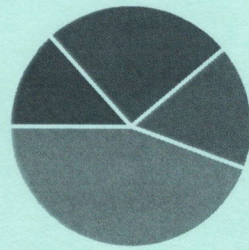


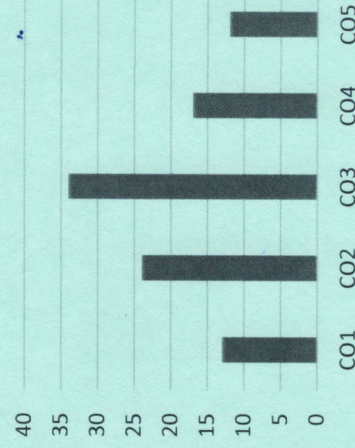
CO1	Understand Explain the fundamentals of thermodynamic systems.
CO2	Apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers and change in properties.
CO3	Apply the knowledge of entropy, reversibility and irreversibility and evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics.
CO4	Interpret the behaviour of pure substances and its application in practical problems.
CO5	Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations.

GRAPHICAL REPRESENTATION

Bloom's level wise Marks Distribution



Course Outcome wise Marks Distribution



ARKA JAIN University
Jharkhand



[17/01/2026]
END SEM EXAMINATION
School of Engineering & IT

Program	Mechanical Engineering	Branch	Diploma
Subject Name	Thermal Engineering	Session	Odd, 2025-26
Semester	III	Year	Jan, 2026
Time: 3 Hour Max. Marks : 70	<ul style="list-style-type: none"> Start writing from 2nd page onwards; don't Write on the 1st Page Backside Answer all Questions of Section A (Compulsory) Answer Any Four out of Six of Section B Answer Any Three out of Five of Section C Possession of Mobile Phone or any kind of <u>Written Material, Arguments with the Invigilator or Discussion with Co-Student</u> will come under <u>Unfair Means</u> and will <u>Result</u> in the <u>Cancellation of the Paper(s)</u>. 		
Knowledge Level (KL)	K1 : Remembering K2 : Understanding	K3 : Applying K4 : Analysing	K5 : Evaluating K6 : Creating

Section A (Each question Carry 02 Marks from Q1-i to x - 20 Marks)

Q.N	QUESTIONS	Marks	COs	KL
1				
i	Define system and surroundings with an example.	2	CO1	KL1
ii	Differentiate between closed and open systems with example.	2	CO1	KL2
iii	Define quasi static process.	2	CO1	KL1
iv	State the use of Zeroth law of thermodynamics.	2	CO1	KL1
v	Write the expression for displacement (PdV) work.	2	CO2	KL2
vi	Differentiate between heat and work. Which is the higher grade of energy?	2	CO2	KL2
vii	State the Clausius statement of Second Law.	2	CO3	KL1
viii	Define entropy.	2	CO3	KL1
ix	Define dryness fraction of steam.	2	CO4	KL1
x	Write two differences between ideal and real gases.	2	CO5	KL2

Section B (Answer any FOUR out of SIX) - 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Differentiate between closed, open, and isolated systems with examples.	5	CO1	KL2
3	Explain different types of thermodynamic work with examples.	5	CO2	KL2
4	A piston-cylinder contains gas that expands from 0.25 m ³ to 0.46 m ³ at constant pressure of 150 kPa. Calculate the work done.	5	CO2	KL3
5	State and explain Kelvin-Planck and Clausius statements. Show their equivalence.	5	CO3	KL3
6	Explain availability and irreversibility with practical examples.	5	CO3	KL3
7	Explain different types of steam (wet, dry saturated, superheated).	5	CO4	KL2

Section C (Answer any THREE out of FIVE) - 30 Marks
(Each question Carry 10 Marks)

