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Code No: 54015

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2016

APPLIED THERMODYNAMICS-I

(Common to ME, AME)

Time: 3 hours **Max. Marks: 75**

Answer any five questions

All questions carry equal marks

1.a) Briefly explain the following with necessary and neat diagrams: i) time loss factor ii) heat loss factor iii) exhaust blow down factor.

b) How does the composition of exhaust gases vary for various fuel-air ratios in gasoline engine? [10+5]

2.a) Explain: i) individual pump and nozzle system ii) unit injector system iii) common rail system iv) distributor System.

b) With suitable sketch explain: i) starting circuit ii) Normal running iii) idling and slow running iv) Acceleration of solex carburetttor. [5+10]

3.a) Briefly explain the effect of engine variables on knock in S.I. engines.

b) Explain the factors effecting the flame speed in S.I. engines. [8+7]

4.a) Explain with figures the various types of combustion chambers used in CI engines.

b) Explain the phenomenon of knock in CI engines. [10+5]

5.a) Explain the measurement of air supply to an internal combustion engine with a neat sketch.

b) A test on a two-stroke engine gave the following results at full load. 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 = 20^0C; jacket water temperature at outlet = 40^0 C; Test room temperature = 20^0 C; Temperature of exhaust gases = 400^0 C; 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 MJ/kg; Mean specific heat of exhaust gases = 1 kJ/kg K. Find indicated power, brake power and draw up a heat balance for the test in kW and in percentage. [5+10]

6.a) Establish that the work done is minimum when the pressure ratio for each stage is the same and there is complete inter cooling.

b) Determine the minimum number of stages required in an air compressor which admits air at 1 bar, 27^0C and delivers at 180 bar. The maximum discharge temperature at any stage is limited to 150^0C. Consider the index for polytrophic compression as 1.25 and perfect and optimum inter-cooling in between the stages. Neglect the effect of clearance. [7+8]

7.a) A centrifugal compressor running at 1440 rpm handles air at 101 kPa and 20^0 C and compresses it to a pressure of 6 bar isentropically. The inner and outer diameters of the impellers are 14 cm and 28cm, respectively. Calculate mass flow rate of air, degree of reaction, power input and width of blades at outlet.

b) With a neat diagram describe construction and working of centrifugal compressor. [10+5]

8.a) Explain surging, stalling and choking in case of Axial compressor.

b) With neat diagrams explain velocity triangles for an axial flow compressor. [7+8]

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