R18

Code No: 154CD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, August/September - 2021

THERMAL ENGINEERING – I

(Mechanical Engineering)

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

Answer any five questions
All questions carry equal marks

1.a) Draw the cross section of a single cylinder spark ignition engine and discuss the important components.
b) Diffferentiate between two stroke engine and four stroke engine and explain. [8+7]

2.a) Explain the effect of various engine variables on SI engine knocking phenomena.
b) Why cooling is required for IC engine? Explain different methods of cooling. [8+7]

3.a) Explain the phenomenon of knock in CI engines and compare it with SI engine knock.
b) How does the fuel rating influence the knocking? Explain. [8+7]

4.a) Explain the method of motoring test for obtaining friction power of an engine.
b) The following data is referenced to a four stroke petrol engine: diameter 100 mm, stroke 125 mm, speed 2000 rpm, indicator area 2.5 mm^2, length of spring 2.5 cm, spring constant 10 bar/cm. Calculate: i) indicated mean effective pressure ii) indicated power iii) indicated thermal efficiency if fuel rate is 0.02 kg/s and C_V = 44000 kJ/kg. [6+9]

5.a) Determine the size of the cylinder for a double acting air compressor of 37 kW in which air is drawn in at 1.01325 bar and 15^0C and compressed according to the law $PV^{1.2} = C$ to 6 bar. The compressor runs at 100 rpm with the average piston speed of 152.5 m/min, neglect clearance.
b) Explain the significance of positive displacement compressor used to compress the air. [8+7]

6.a) With the help of neat sketches explain a roots air blower. How its PV diagram is different from a reciprocating air compressor.
b) What is the role of impeller in the centrifugal compressor? Explain. [8+7]

7. Derive an expression for the polytropic efficiency of centrifugal compressor in terms of inlet pressure delivery pressure, inlet temperature and the ratio of specific heats. [15]

8. Discuss the methods of improving the work ratio, specific out put and cycle thermal efficiency by employing multi state system gas turbines with Inter cooling and reheating. [15]

---ooOoo---