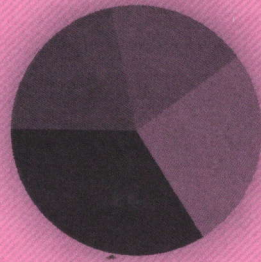
Q. No.	QUESTIONS	Marks	COs	KL
8	Derive the expression for entropy change of an ideal gas undergoing a reversible process. Use it to calculate the entropy change when 1 kg of air is heated from 300 K to 600 K at constant pressure.	10	CO3	KL4
9	Derive the Steady Flow Energy Equation (SFEE) for an open system and apply it to a steam turbine.	10	CO2	KL4
10	Derive Maxwell's thermodynamic relations and explain their significance.	10	CO3	KL3
11	A vessel of 1.5 m ³ contains steam at 10 bar with a dryness fraction of 0.9. Determine the mass of steam, its enthalpy, and entropy using steam tables.	10	CO4	KL4
12	Discuss differences between ideal and real gases and evaluate thermodynamic properties of real gas mixtures using suitable relations.	10	CO5	KL4

CO- Course Outcomes, **KL-** Knowledge Level, **PO** – Program Outcome

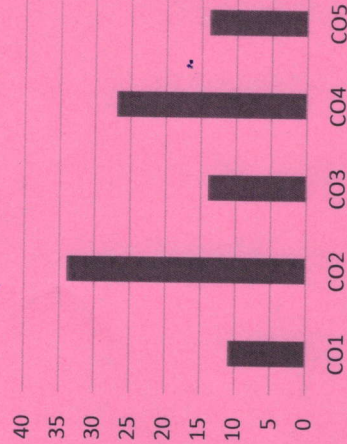
CO1	Remember various properties of fluids in solving the problems.
CO2	Understand working of Impact of Jet, pumps and turbines.
CO3	Apply Bernoulli's equation for solutions in fluids.
CO4	Analyse fluid forces - drags and lift on immersed bodies.
CO5	Evaluate the dimensionless parameters.

GRAPHICAL REPRESENTATION

Bloom's level wise Marks Distribution



Course outcome wise Marks Distribution



■ KL 1 ■ KL 2 ■ KL 3 ■ KL 4 ■ KL 5 ■ KL 6



ARKA JAIN University
Jharkhand



[20/01/2026]

END SEM EXAMINATION
School of Engineering & IT

Program	Mechanical Engineering	Branch	Diploma
Subject Name	Fluid Mechanics & Hydraulic Machinery	Session	Odd, 2025-26
Semester	III	Year	Jan, 2026
Time: 3 Hour Max. Marks : 70	<ul style="list-style-type: none"> Start writing from 2nd page onwards; don't Write on the 1st Page Backside Answer all Questions of Section A (Compulsory) Answer Any Four out of Six of Section B Answer Any Three out of Five of Section C Possession of Mobile Phone or any kind of Written Material, Arguments with the Invigilator or Discussion with Co-Student will come under <u>Unfair Means</u> and will <u>Result</u> in the <u>Cancellation of the Paper(s)</u>. 		
Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
i	Define Specific gravity of any fluid.	2	CO1	K1
ii	Define the term Viscosity.	2	CO4	K2
iii	Write statement for Bernoulli's theorem.	2	CO2	K2
iv	Define viscosity and give its unit.	2	CO1	K1
v	Make a list of minor losses in Pipes?	2	CO3	K1
vi	Write classification of different types of turbines.	2	CO5	K2
vii	Write expression for continuity equation.	2	CO4	K3
viii	What is turbine?	2	CO3	K3
ix	Write difference between laminar and turbulent flow.	2	CO3	K3
x	Classify different types of pumps.	2	CO5	K1

