

Q.4 a) Discuss the effect of the following engine variables on delay period in CI engine.

- a) Compression ratio
- b) Engine speed
- c) Turbulence

4

OR

b) Draw any two sketches of combustion chambers used in CI engine.

4

- Q.5 a)** A single cylinder and stroke cycle I.C. engine when tested, the following observations available :

Area of indicator diagram	= 3 sq.cm
Length of indicator diagram	= 4 cm
Spring constant	= 10 bar/cm
Speed of engine	= 400 rpm
Brake drum diameter	= 120 cm
Dead weight on brake	= 380 N
Spring balance reading	= 50 N
Fuel consumption	= 2.8 kg/hr
Calorific Value	= 42000 kJ/kg
Cylinder diameter	= 16 cm
Piston stroke	= 20 cm

Draw up heat balance sheet on kW basis.

6

- b)** A single cylinder engine running at 180 rpm develops a torque of 8 Nm. The indicated power of the engine 1.8 kW. Find the loss due to friction power as the percentage of brake power.

4

- c)** Define following terms and write mathematical expression.

4

(i) Volumetric efficiency (η_{vol})

(ii) Indicated Thermal Efficiency (η_{ith})

OR

- Q.6 a)** A six-cylinder, gasoline engine operates on the four-stroke cycle. The bore of each cylinder is 80 mm and the stroke is 100 mm. The clearance volume per cylinder is 70 cc. At the speed of 4100 rpm, the fuel consumption is 5.5 gm/sec. and the torque developed is 160 Nm. Calculate : (i) Brake power, (ii) The brake mean effective pressure, (iii) Brake thermal efficiency if the calorific value of the fuel is 44000 kJ/kg and $\gamma = 1.4$ for air.

6

- b)** A 4-cylinder, 4-stroke cycle engine having cylinder diameter 100 mm and stroke 120 mm was tested at 1600 rpm and the following readings were obtained. Fuel consumption = 0.27 litres/minute, Specific gravity fuel = 0.74, B.P. = 31.4 kW, Mechanical efficiency = 80 %, Calorific value of fuel = 44000 kJ/kg.

Determine :

(i) Break specific fuel consumption

(ii) Indicated mean effective pressure

4

- c)** Define following terms and write mathematical expression.

(i) Indicated Power (ip)

(ii) Mechanical Efficiency (η_{mech})

4

- Q.7 a) Write a note on adverse health effects of IC engine generated air pollutants. 6
b) Explain construction and working of catalytic converter 4
c) Discuss advantages of LPG and CNG as an alternate fuel for IC engines 4
- OR
- Q.8 a) Write a short note on Emission control methods for SI and CI engines 6
b) Explain working of exhaust gas recirculation 4
c) Discuss advantages of hybrid vehicles. 4

*****Best of Luck*****