JGI	ARKA JAIN University, Jharkhand	NAAC GRADE A ACCREDITED UNIVERSITY	[06-05-2026] END SEM EXAMINATION School of Engineering & IT

Program	**Mechanical Engineering**	**Branch**	**Diploma**
Subject Name	**3D Printing**	**Session**	**Even, 2025-26**
Semester	**VI**	**Year**	**April, 2026**
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 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 1	QUESTIONS	Marks	COs	KL
i	State any two advantages of 3D printing.	02	CO1	K1
ii	State any two limitations of 3D printing.	02	CO1	K1
iii	What is the basic working principle of 3D printing?	02	CO1	K2
iv	What is Tinkercad?	02	CO2	K1
v	What is the purpose of Tinkercad lessons for beginners?	02	CO2	K2
vi	What is an STL file and why is it important in 3D printing?	02	CO2	K2
vii	Mention any two applications of 3D printing in the medical field.	02	CO4	K1
viii	What is prototyping in 3D printing?	02	CO3	K2
ix	What is a design challenge in 3D printing?	02	CO3	K2
x	Why 3D printing is considered an advanced manufacturing technology?	02	CO1	K2

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

Q. No.	QUESTIONS	Marks	COs	KL
2	Define 3D printing and mention any two advantages of additive manufacturing over conventional manufacturing?	05	CO1	K1
3	Write the various types of 3D Printing with an example of manufactured product.	05	CO3	K2
4	Write down the differences between FDM and SLA processes.	05	CO3	K4
5	Explain the features and applications of Tinkercad in 3D design.	05	CO2	K2
6	Discuss various applications of 3D printing in industries such as medical, automotive, and aerospace.	05	CO4	K3
7	Describe the steps involved in scanning, modifying, and printing a 3D object.	05	CO3	K3

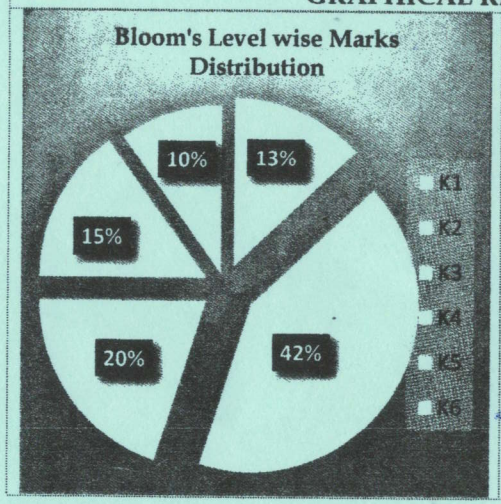
Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

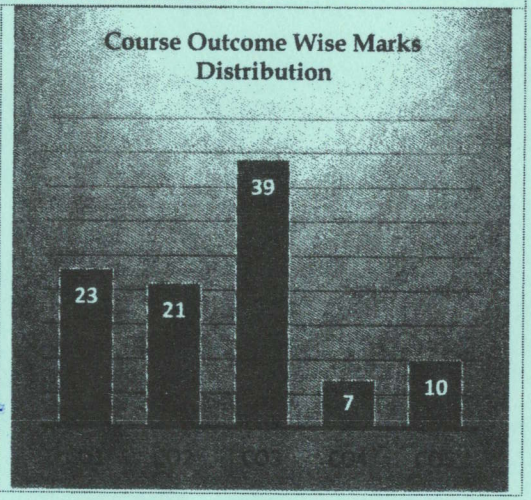
Q. No.	QUESTIONS	Marks	COs	KL
8	Explain the basic working principle of 3D Printing.	10	CO1	K2
9	Discuss the advantages, limitations, and suitable applications of 3D printing.	10	CO3	K4
10	Write short notes on powder-based 3D printing processes.	10	CO3	K2
11	Design and justify a 3D printing-based solution for a real-world problem, considering material selection, design constraints, and process limitations.	10	CO5	K5
12	Explain the complete process of 3D printing from model design to final product with suitable diagrams.	10	CO2	K3

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

Course Outcomes	CO1	Students able to makes 3D printing special, and when to use 3D printing vs. alternative options.
	CO2	Students able to understand familiarize themselves with the 3D printing process and how it works.
	CO3	Students learn how to visualize and plan projects before getting started, so they can be more efficient.
	CO4	Students spend several days familiarizing themselves with several software programs and combining them to accomplish tasks.
	CO5	Students put all their knowledge together to design and 3D print prototypes for design challenges Students design and print whatever object they would like to take home.

