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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR  
(AUTONOMOUS)****M.Tech I Year I Semester Regular & Supplementary Examinations February 2018****ADVANCED THERMODYNAMICS****(THERMAL ENGINEERING)**

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 X 12 =60 Marks)

**UNIT-I**

- 1 Calculate the decrease the available energy when 25kg of water 95<sup>0</sup>C mix with 35 kg of water at 35<sup>0</sup>C, the pressure being taken as constant and the temperature of surroundings being 15<sup>0</sup>C ( $C_p$  of water = 4.2Kj/Kg K)
- (a) Total available energy. 4M
- (b) Total mass after mixing. 4M
- (c) Decrease in available energy due to mixing. 4M

**OR**

- 2 a Define Dead state. 4M
- b Define Availability. 4M
- c Define thermodynamic potentials. 4M

**UNIT-II**

- 3 a Determine the specific volume of CO<sub>2</sub> at 200<sup>0</sup>C and 60 bar by the use of (i) perfect gas law (ii) vanderwaal's equation. 4M
- b Define compressibility factor 4M
- c Define Gibbs phase rule. 4M

**OR**

- 4 a Explain Dalton's law of partial pressure. 6M
- b Entropy change of an Ideal gas. 6M

**UNIT-III**

- 5 Discuss the following.
- (i) Adiabatic flame temperature 6M
- (ii) Entropy of formation. 6M

**OR**

- 6 a Calculate the air fuel ratio required for the burning of propene (C<sub>3</sub>H<sub>8</sub>) with 150 percent theoretical air. 6M
- b Discuss Enthalpy of formation. 6M

**UNIT-IV**

- 7 a Define irreversibility and causes of irreversibility. 6M  
b A reversible cycle operates between the temperature limits of  $50^{\circ}\text{C}$  and  $500^{\circ}\text{C}$ .  
The minimum and maximum pressure in the cycle are 100Kpa and 10 Mpa. 6M  
Calculate the thermal efficiency and net work output of the cycle

**OR**

- 8 a A metal piece of 1kg mass with constant specific heat of  $0.4 \text{ K J/Kg K}$  is cooled  
from  $200^{\circ}\text{C}$  to  $100^{\circ}\text{C}$  by transferring heat to the surrounding air at  $27^{\circ}\text{C}$ . 8M  
Determine the reversible work and irreversibility for this process.  
b Define heat flux with entropy production. 4M

**UNIT-V**

- 9 Write short note on:  
(i) Seebeck effect 4M  
(ii) Joule effect 4M  
(iii) Peltier Effect 4M

**OR**

- 10 a What are the advantages and disadvantages of fuel cells 6M  
b Discuss photovoltaic cells. 6M

**\*\*\* END \*\*\***