



KERALA AGRICULTURAL UNIVERSITY
B. Tech.(Food Technology) 2025 & Previous Admission
II Semester Final Examination – July 2026

FPE 1203

Food Thermodynamics (2+1)

Marks: 50
Time: 2 hours

- I Fill in the blanks** **(10x1=10)**
1. Energy can neither be created nor destroyed, but it can be transferred from one form to another. This statement is known as.....
 2. When neither mass nor energy is allowed to cross boundary of a system, it is then called.....system.
 3. For unsaturated air, the dew point temperature is.....wet bulb temperature.
 4. is the state at where all the three phases ie solid, liquid and vapour to exist in equilibrium.
 5. The entropy is an property of the system.
- State True or False**
6. In otto cycle, heat addition takes places at constant pressure.
 7. There is a loss of heat in an irreversible process.
 8. The vertical and uniformly spaced lines on a psychrometric chart represents dew point temperature.
 9. An economizer decreases the steam raising capacity of a boiler.
 10. In a fire tube boiler, the water passes through the tubes which are surrounded by flames and hot gases from outside.
- II Write short notes on ANY FIVE of the following** **(5x2=10)**
1. Prove that for an isolated system, there is no change in internal energy.
 2. State Kelvin plank statement of Second law of thermodynamics.
 3. What is dew point temperature? How is it related to dry bulb and wet bulb temperature at the saturation condition?
 4. Explain Clausius inequality.
 5. Define boiler draught and explain its importance in boiler operation.
 6. Explain steady flow process and unsteady flow process.
 7. List the various process involved in Rankine cycle. Draw the p-v diagram of the cycle.
- III Answer ANY FIVE of the following** **(5x4=20)**
1. What are the similarities and differences between Heat and Work?
 2. Explain the following a) Available energy b) Unavailable energy c) Irreversibility.
 3. Calculate the percentage increase in the efficiency of an otto cycle engine if its compression ratio increases from 5 to 8. Take $\gamma = 1.4$.
 4. Steam at 130 bar has a specific volume of $0.01510 \text{ m}^3/\text{kg}$, find the temperature, enthalpy and the internal energy.
 5. Explain the effect of superheating and subcooling on the performance of vapour compression cycle.
 6. At the inlet of nozzle, the enthalpy and velocity of the fluid are 2900 kJ/kg and 50 m/s respectively. there is negligible heat loss from the nozzle. At the outlet of nozzle, the enthalpy is 2400 kJ/kg . If the nozzle is horizontal, find the velocity of fluid at exit.
 7. Explain the functions of Water level indicator and Fusible plug in boiler.

IV

Write an essay on ANY ONE of the following

(1x10=10)

1. An ideal engine with 150 mm cylinder diameter and 200 mm stroke works on theoretical Diesel cycle. The initial pressure and temperature of air used are 1 bar and 28°C. The cut-off is 8% of the stroke. Determine:
 - i) Pressures and temperatures at all salient points.
 - ii) Theoretical air standard efficiency.
 - iii) Mean effective pressure.Assume that compression ratio is 15 and working fluid is air.
2. a) Atmospheric air at 760 mm of Hg has 45°C Dry bulb temperature and 30°C Wet bulb temperature. Using Psychrometric chart estimate
 - i) Relative humidity
 - ii) Humidity ratio
 - iii) Dew point temperature
 - iv) Enthalpy.b) Sketch the following psychrometric process in a simple psychrometric chart.
 - i) Sensible heating
 - ii) Sensible cooling
 - iii) Humidification
 - iv) Dehumidification