GRAPHICAL REPRESENTATION





JGI	**ARKA JAIN University** Jharkhand	NAAC GRADE A ACCREDITED UNIVERSITY	[08-05-2026] **END SEM EXAMINATION** **School of Engineering & IT**

Program	**Mechanical Engineering**	**Branch**	**Diploma**
Subject Name	**Design of Machine Elements**	**Session**	**Even, 2025-26**
Semester	**VI**	**Year**	**April, 2026**

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 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 1	QUESTIONS	Marks	COs	KL
i	What is fatigue failure?	02	CO1	K3
ii	What is stress concentration?	02	CO1	K2
iii	Define creep and creep curve.	02	CO2	K2
iv	What is a cotter joint?	02	CO3	K3
v	What is a coupling?	02	CO3	K3
vi	Define ductile and brittle materials.	02	CO2	K1
vii	Define stress and strain.	02	CO4	K2
viii	Define shaft and mention its types.	02	CO3	K1
ix	Define principal stresses.	02	CO2	K2
x	What are the different types of loads acting on machine elements?	02	CO1	K3

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

Q. No.	QUESTIONS	Marks	COs	KL
2	Draw and explain the stress–strain diagram for ductile materials.	05	CO1	K1
3	Explain factors affecting the selection of factor of safety.	05	CO3	K3
4	Design a flange coupling and explain its components.	05	CO2	K2
5	Describe stress concentration and its remedies.	05	CO1	K1
6	Describe construction and working of leaf springs.	05	CO1	K2
7	Discuss different types of Engineering Materials	05	CO3	K2

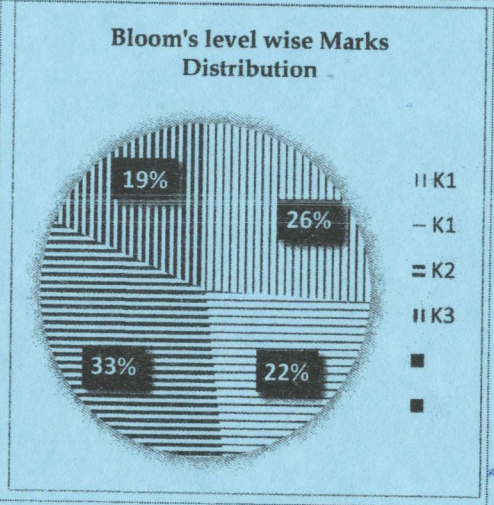
Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

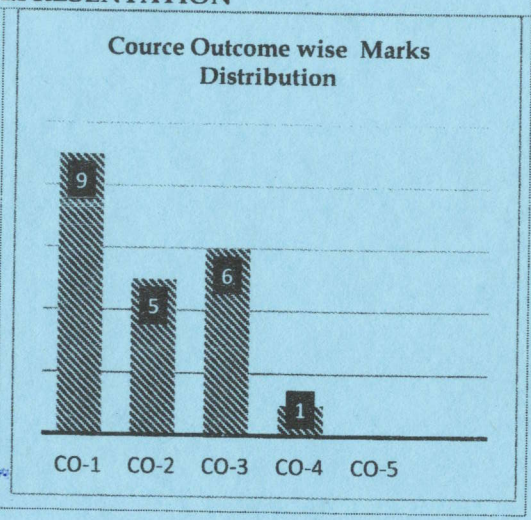
Q. No.	QUESTIONS	Marks	COs	KL
8	Explain the working and applications of cotter joint and knuckle joint.	10	CO1	K1
9	Design a knuckle joint to transmit 150 KN. The design stresses may be taken as 75 Mpa in tension 60 Mpa in shear and 150 mpa in compression?	10	CO1	K2
10	Design a knuckle joint and explain its failure modes.	10	CO3	K3
11	Explain the types of couplings with neat sketches.	10	CO2	K2
12	Explain classification and applications of springs.	10	CO1	K1

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

Course Outcomes	CO1	Analyze the various modes of failure of machine components under different load patterns
	CO2	Design and prepare part and assembly drawings.
	CO3	Use design data books and different codes of design.
	CO4	Select standard components with their specifications from manufacturer's catalogue
	CO5	Develop drawings on CAD software.

GRAPHICAL REPRESENTATION





JGI ARKA JAIN University Jharkhand — NAAC GRADE A ACCREDITED UNIVERSITY			[11-05-2026] END SEM EXAMINATION School of Engineering & IT
Program	Mechanical Engineering	Branch	Diploma
Subject Name	Production and Operations Management	Session	Even, 2025-26
Semester	VI	Year	April, 2026
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 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 1	QUESTIONS	Marks	COs	KL
i	What is the meaning of production management?	02	CO1	K1
ii	Name any two benefits of production management?	02	CO1	K2
iii	What is plant location?	02	CO2	K1
iv	Give the meaning of production planning.	02	CO2	K2
v	What is planning system?	02	CO3	K3
vi	What is the meaning of inventory Management?	02	CO3	K1
vii	What is total quality management?	02	CO4	K3
viii	Give the meaning of waste management.	02	CO4	K1
ix	Define Supply Chain Management.	02	CO5	K2
x	Define forecasting.	02	CO5	K3

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

Q. No.	QUESTIONS	Marks	COs	KL
2	Distinguish between production and operations management.	05	CO1	K4
3	Discuss the characteristics of production planning and control.	05	CO2	K3
4	Explain the techniques of inventory Management.	05	CO3	K6
5	Explain the advantages of waste management.	05	CO4	K1
6	Differentiate between supply chain management and logistics management.	05	CO5	K1
7	What are the drawbacks of six sigma? Explain.	05	CO5	K1

