

Code No: 09A40303

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year II Semester Examinations, June-2014

APPLIED THERMODYNAMICS-I

(Common to ME, AME)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) What are the differences between air standard cycle and fuel-air cycle? Explain the significance of fuel-air cycle.
- b) Why the actual cycle efficiency is much lower than the air standard cycle efficiency? List the major losses in the actual engine.
- 2.a) Classify I.C engines and explain working of four stroke diesel engine.
- b) Why cooling system is required for I.C engine and explain water cooling with neat sketch.
- 3.a) Explain the air-fuel mixture combustion regions in S.I engine. Under what conditions the rich fuel air ratio is required.
- b) What are different stages of combustion in S.I. engine? How much of heat is released in each stage?
- 4.a) Describe the mixture requirement in S.I. Engine for different speed conditions. How to achieve above requirements from the carburetor?
- b) What are the different types of combustion chambers used in S.I. Engine?
5. A 4 cylinder 4-stroke petrol engine having bore 6 cm and stroke 10 cm develops 65 N-m torque at 3000 RPM. Find the fuel consumption of the engine in kg/hr and brake mean effective pressure, if the relative efficiency is 50% and clearance volume is 60 cm^3 . Take $CV = 40 \text{ MJ/kg}$.
- 6.a) Derive an equation for the work done in single stage reciprocating compressor neglecting the clearance volume.
- b) Air at 1 bar and 27°C is taken into single stage single acting reciprocating air compressor with law of $Pv^{1.1} = \text{constant}$ to a final pressure of 7 bar and compressor takes $1 \text{ m}^3/\text{min}$. Calculate the indicated power and isothermal efficiency. Also calculate the cylinder dimensions and power of the motor required to drive compressor. Speed of compressor is 5 rps. Stroke to bore ratio 1.5:1, $\eta_{mech} = 85\%$, $\eta_{transmission} = 90\%$.
- 7.a) Explain the working details of steady flow rotary compressors and p-v curves of the same.
- b) Derive the equation for the thermodynamics cycle work done for a rotary compressor.
8. Write short notes on the following:
 - a) Work done factor in axial flow compressor.
 - b) Measurement of cylinder pressure.
 - c) Anti knock additives.

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