Section B (Answer any FOUR out of SIX) – 20 Marks

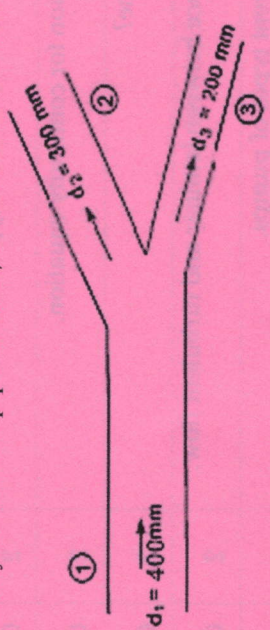
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Calculate specific weight, density and specific gravity of one litre of liquid which weights 8.5 N.	05	CO2	K2
3	Write statement for Bernoulli's theorem. Also write mathematical equation for same.	05	CO5	K3
4	What is capillarity? Write expression for capillary rise and fall.	05	CO1	K2
5	Draw neat sketch for impact of jet on a Stationary vertical flat plate and write the formula to determine the work done.	05	CO5	K3
6	Draw and explain hydroelectric power plant.	05	CO4	K3
7	Write a short note on draft tube used in reaction turbine.	05	CO3	K4

Section C (Answer any THREE out of FIVE) – 30 Marks

(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	Define these terms: a) Density b) Specific Gravity c) Specific Weight d) specific volume. Also calculate Sp. Weight and Sp. Gravity for cruid oil which wight 9.4 N for one litre.	10	CO3	K4
9	A pipe 400 mm in diameter branches into two pipes (2) and (3) of diameters 300 mm and 200 mm respectively. If the average velocity in 400 mm diameter pipe is 3.5 m/s. Find (i) Discharge through 450 mm dia. Pipe and (ii) velocity in 200 mm diameter pipe if the average velocity in 300 mm pipe is 2.5 m/s. 2-5 8 4-6 t	10	CO4	K4
10	What do you understand by continuity equation? A 30 cm diameter pipe carries oil of sp. Gravity 0.92 at a	10	CO4	K5



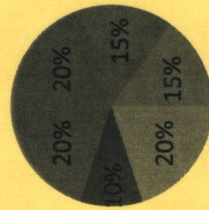
velocity of 3 m/s. At another section the diameter is 22 cm. find the velocity at this section and also mass flow rate of oil.

11	What is Impact of Jet? Derive Expression for force exerted by the jet on the plate in the direction of jet?	10	CO2	K5
12	Draw a schematic diagram of reciprocating pump and explain its working principle.	10	CO5	K4

CO1	Remember the definition of stress and strain. Find the changes in axial, lateral and volumetric dimensions
CO2	Understand the phenomenon of shear force and bending moment and draw the S.F. & B.M diagrams of for UDL and Point loads.
CO3	Apply various approaches to calculate thermal stresses, in bodies of uniform section and composite sections. Obtain expressions for instantaneous stress developed in bodies subjected to different loads.
CO4	Analyse the theory of bending and deflection of beam.
CO5	Evaluate and Compare strength and weight of solid and hollow shafts of the same length and material and compute the stress and deflection of the closed coil helical spring.
CO6	Analyse the theory of bending and deflection of beam

