



Sanjay Ghodawat University, Kolhapur

2018-19

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

EXM/P/09/01

Year and Program: 2018-19

School of Technology

Department of Mechanical

Engineering (SY B.Tech)

Course Code: MET207

Course Title: Thermodynamics

Semester – III

Day and Date

End Semester Examination

Time: 3 Hrs. 2.30 to 5.30 pm.

Wednesday

(ESE)

Max Marks: 100

12/06/2019

Instructions:

- 1) All questions are compulsory.
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks.

Q.1	Solve any Two	Marks	Bloom's Level	CO
a)	Define thermodynamic property? Explain intensive & Extensive Properties	07	L ₁	CO1
OR				
a)	Explain in detail work in terms of mechanics & Thermodynamic point of view also explain PdV or displacement work	07	L ₂	CO1
b)	State SFEE & Apply steady flow energy equation to water & steam Turbine	08	L ₃	CO2
OR				
b)	Explain First law of thermodynamics & apply it for a closed system undergoing a cycle and change of state	08	L ₃	CO2
Q.2				
Solve any Two				
a)	Describe Limitations of first law of thermodynamics? Explain Kelvin-Planck & Clausius statement	07	L ₂	CO3
OR				
a)	Define heat engine? Explain its working with block diagram. What is its thermal efficiency?	07	L ₂	CO3

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- b) Show that the specific entropy change for a perfect gas in a process is given by $S_2 - S_1 = C_V \log_e (P_2/P_1) + C_P \log_e (V_2/V_1)$ 08 L₃ CO4

OR

- b) Define entropy and prove that entropy is property 08 L₃ CO4

Q.3 Solve any Two

- a) Explain the following terms: 08 L₁ CO1
- 1) Specific heat
 - 2) Latent heat
 - 3) Point function
 - 4) Path function
- b) Explain the following terms: 08 L₁ CO2
- 1) Energy 2) Enthalpy
 - 3) PMM-I 4) Control Volume
- c) Explain in detail Carnot cycle with P-V & T-S diagram & Derive its efficiency 08 L₂ CO3
- d) State & Prove principle of increase of entropy 08 L₂ CO4

Q.4 Solve any Two

- a) The percentage composition of a sample of liquid fuel by weight is C=84.8%, H₂=15.2%. Calculate 09 L₄ CO5
- 1) The mass of air required for combustion of 1 kg fuel
 - 2) Composition of products of combustion if 15% excess air is supplied.
- b) A sample of coal contains 89%C, 4%H₂, 3%O₂, 1%Sulphur & remainder as non combustible ash. Find out the requirement of air for complete combustion of 1 kg of fuel. Also determine the products of combustion at flue gases. 09 L₃ CO5

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|----|---|----|----------------|-----|
| c) | A coal sample gave the following analysis by weight, Carbon 85%, Hydrogen 6%, Oxygen 6%, the remainder being incombustible. Determine minimum weight of air required per kg of coal for chemically correct composition. | 09 | L ₃ | CO5 |
|----|---|----|----------------|-----|

Q.5 Solve any Two

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|----|--|----|----------------|-----|
| a) | State Boyle's and Charle's laws and derive an equation of the state for a perfect gas. | 09 | L ₂ | CO6 |
| b) | Draw the phase equilibrium diagram on P-v, T-s, h-s coordinates for a pure substance which expands in volume on melting. Indicate thereon relevant constant property lines | 09 | L ₂ | CO6 |
| c) | Explain in detail property table of steam with respect to saturated & superheated steam. | 09 | L ₂ | CO6 |

Q.6 Solve any Three

- | | | | | |
|----|---|----|----------------|-----|
| a) | Write Short Note on the following
1. Turbofan Engine
2. Turboprop Engine | 06 | L ₂ | CO5 |
| b) | Explain in short principles of jet propulsion | 06 | L ₂ | CO5 |
| c) | Explain specific heat capacities of ideal gas? Give Relation between C _p and C _v | 06 | L ₂ | CO6 |
| d) | Define dryness fraction & prove that dryness fraction is 0 (zero) on saturated liquid line & 1 (one) on saturated vapour line | 06 | L ₂ | CO6 |

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