Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U4A02

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2024

Fourth semester

Agriculture Engineering

21UAG402-FUNDAMENTALS OF THERMODYNAMICS FOR AGRICULTURE ENGINEERING

(Regulations 2021)

Duration: Three hours | Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The branch of science concerned with the internal macroscopic state of the body is — CO1 -U

   (a) Mechanics (b) Thermodynamics (c) Mechatronics (d) All the above

2. The thermodynamic system characterized by energy transfer but not mass transfer is known as — CO1-U

   (a) Continuous system (b) Closed system (c) Isolated system (d) Open system

3. Which of the following thermodynamic parameter is dependent on the state of the system? — CO2 -U

   (a) Enthalpy (b) Entropy (c) Volume (d) Pressure

4. Thermodynamic temperature scale is — CO2 -U

   (a)Kelvin Scale (b)Rankine Scale (c)Clausius Scale (d)Carnot Scale

5. The volume of liquid or gas in the boundary of a flow process is called — CO3- U

   (a)Fixed volume (b)Flexible volume (c)Rigid volume (d)Control volume

6. Conversion of solid into liquid occurs by absorption of — CO1-U

   (a) Latent heat of vaporization (b) Latent heat of fission

   (c) Latent heat of fusion (d) All the above

7. The volume occupied by one mole of any gas at standard temperature and pressure is — CO1-U

   (a)35.4 litres (b)22.4 litres (c)22.6 litres (d) 35.6 litres

8. Identify the equation indicated by the expression, pv = n RT CO1-U

(a) Real gas equation (b) Ideal gas equation

(c) Van der waal's equation (d) Maxwell's equation

9. What are the major components of dry air? CO1-U

(a) Ozone & Xenon (b) Oxygen & Nitrogen

(c) Argon & Neon (d) Krypton & Helium

10. Which of the following is not a component of dry air? CO5-U

(a)Methane (b) Carbon dioxide (c) Hydrogen (d)Oxygen

PART – B (5 x 2= 10Marks)

11. Differentiate enthalpy and entropy. CO1- U

12. Differentiate ideal and real gases. CO1- U

13. Distinguish between saturated solid state and saturated vapour state. CO1- U

14. Five moles of helium gas fills up an empty balloon to a volume of 6.5 litres. What would be the volume of the balloon if an additional 8.5 moles of helium gas is added? (Assume that the temperature and the pressure are kept constant) CO2-App

15. What is dry air? Mention the composition and properties of dry air. CO5-U

PART – C (5 x 16= 80Marks)

16. (a) Explain the fundamental concepts involved in thermodynamics. CO1-U (16)

Or

(b) Outline the features of various instruments used to measure thermodynamic parameters. CO1-U (16)

17. (a) A cyclic heat engine operates between a source temperature of 1200℃ and a sink temperature of 50degree. What is the least rate of heat rejection per kW net output of the engine? CO2-App (16)

(b) A carnot engine converts one fifth of the heat input into work. If the sink temperature is reduced by 80 degree, the efficiency gets doubled. Find the source and the sink temperature. Calculate the net efficiency of the heat engine. Provide the consequences of carnot cycle. CO2-App (16)

18. (a) Diagrammatically illustrate the P – V relationship of a pure substance CO1-U (16)

Or

	(b)	Compute the work done in various flow and non-flow thermodynamic processes	CO1-U	(16)
19.	(a)	Compute the work done in various flow and non-flow thermodynamic processes	CO1- U	(16)
		Or		
	(b)	What is entropy? What are its properties? Explain the changes in entropy occurring during thermodynamic processes with calculations.	CO2 -App	(16)
20.	(a)	Outline the important features of psychrometric charts.	CO1 -U	(16)
		Or		
	(b)	Discuss the applications of sensible heat as a mode of heat exchange.	CO1- U	(16)