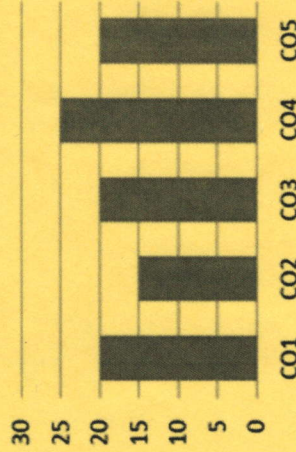
GRAPHICAL REPRESENTATION

Bloom's Level Wise Marks Distribution



■ Level 1 ■ Level 2 ■ Level 3

Course Outcome Wise Marks Distribution



				[22/01/2026] END SEM EXAMINATION School of Engineering & IT	
Program	Mechanical Engineering	Branch	Diploma	Session	Odd, 2025-26
Subject Name	Mechanics of Solid	Year	Jan, 2026		
Semester	III				
• Start writing from 2nd page onwards; <u>don't Write on the 1st Page Backside</u> • Answer all Questions of Section A (Compulsory) • Answer Any Four out of Six of Section B • Answer Any Three out of Five of Section C • Possession of <u>Mobile Phone</u> or any kind of <u>Written Material, Arguments</u> with the <u>Invigilator or Discussion</u> with <u>Co-Student</u> will come under <u>Unfair Means</u> and will <u>Result in the Cancellation of the Paper(s)</u> .					
Time: 3 Hour Max. Marks : 70					
Knowledge Level (KL)		K1 : Remembering		K3 : Applying	
		K2 : Understanding		K4 : Analysing	
				K5 : Evaluating	
				K6 : Creating	

Q.N	QUESTIONS	Marks	COs	KL
1				
i	Define stress and strain with suitable examples.	2	CO1	K2
ii	What is ductility? Give examples of ductile materials.	2	CO2	K3
iii	Why are thermal stresses developed in a body?	2	CO3	K2
iv	Define resilience, proof resilience, and modulus of resilience.	2	CO4	K3
v	Define shear force and bending moment.	2	CO5	K4
vi	State the assumptions made in the theory of simple bending.	2	CO1	K2
vii	Define torsion. Write the torsion equation.	2	CO2	K3
viii	What are the types of springs?	2	CO1	K2
ix	What are hoop stress and longitudinal stress?	2	CO2	K3
x	What is meant by safe working pressure?	2	CO3	K2

Section A (Each question Carry 02 Marks from Q1-i to x – 20 Marks)

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Explain factor of safety (FOS) and state its significance	5	CO1	K2
3	Explain different types of beams and types of loading.	5	CO1	K3
4	A steel bar of 30 mm diameter and 2 m length is subjected to a pull of 30 kN. Find the stress, strain, and elongation ($E = 2 \times 10^5 \text{ N/mm}^2$).	5	CO2	K4
5	A simply supported beam span 6 m carries a central point load of 12 kN. Find support reactions and draw S.F. & B.M.	5	CO2	K4
6	Differentiate between strength and rigidity of a shaft.	5	CO3	K4
7	Differentiate between circumferential and longitudinal failure of thin shells.	5	CO4	K5

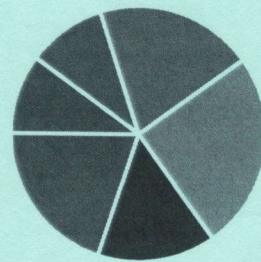
Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	Explain thermal stresses in a uniform bar subjected to temperature change.	10	CO2	K5
9	Explain the effect of loading on the shape of S.F. and B.M. diagrams.	10	CO1	K2
10	Derive the expression for maximum deflection in a cantilever beam carrying a point load at the free end.	10	CO3	K3
11	Write short notes on: a) Closed coil helical spring b) Open coil helical spring	10	CO4	K5
12	Explain the significance of safe working pressure and thickness in shell design.	10	CO4	K1

CO1	Understand the crystal structures and atomic bonds. Classification of ferrous metals and their properties
CO2	Describe non-ferrous metals, cutting tool materials and composites along with their properties. Principle of corrosion, their types and its prevention methods along with the various surface engineering processes.
CO3	Apply various parameters to understand the properties and compositions of materials.
CO4	Analyse the various phase diagrams of ferrous metals and alloys, composition and use of non-ferrous metals.
CO5	Evaluate different methods of failure analysis and testing of materials.

