

B.Tech 3rd Semester (AUE) F-Scheme Examination,

December-2016

ENGINEERING THERMODYNAMICS

Paper-AUE-205-F

Time allowed : 3 hours] [Maximum marks : 100

Note : Question No 1 is compulsory and attempt five questions in total selecting at least one question from each unit.

1. (a) What are positive and negative work interactions?
- (b) Define enthalpy.
- (c) Define the COP of refrigerator.
- (d) State the four processes of the Diesel cycle.
- (e) What is refrigerating effect ?
- (f) What are psychrometrics ?
- (g) What is log mean temperature difference ?
- (h) What is a grey body ? 8×2½=20

Section-A

2. Give the Clausius statement of the second Law. What is PMM2? Why it is impossible ? Can you use the same plant as heat pump in winter and as refrigerator in summer ? Explain. 20
3. Water is heated to a constant pressure of 0.7 MPa. The boiling point is 164.97°C. The initial temperature of water is 0°C. The latent heat of evaporation is 2066.3 kJ/kg. Find the increase of entropy of water, if the final state is steam. 20

Section-B

4. Derive the expression for air standard efficiency and mean effective pressure for otto cycle. 20
5. Write short notes on :
- (a) Simple jet propulsion system
 - (b) Isentropic flow of ideal gases through nozzles. 20

Section-C

6. With the help of neat sketch explain the working of Vapour compression refrigeration cycle. Also draw the p-h plot. 20
7. Write short notes on :
- (a) Properties fo refrigerants
 - (b) Air-conditioning and heat pumps. 20

Section-D

8. An oil cooler for lubrication system has to cool 1000 kg/h of oil ($C_p = 2.09 \text{ kJ/kgK}$) from 80°C to 40°C by using a cooling water flow of 1000 kg/h available at 30°C . Give your choice for parallel flow or counter flow heat exchanger, with reasons. Estimate the surface area of the heat exchanger, if overall heat transfer coefficient is $24 \text{ W/m}^2 \text{ K}$ (C_p of water = 4.18 kJ/kgK). 20
9. Show that, for estimating radial heat conduction through a Spherical wall, the geometric mean area of inner and outer surfaces has to be considered. What is Fourier's law of heat conduction ? 20