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Enrolment No:	
SAP ID:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Program: B. Tech. Fire and Safety Engineering
Course: Basic of Mechanical Engineering
Max. Marks: 100

Semester-I
Course Code: MECH 1008
Time:03 Hours

SECTION A

(5x4 = 20 marks)

Instructions: Answer all questions @ 4 marks

Q 1	<p>A. Illustrate the definition of thermodynamics process.</p> <p>B. Illustrate the cantilever beam with schematic diagram.</p> <p>C. Define concurrent force system.</p> <p>D. Give the name of different type of casting.</p>	4	CO2
Q 2	<p>A. If the two forces, P and Q, are acting at a point in a plane and P is acting in horizontal direction. The angle between the forces is α. Write the expression of resultant force magnitude R using the Parallelogram law of forces. If the angle made by resultant force R from P force is θ, then state the expression for θ in terms of P, Q and α.</p> <p>B. Find out the resultant R and α</p> <p>(i) If $\theta = 0^\circ$ i.e. when P and Q are acting on the same straight line and in the same direction.</p> <p>(ii) If $\theta = 90^\circ$ i.e. when P and Q are acting at right angles.</p>	2+2	CO1
Q 3	<p>A. Intensive properties are independent of the _____ of a system (a) work (b) volume (c) mass (d) energy (e) heat</p> <p>B. Heat flow into a system is _____, and heat flow out of the system is _____ (a) positive, positive (b) negative, negative (c) negative, positive (d) positive, negative</p> <p>C. In which of the following systems does mass transfer occur across the system boundary? a) isolated system b) closed system c) open system d) none of the mentioned</p> <p>D. Heat does not spontaneously flow from a colder body to a hotter one. Which of the following thermodynamics law states this? a) Zeroth law of thermodynamics b) First law of thermodynamics c) Second law of thermodynamics d) Third law of thermodynamics</p>	4	CO1
Q 4	State the second law of thermodynamics with a suitable example.	4	CO1

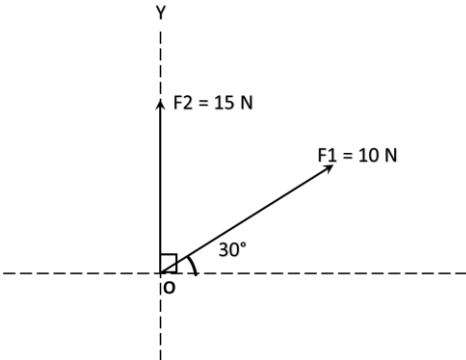
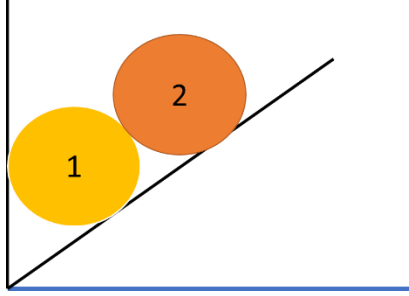
Q 5	State true or false A. Durability is the ability of a material to withstand wear and tear through weathering and corrosive attack. B. Coal gas is commonly used in gas welding. C. Plasticity is the ability of a material to return to its original form after a load has been applied and removed. D. Non-metallic materials are not generally bad conductor of heat and electricity.	4	CO3
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SECTION B

(4x10 = 40 marks)

Instructions: Answer all questions @ 10 marks

Q 1	A. Match the following a. Isothermal (i) Constant Pressure (P) b. Isobaric (ii) Constant Volume (V) c. Isochoric (iii) Constant Temperature (T) d. Isentropic (iv) Constant Enthalpy (h) e. Isenthalpic (v) Constant Entropy (s) B. According to the first law of thermodynamics that heat energy cannot be created or destroyed. It can, however, be transferred from one location to another and converted to and from other forms of energy. Can you state this law in mathematical form. C. Find the system's internal energy of given system where a loss of 45 J of heat in the surroundings around the system and 450 J of work is done onto the system.	5+3+2	CO2
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Q 2	A. Find out the resultant and its direction of given force system (see Fig 1) B. Draw the free body diagram of given balls (see Fig 2). <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Fig 1</p> </div> <div style="text-align: center;">  <p>Fig 2</p> </div> </div>	6+4	CO1
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Q 3	Classify the engineering materials with their examples. OR Give the difference between Gas welding and Arc welding.	10	CO3
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Q 4	A. Explain the different type of beam supports with their schematic diagrams. B. Differentiate the open belt drive and cross belt drive in power transmission system.	6+4	CO1
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SECTION C**(2x20 = 40 marks)****Instructions: Answer all questions @ 20 marks**

Q 1	Explain the working of refrigeration system. OR Explain the working of the 4 Stroke IC engine.	20	CO3
Q 2	Draw and explain the stress strain diagram with these following terms A. Proportional limit B. Elastic Limit C. Hook's law D. Yield point E. Ultimate strength F. Fracture point OR Illustrate the definition of force system and explain the different type of force system with their examples.	20	CO2