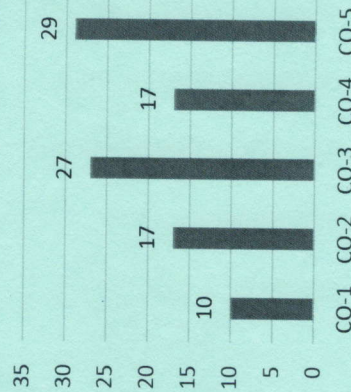
GRAPHICAL REPRESENTATION

Bloom's level wise Marks Distribution



■ K1 ■ K2 ■ K3 ■ K4 ■ K5 ■ K6

Course Outcome wise Marks Distribution



ARKA JAIN University
Jharkhand



[30/01/2026]

END SEM EXAMINATION
School of Engineering & IT

Branch	Mechanical Engineering	Program	Diploma
Subject Name	Engineering Materials	Session	Odd, 2025-26
Semester	III	Year	Jan, 2026
Time: 3 Hour Max. Marks : 70	<ul style="list-style-type: none"> Start writing from 2nd page onwards; don't write on the 1st Page Backside Answer all Questions of Section A (Compulsory) Answer Any Four out of Six of Section B Answer Any Three out of Five of Section C Possession of <u>Mobile Phone</u> or any kind of <u>Written Material, Arguments with the Invigilator or Discussion with Co-Student</u> will come under <u>Unfair Means</u> and will result in the <u>Cancellation of the Paper(s)</u>. 		
Knowledge Level (KL)	K1 : Remembering K2 : Understanding	K3 : Applying K4 : Analysing	K5 : Evaluating K6 : Creating

Section A (Each question Carry 02 Marks from Q1-i to x - 20 Marks)

Q.N	QUESTIONS	Marks	COs	KL
1	Define Unit Cell and Crystal Structure.	2	CO1	K1
i	List out the name of the seven basic crystal systems.	2	CO3	K2
ii	Explain Covalent and Metallic Bonds.	2	CO1	K2
iii	Explain Simple Cubic, BCC, FCC and HCP with example.	2	CO2	K1
iv	Explain types of steel with example.	2	CO1	K1
v	Discuss classification of Iron and Steel with suitable Example	2	CO5	K2
vi	Differentiate between ferrous and nonferrous metals with examples.	2	CO5	K3
vii	Write down the name of copper and Aluminium alloys	2	CO1	K2
viii	List out the name of Non- destructive testing methods	2	CO1	K2
ix	Write down the factors affecting the corrosion of metals	2	CO4	K3

Section B (Answer any FOUR out of SIX) - 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Elaborate engineering materials with examples.	05	CO5	K3
3	Discuss in brief Crystal structure, Unit cell and 7 crystal system in materials with diagram.	05	CO2	K4
4	Distinguish clearly amongst cast iron, wrought iron and steel regarding their constituents.	05	CO3	K6
5	Elaborate FCC, BCC & HCP in details with No of atoms, Coordination no and Atomic Packing factor.	05	CO5	K3
6	Discuss about bonds in materials in details.	05	CO5	K6
7	State the difference types of bond and their characteristics.	05	CO4	K5

Section C (Answer any THREE out of FIVE) - 30 Marks
(Each question Carry 10 Marks)

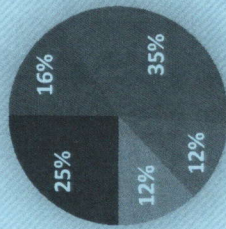
Q. No.	QUESTIONS	Marks	COs	KL
8	Elaborate stainless steel. Discuss the effect of nickel, chromium and manganese on stainless steel.	10	CO3	K5
9	Discuss types of stainless steel and their properties in details.	10	CO2	K6
10	Write the short notes on free cutting steel and stainless steel.	10	CO5	K4
11	What is corrosion? Write the types of corrosion. What are the various measures to avoid corrosion in material?	10	CO3	K3
12	Elaborate the nonferrous metals and explain any four types of nonferrous metals.	10	CO4	K4

CO- Course Outcomes, KL- Knowledge Level, PO – Program Outcome

CO1	Adopt safety practices while working on various machines.
CO2	Understand the basic manufacturing processes for manufacturing different components.
CO3	Apply the specific manufacturing process for getting the desired type of output.
CO4	Analyze the process of casting, forging and welding required for specific condition.
CO5	Evaluate the entire manufacturing process involved in manufacturing components.

