

16/01/25

 ARKA JAIN University Jharkhand		NAAC GRADE A ACCREDITED UNIVERSITY		END SEM EXAMINATION School of Engineering & IT	
Branch	Mechanical Engineering			Program	Diploma
Subject Name	Fluid Mechanics and Hydraulic Machinery			Semester	III
				Year	January, 2025
Time: 3 Hour Max. Marks : 70	• 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</u> , <u>Arguments with the Invigilator</u> or <u>Discussion with Co-Student</u> will comes 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.N.	QUESTIONS		Marks	COs	KL
i	Define fluid with examples		2	CO1	K1
ii	How steady flow differs from unsteady flow?		2	CO5	K3
iii	Define Capillarity.		2	CO2	K2
iv	Write the differences between compressible flow and incompressible flow.		2	CO4	K4
v	Write the statement for Bernoulli's theorem and its assumptions.		2	CO3	K1
vi	Evaluate the condition of cavitation formation.		2	CO3	K2
vii	What do you mean by metacentre and metacentric height?		2	CO1	K5
viii	Define viscosity.		2	CO2	K2
ix	Explain briefly the importance of force of buoyancy		2	CO1	K4
x	Analyse the condition of river flowing during flood. State the type of flow.		2	CO2	K4

1 Set x 20 = 200x

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

Q.N.	QUESTIONS	Marks	COs	KL
2	A pipe (1) 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.	05	CO1	K1
3	Define these terms a) Density b) Specific Gravity c) Specific Weight d) specific volume. Also calculate Sp. Weight and Sp. Gravity for crude oil which weight 9.4 N for one litre.	05	CO1	K3
4	Define surface tension. Also write expression for pressure inside a soap bubble, droplet and jet of liquid.	05	CO3	K4
5	Draw Velocity Triangle for inward flow reaction turbine and name each component. Also derive equation for work done by unite weight of water flowing through the turbine. Assume suitable data if needed.	05	CO5	K3
6	Draw a schematic diagram of reciprocating pump and explain its working principle.	05	CO2	K2
7	State Newton's law of viscosity. How dynamic viscosity differs from kinematic viscosity?	05	CO2	K5

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

Q.N.	QUESTIONS	Marks	COs	KL
8	Define draft tube. What is the function of draft tube? Explain different types of draft tubes with neat sketches.	10	CO1	K3
9	Explain the principle of venturi meter, Orifice meter and Pitot Tube with diagram. Derive equation for flow velocity for one of them.	10	CO3	K4
10	Define Hydraulic Turbine & pump. Differentiate between centrifugal and reciprocating pump	10	CO5	K4
11	Explain working of Pelton wheel turbine with schematic diagram. Also write formula for different efficiencies involved in calculation of performance of a turbine.	10	CO2	K3
12	Draw and explain hydroelectric power plant.	10	CO4	K5

Course Outcomes	CO1	CO2	CO3	CO4	CO5
Remember various properties of fluids in solving the problems					
Apply Bernoulli's equation for solutions in fluids					
Analyse impact of jets					
Understand the hydraulic turbine.					
Understand the hydraulic pump.					
GRAPHICAL REPRESENTATION					
Bloom's level wise Marks Distribution			Course outcome wise Marks Distribution		
■ K1 ■ K2 ■ K3 ■ K4 ■ K5			CO1 CO2 CO3 CO4 CO5		

18/01/25

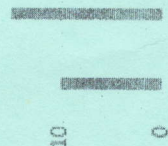
 ARKA JAIN University Jharkhand		NAAC GRADE A ACCREDITED UNIVERSITY		END TERM EXAMINATION School of Engineering & IT	
Branch	Mechanical Engineering			Program	Diploma
Subject Name	Material Science & Engineering			Semester	III
				Year	January, 2024
• Start writing from 2nd page onwards; <u>don't Write 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 Phones</u> or any kind of <u>Written Material, Arguments with the Invigilator or Discussing with Co-Student</u> will comes under <u>Unfair Means</u> and will <u>Result in the Cancellation of the Papers.</u>					
Time: 3 Hour					
Max. Marks : 70					
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 Q1-x) - 20 Marks

