No. of Printed Pages : 04 **Roll No. .....**

534

B. Tech. EXAMINATION, Dec. 2017

(Fifth Semester)

(Old Scheme) (Re-appear Only)

(ME)

ME-307

INTERNAL COMBUSTION ENGINES AND GAS TURBINES

Time : 3 *Hours*] [*Maximum Marks :* 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt any *Five* questions. All questions carry equal marks.

7. With the help of neat sketch discuss the construction working of centrifugal compressor. **20**

8. (a) Discuss the application of gas turbine. **5**

(b) Drive the relation for mean effective pressure for Brayton cycle. **15**

1. An oil engine works on the dual cycle, the heat liberated at constant pressure being twice that liberated at constant volume. The compression ratio of the engine is 8 and the expansion ratio is 5.3. But the compression and the expansion process follow that law $PV^{1.3} = C$. The pressure and temperature at the beginning of compression are 1 bar and 27ºC respectively. Assuming $C_p = 1.004$ kJ/kg K and $C_v = 0.717$ kJ/kg K for air, find the air standard efficiency and the mean effective pressure. **20**

2. Explain the factors that affect the process of carburetion. With the help of neat sketch explain the working principal of a simple Carburetor. **20**

3. Bring out clearly the process of combustion in C.I. engines and also explain the various stages of combustion. **20**

4. What are the functions of lubricating system ? Discuss in detail the different types of lubrication system with neat sketch. **20**

5. A test on two stroke engine gave the following result at full load :

Speed = 400 rpm, Net brake load = 70 kg, mep = 4 bar, fuel consumption = 4 kg/h, Jacket cooling water flow rate = 500 kg/h, 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 = 20 cm, Stroke = 28 cm, Effective brake diameter = 1 m, Calorific value of fuel = 43 MJ/kg, Proportion of hydrogen in fuel = 15%, Mean specific heat of dry exhaust gas = 1 kJ/kg K, Mean specific speed of steam = 2 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 heat balance sheet for the test in kJ/min and in percentage. **20**

6. Discuss the current scenario on the pollution front. **20**