Total No. of Printed Pages:2

SUBJECT CODE NO:- H-360
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mechanical)
Thermodynamics-I
(REVISED)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.
(i) Question no.1 & 6 are compulsory from section A & B
(ii) Solve any two questions from the remaining from each section.
(iii) Use of steam table & mollier diagram is permitted.
(iv) Assume suitable data, if required.

Section A

Q.1 Solve any Five 10

(i) Modify SFEE for isentropic nozzle
(ii) Explain PMM-II
(iii) State Kelvin-plank law
(iv) Represent isentropic expansion on P-V. & T-S. diagram.
(v) List the limitations of First law of thermodynamics
(vi) Write assumption for SFEE
(vii) Explain flow work

Q.2 (a) Prove the equivalence of Kelvin plank and clousius statements. 07
(b) Steam at a 6.87 bar, 205°C enters a insulated nozzle with a velocity of 50 m/s & leaves at 0.137 MPa and velocity of 500 m/s. Determine final enthalpy of steam. 08

Q.3 (a) Two Carnot engines work in series between the source and sink temperatures of 500K & 300K if both engines develop seam power determine intermediate temp. 08
(b) State & prove Carnot theorem. 07

Q.4 (a) Explain Clausius inequality. 07
(b) Prove that "entropy is property of system". 08

Q.5 Short notes on (Any three) 15
(i) Heat engine & heat pump
(ii) PMM-I & PMM-II
(iii) Various statements of second law of thermodynamics
(iv) Temperature – Entropy diagram.

Section B

Q.6 Solve any five 10

(i) What is fuel
(ii) List Applications of steam
(iii) Write equation for minimum of air required per kg of fuel.
(iv) List methods used to determine dryness fraction of steam.
(v) Draw Dual Cycle on P-V. & T-S diagram.
(vi) Explain h-s diagram
(vii) Define critical & Tripple point.

Q.7 (a) Derive the expression for ideal efficiency of Brayton cycle 07

(b) Derive the condition for maximum power output from engine working on Otto cycle. 08

Q.8 (a) Explain flue gas analysis by using Orsat apparatus. 07

(b) Steam at 10 bar, 250°C determine 08

(i) Quality of Steam
(ii) Sp-Volume
(iii) Specific enthalpy
(iv) Specific entropy

Q.9 A volumetric analysis of coal gives C=80%, H_2=15% & remaining incombustible calculate 15

(i) Minimum air required.
(ii) Gravemetric analysis of products of combustion if 25% excess air is supplied.

Q.10 Short note on (Any three) 15

(i) Compare Otto, Diesel & Dual cycle for same compression ratio & same heat addition.
(ii) Diesel cycle
(iii) Separating calorimeter
(iv) Enthalpy-Entropy diagram.