Q. N1	QUESTIONS	Marks	COs	KL	PO
i	What is unit cell?	2	Co4	K2	PO1
ii	What is wrought iron?	2	Co1	K2	PO3
iii	What is stainless steel?	2	Co3	K1	PO1
iv	What is HSS and write the composition of HSS?	2	Co5	K2	PO1
v	What is alloy steel and write down list of alloying elements?	2	Co5	K2	PO1
vi	Why is alloying done?	2	Co4	K1	PO2
vii	Explain the theory of tempering.	2	Co4	K2	PO3
viii	What is plain carbon steel?	2	Co3	K2	PO1
ix	What is stainless steel?	2	Co4	K2	PO1
x	What are metals? Classify engineering materials.	2	Co5	K2	PO1

Section B (Answer any FOUR out of SIX) – 20 Marks (Each question 5 Marks)					
Q. No.	QUESTIONS	Marks	COs	KL	PO
2	Define alloy steel. Discuss the effect of nickel, chromium and manganese on steel.	5	Co5	K2	PO3
3	What do you understand by the term of corrosion? How corrosion can be prevented?	5	Co3	K2	PO1
4	What is nonferrous metals and explain any four types of nonferrous metals?	5	Co4	K2	PO1
5	Explain briefly the following i. BCC ii. FCC iii. HCP	5	Co5	K1	PO2
6	Give the comparison between ionic, covalent and metallic bond.	5	Co5	K2	PO4
7	Define the term atomic factor- calculate its value for Simple Cube, Body centred cubic and Face centred cubic.	5	Co3	K2	PO1
Section C (Answer any THREE out of FIVE) – 30 Marks (Each question Carry 10 Marks)					
Q. No.	QUESTIONS	Marks	COs	KL	PO
8	What is corrosion and explain types of corrosion. Write down method of corrosion Protection.	10	Co2	KL3	PO1
9	Define mechanical property of engineering materials. State any six mechanical properties.	10	Co1	KL2	PO1
10	Write short notes on Low alloy steel, high alloy steel, tools steel	10	Co5	KL4	PO4
11	What are Effect of various alloying elements such as – Chromium, nickel, manganese, molybdenum, tungsten, vanadium?	10	Co5	KL3	PO4
12	What is atomic radius? Calculate the atomic radius following cases i. Simple Cubic ii. BCC iii. FCC	10	Co5	KL1	PO4

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

Course Outcomes	CO1	CO2	CO3	CO4	CO5
	Know about different types of material structure	Understand the personnel development inform sound knowledge.	Explain the concept of material composition.	Develop ability to come up improving properties of materials.	Understand different types of materials and their structures and mechanical properties.
GRAPHICAL REPRESENTATION					
Bloom's level wise marks distribution		 ■ CO1 ■ CO2 ■ CO3 ■ CO4 ■ CO5			
		 ■ Course outcome wise marks distribution ■ Column 1			

21/01/25

	ARKA JAIN University Jharkhand	NAAC GRADE A ACCREDITED UNIVERSITY	END SEM EXAMINATION School of Engineering & IT
Branch	Mechanical Engineering	Program	Diploma
Subject Name	Thermal Engineering-I	Semester	III
		Year	January, 2025
Time: 3 Hour Max. Marks : 70	- 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 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 1	QUESTIONS	Marks	COs	KL
i	State Charles's law	2	CO1	K1
ii	State zeroth law of thermodynamics	2	CO1	K2
iii	Steady flow energy satisfied which laws of thermodynamics	2	CO2	K1
iv	What is isentropic process	2	CO2	K2
v	State the term adiabatic.	2	CO3	K1
vi	In thermometry which thermodynamics law is applicable	2	CO3	K3
vii	Explain perpetual motion of machine of 1 st kind	2	CO4	K5
viii	What will be the work done for Isobaric process?	2	CO4	K1
ix	What is the heat calculation formulae for isobaric process?	2	CO5	K2
x	What do you mean by ideal Gas?	2	CO5	K4

