

Code No: R22033

R10**SET - 1****II B. Tech II Semester Supplementary Examinations, November - 2018****THERMAL ENGINEERING - I**

(Com. to ME, AME)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks

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1. a) What is the effect of direct heat loss on P-V diagram of an Otto cycle engine? How much efficiency would be increased if the direct heat loss is completely recovered or eliminated?  
b) Explain the factors that effect the volumetric efficiency in an actual cycle.
2. a) Discuss the differences between ideal and actual valve timing diagram of a petrol engine?  
b) What is the function of carburetor in an SI engine? Briefly explain with a neat sketch the operation of a sketch the operation of a simple float type carburetor?
3. a) Discuss the general principles of SI engine combustion chamber design  
b) Discuss the effect of the following engine variables on flame propagation  
(i) Compression ratio (ii) fuel-air ratio (iii) Turbulence (iv) Engine speed
4. a) Explain briefly the combustion phenomenon in CI engine  
b) How are CI engine combustion classified? What type of swirl is used in these chambers? Explain them in brief
5. The following observations were recorded in a test of one hour duration on a single cylinder oil engine working on four stroke cycle. Bore=300 mm, stroke=450mm, fuel used=8.8 Kg, calorific value of fuel=41800KJ/kg, Average speed=200rpm, M.E.P=5.8 bar, Brake friction load=1860N, Quantity of cooling water=650 Kg, Temperature rise=22°C, Diameter of the brake wheel=1.22 m. Calculate (i) Mechanical efficiency and (ii) Brake thermal efficiency. Draw the balance sheet
6. Calculate the size of the cylinder for a double acting air compressor taking air at 1 bar and 15°C and compressing to 6.5 bar with law of compression  $p v^{1.25} = C$ . The indicated power of the compressor is 40Kw and it runs at 120rpm. The average piston speed is 150m/min. Clearance may be neglected
7. a) Explain the working of the vane type compressor in detailed  
b) Define and derive the expressions of slip factor and pressure coefficient of the centrifugal compressor.
8. An axial flow compressor of 50% reaction design has blades with inlet and outlet angles of 45° and 10° respectively. The compressor is to produce a pressure ratio of 6:1 with an overall isentropic efficiency of 0.85 when the air inlet temperature is 40°C. The blade speed and axial velocity are constant throughout the compressor. Assuming a value of 200m/s for the blade speed, find the number of stages required when work factor is (i) unity (ii) 0.89 for all stages