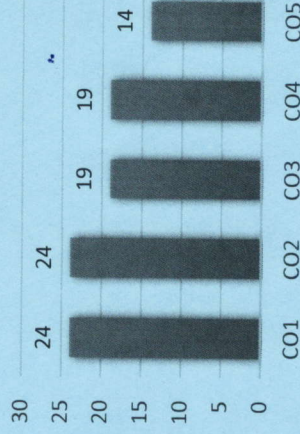
GRAPHICAL REPRESENTATION

Bloom's Level Wise Marks Distribution



■ KL1 ■ KL2 ■ KL3 ■ KL4 ■ KL5 ■ KL6

Course Outcome wise Marks Distribution



ARKA JAIN University
Jharkhand



[28/01/2026]

END SEM EXAMINATION
School of Engineering & IT

Branch	Mechanical Engineering	Program	Diploma
Subject Name	Manufacturing Process	Session	Odd, 2025-26
Semester	III	Year	Jan, 2026
Time: 3 Hour Max. Marks : 70	<ul style="list-style-type: none"> Start writing from 2nd page onwards; don't Write on the 1st Page * Backside Answer all Questions of Section A (Compulsory) Answer Any Four out of Six of Section B Answer Any Three out of Five of Section C Possession of Mobile Phone or any kind of Written Material, Arguments with the Invigilator or Discussion with Co-Student will comes under Unfair Means and will Result in the Cancellation of the Paper(s). 		
Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Section A (Each question Carry 02 Marks from Q1-i to x - 20 Marks)

Q. N	QUESTIONS	Marks	COs	KL
1				
i	Define casting.	2	CO1	K1
ii	Name the Materials used for making Patterns.	2	CO2	K1
iii	List out any four arc welding equipment.	2	CO3	K2
iv	What are the advantages of a.c. arc welding?	2	CO4	K2
v	Define Extrusion.	2	CO5	K1
vi	What do you understand by recrystallization and recrystallization temperature?	2	CO1	K2
vii	What do you understand by forging?	2	CO2	K2
viii	List out the forging defects.	2	CO3	K2
ix	What are the functions of riser?	2	CO4	K3
x	Name the different zones in Cupola furnace?	2	CO5	K4

Section B (Answer any FOUR out of SIX) – 20 Marks

(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Classify the types of patterns and sketch any three of them.	05	CO1	K2
3	Explain the steps involved in sand casting.	05	CO1	K2
4	Summarize shielded metal arc welding process with suitable diagram. What are its applications?	05	CO2	K2
5	Explain impact extrusion with a sketch	05	CO2	K4
6	What is a Press? Discuss various types of presses.	05	CO3	K4
7	Give the advantages and limitations of gas welding.	05	CO4	K5

Section C (Answer any THREE out of FIVE) – 30 Marks

(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	Explain the pressure die casting process with a neat sketch? Also write its advantages and Disadvantage.	10	CO2	K5
9	Define forging and explain drop forging with a neat sketch.	10	CO1	K2
10	Define tube piercing and explain it with a neat sketch.	10	CO3	K3
11	Describe the various types shearing dies used in sheet metal work.	10	CO4	K5
12	Explain submerged arc welding with a neat sketch.	10	CO4	K1

Section B (Answer any FOUR out of FIVE) - 20 Marks
(Each question Carry 05 Marks)

QUESTIONS

Q. No.	Marks	COs	KL
2	5	CO1	KL1
3	5	CO2	KL2
4	5	CO2	KL3
5	5	CO3	KL3
6	5	CO4	KL3
7	5	CO4	KL2

Section C (Answer any THREE out of FIVE) - 30 Marks
(Each question Carry 10 Marks)

QUESTIONS

Q. No.	Marks	COs	KL
8	10	CO3	KL4
9	10	CO3	KL4
10	10	CO2	KL4
11	10	CO3	KL3
12	10	CO4	KL4
	10	CO5	KL4