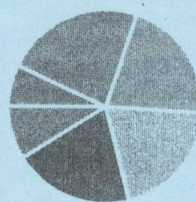
Section B (Answer any FOUR out of SIX) – 20 Marks (Each question Carry 05 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
2	State and explain the availability and irreversibility in thermodynamic	05	CO1	K5
3	State the limitation of 1st law of thermodynamics	05	CO2	K5
4	Draw the PV and TS diagram of Carnot cycle also write the process.	05	CO3	K5
5	Differentiate between heat and work in the context of energy transfer.	05	CO4	K3
6	What are the various type of solar collector	05	CO5	K4
7	Describe the working principle of a flat plate solar collector with neat labelled diagram.	05	CO5	K4
Section C (Answer any THREE out of FIVE) – 30 Marks (Each question Carry 10 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
8	An ideal Carnot engine operates between a high-temperature reservoir at 600 K and a low-temperature reservoir at 300 K. If the engine absorbs 500 kJ of heat from the high-temperature reservoir, calculate: a) The work done by the engine. b) The heat rejected to the low-temperature reservoir. c) The thermal efficiency of the engine.	10	CO1	K5
9	A Carnot engine operates between a high-temperature reservoir at 800 K and a low-temperature reservoir at 400 K. If the engine absorbs 1000 kJ of heat from the high-temperature reservoir, calculate: a) The work output of the engine. b) The heat rejected to the low-temperature reservoir. c) The thermal efficiency of the engine.	10	CO2	K5
10	Define a thermal reservoir and explain the concepts of a heat engine and a heat pump with schematic representations.	10	CO3	K3
11	Describe the working principles of a constant volume gas thermometer and a mercury-in-glass thermometer.	10	CO4	K4
12	Discuss the limitations of the First Law of Thermodynamics. Also explain PMM1 and PMM2	10	CO5	K3

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

CO1	Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems.
CO2	Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics.
CO3	Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers and change in properties.
CO4	Interpret the behavior 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.
CO6	

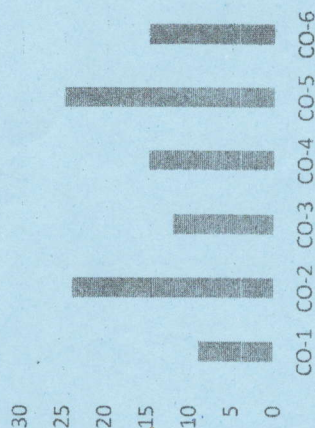
GRAPHICAL REPRESENTATION

Bloom's level wise Marks Distribution



■ K1 ■ K2 ■ K3 ■ K4 ■ K5 ■ K6

Course Outcome wise Marks Distribution



22/01/25

	ARKA JAIN University Jharkhand			END SEM EXAMINATION School of Engineering & IT
	Branch	Mechanical Engineering	Program	Diploma
	Subject Name	Strength of Materials	Semester	III
Time: 3 Hour Max. Marks : 70		Year January, 2025		
• 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 with the Invigilator or Discussion with Co-Student</u> will comes 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	
	K2 : Understanding		K4 : Analysing	
		K5 : Evaluating		
		K6 : Creating		