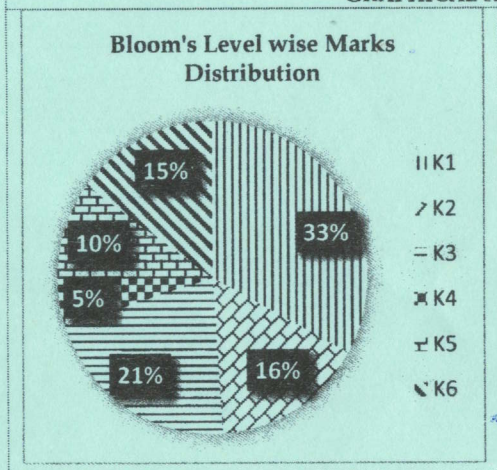
Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

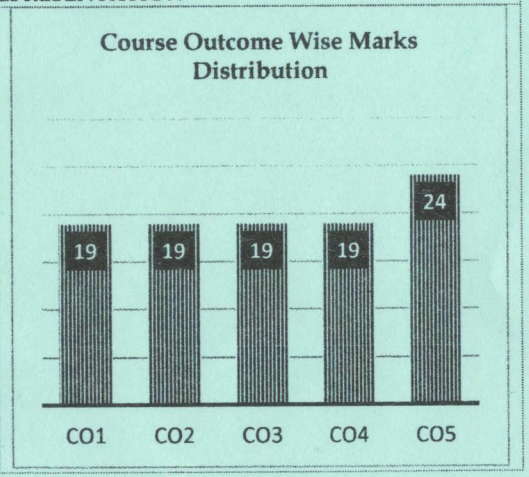
Q. No.	QUESTIONS	Marks	COs	KL
8	Explain the types of production process.	10	CO1	K5
9	Explain the principles of plant layout.	10	CO2	K6
10	What is production planning? Explain the factors affecting production planning and control.	10	CO3	K2
11	Explain the types of inventory Management.	10	CO4	K3
12	What is Maintenance? Explain the types of maintenance.	10	CO5	K1

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

Course Outcomes	CO1	Define operations management and explain its relationship to productivity. And understand tools and techniques.
	CO2	Describe the importance of forecasting and explain the effective application of the different forecasting approaches and methods.
	CO3	Explain layout strategy and how operations managers determine facility arrangements and size.
	CO4	Describe how operations managers achieve a reasonable work environment and set expectations related to employee productivity.
	CO5	Understand make-or-buy decisions, and the selection and integration of suppliers. And how much to order and when to order.

GRAPHICAL REPRESENTATION





JGI	**ARKA JAIN University** Jharkhand	NAAC GRADE A ACCREDITED UNIVERSITY	[14-05-2026] **END SEM EXAMINATION** **School of Engineering & IT**

Program	**Mechanical Engineering**	**Branch**	**Diploma**
Subject Name	**Robotics**	**Session**	**Even, 2025-26**
Semester	**VI**	**Year**	**April, 2026**

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**
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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 1	QUESTIONS	Marks	COs	KL
i	What is meant by Degrees of Freedom (DOF)?	02	CO3	K1
ii	What is a robot?	02	CO4	K3
iii	Define forward kinematics.	02	CO1	K2
iv	What is a sensor in robotics?	02	CO2	K5
v	Name any two types of robot sensors.	02	CO5	K3
vi	What is robotic vision?	02	CO3	K6
vii	Define teach programming	02	CO1	K1
viii	State one application of robots in industry.	02	CO2	K3
ix	What is image segmentation?	02	CO4	K2
x	Define reprogram ability in robots.	02	CO5	K6

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

Q. No.	QUESTIONS	Marks	COs	KL
2	Describe the laws of robotics and their significance.	05	CO3	K4
3	Explain different types of sensors used in robotics.	05	CO2	K6
4	Explain Denavit–Hartenberg (D-H) parameters.	05	CO4	K3
5	Describe different types of robot programming methods.	05	CO1	K1
6	Explain the process of image acquisition and representation in robotic vision.	05	CO5	K2
7	Describe safety measures required in robotic systems.	05	CO2	K1

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

Q. No.	QUESTIONS	Marks	Cos	KL
8	Discuss industrial applications of robots in detail (material handling, processing, assembly, inspection).	10	CO4	K4
9	Explain robot applications for sustainable development and non-industrial applications.	10	CO4	K5
10	Explain in detail the design and control issues in robotics.	10	CO5	K5
11	Describe the architecture of a robotic vision system and explain its components in detail.	10	CO1	K2
12	A 2-link planar robot has link lengths $L_1 = 1$ m and $L_2 = 1$ m with joint angles $\theta_1 = 30°$ and $\theta_2 = 45°$. Find the end-effector position using forward kinematics.	10	CO3	K6

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

Course Outcomes	CO1	Remember basic knowledge in programming, electronics, digital technology and mathematics.
	CO2	Understand how computers, embedded systems and robots work and how they can understand and adapt to the world.
	CO3	Analyze and model systems that contain both software, hardware and mechanics
	CO4	knowledge about electronics and sensors that form the basis for machine launching
	CO5	knowledge of mathematics required for electronics, programming and robotics

GRAPHICAL REPRESENTATION