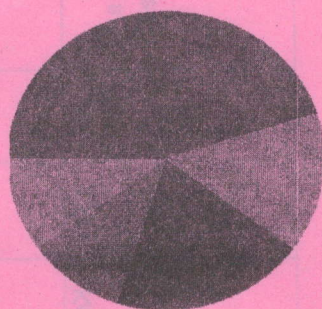
Section A (Each question Carry 02 Marks from Q1-i to x - 20 Marks)				
Q.N	QUESTIONS	Marks	COs	KL
i	Define these terms a) Young's Modulus b) Poisons Ratio	2	CO1	K1
ii	What is thermal Stress? Write formula for thermal stress.	2	CO2	K2
iii	What do you understand by shear force and bending moments in beams?	2	CO2	K1
iv	Where location of maximum bending moment does occurs in cantilever beam.	2	CO1	K1
v	What are different types of beams?	2	CO3	K2
vi	What is bending stress? Also write formula for Bending stress.	2	CO3	K1
vii	Find moment of inertia about centroidal axis of a beam of rectangular cross-section as 50mm depth and 30 mm width.	2	CO3	K2
viii	What do you understand by Torsion of Shaft?	2	CO5	K3
ix	What types of stress will induced in a helical spring and why?	2	CO5	K3
x	How to differentiate thin and thick cylinders?	2	CO4	K4

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

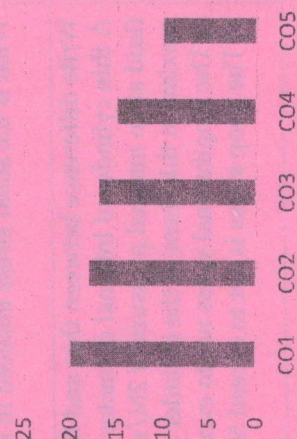
CO1	Remember the definition of stress and strain. Find the changes in axial, lateral and volumetric dimensions
CO2	Understand the phenomenon of shear force and bending moment and draw the S.F. & B.M diagrams of for UDL and Point loads.
CO3	Apply various approaches to calculate thermal stresses, in bodies of uniform section and composite sections. Obtain expressions for instantaneous stress developed in bodies subjected to different loads.
CO4	Analyze 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.

GRAPHICAL REPRESENTATION

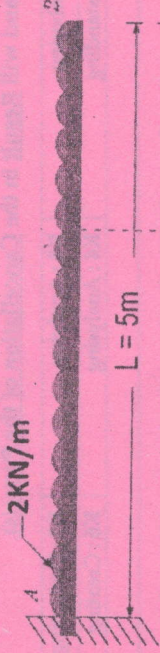
Blooms Level wise marks Distribution



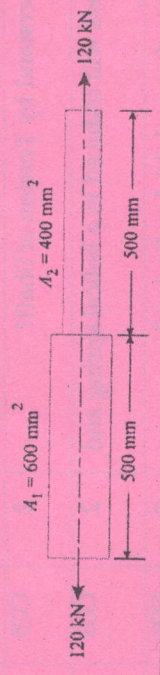
Course Outcome Wise Marks Distribution

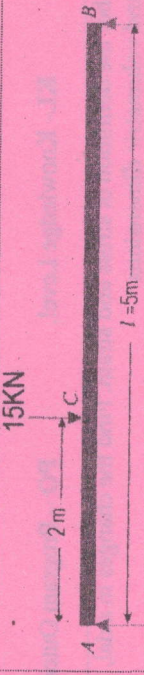


Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	A brass rod 1.5m long and 20 mm diameter was found to deform 1.9 mm under a tensile load of 40kN. Calculate the modulus of elasticity of the rod.	5	CO1	K3
3	Draw shear force and bending moment diagram for a cantilever beam of length 5 m subjected to UDL of 2kN/m on entire length.	5	CO2	K2
4	Draw Shear Force and Bending Moment Diagram for beam Shown in Figure. 	5	CO2	K3
5	What do you understand by 'Pure Bending'? Write Assumptions in theory of pure bending. Also write formula for bending stress and define each term.	5	CO2	K1
6	A Circular shaft of 60mm diameter is required to transmit torque from one shaft to another. Find the safe torque, which the shaft can transmit, if shear stress is not to exceed 40MPa.	5	CO5	K3
7	What is difference between simply supported beam and cantilever beam? Explain with help of sketches.	5	CO4	K4

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

Q. No.	QUESTIONS	Marks	COs	KL
8	A Composite Steel Bar is subjected to a tensile load of 120kN as shown in fig. Determine the Total elongation of the bar. Take $E = 200 \text{ GPa}$ for Steel. 	10	CO1	K2
9	Draw Shear force and bending Moment diagram for beam shown in figure.	10	CO2	K1

				
10	a) What is Uniformly Distributed Load? Find equivalent load and position of equivalent load for an UDL of 2.5 kN acting over full span of a cantilever of length 6m. b) Find deflection of above cantilever, if cross section of cantilever is rectangular of width 50mm and depth 80mm. consider Young's modulus of beam material as $E = 200 \text{ GPa}$.	10	CO4	K5
11	What is polar Moment of Inertia? A Hollow Shaft of external and Internal Diameter of 80mm and 40mm is required to transmit torque 4kN-m. What is the shear stress induced in it?	10	CO5	K3
12	Write difference between thin and thick cylinders. A thin cylinder of internal diameter 1.25 m contains a fluid at an internal pressure of 2 N/mm^2 . Determine the maximum thickness of the cylinder if a) The longitudinal stress not to exceed 25 N/mm^2 b) The hoop stress is not to exceed 50 N/mm^2	10	CO3	K4

27/01/25

JGI	ARKA JAIN University Jharkhand	NAAC GRADE A ACCREDITED UNIVERSITY	END SEM EXAMINATION School of Engineering & IT
Branch	Mechanical Engineering	Program	Diploma
Subject Name	Manufacturing Technology -I	Semester	III
		Year	January, 2025
Time: 3 Hour Max. Marks : 70	- 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 comes 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. N	QUESTIONS	Marks	COs
1			KL
i	What is forging?	2	CO2 K1
ii	What is casting?	2	CO1 K2
iii	Write the various defects in casting.	2	CO2 K3
iv	What is Pattern?	2	CO3 K1
v	Write the different types of pattern allowances.	2	CO2 K2
vi	What is core?	2	CO2 K1
vii	Why riser is provided in Casting	2	CO2 K1
viii	Explain Cupola furnace with neat sketch.	2	CO3 K2
ix	Write down the classification of bending operations	2	CO4 K3
x	What do you understand by MIG and TIG welding	2	CO5 K1

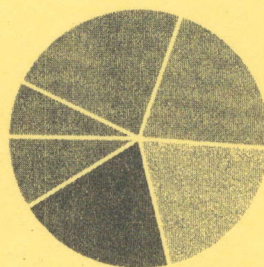
Section B (Answer any FOUR out of SIX) – 20 Marks (Each question Carry 05 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
2	Write down the Basic steps of casting process and explain.	05	CO1	K1
3	Write down the different types of defects found in casting process	05	CO3	K2
4	What are the differences between upset forging and drawing	05	CO2	K3
5	Explain extrusion process with neat sketch	05	CO3	K1
6	Write difference between punching and blanking	05	CO4	K2
7	Differentiate arc welding and gas welding	05	CO5	K1
Section C (Answer any THREE out of FIVE) – 30 Marks (Each question Carry 10 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
8	Describe the different types of patterns? Explain any two type of pattern with neat sketch.	10	CO1	K1
9	Define Forging Operation. Also draw a die design for close die forging and explain the process of open die and closed die forging.	10	CO3	K2
10	What are different sheet metal operations? Explain any five sheet metal operation with diagram	10	CO2	K3
11	Explain any four sheet metal characteristics	10	CO4	K1
12	Explain the flame characteristics of gas welding process with a neat sketch.	10	CO5	K2

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	Analyse the process of casting, forging and welding required for specific condition
CO5	Evaluate the entire manufacturing process involved in manufacturing components
CO6	Evaluate the entire manufacturing process involved in manufacturing components

GRAPHICAL REPRESENTATION

Bloom's level wise Marks Distribution



Course Outcome wise Marks Distribution

