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

Program	**Mechanical Engineering**	**Branch**	**B. Tech**
Subject Name	**Automobile Engineering**	**Session**	**Even, 2025-26**
Semester	**VIII**	**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 are the benefits of four-wheel drives?	02	CO1	K1
ii	Define the basic structure of an automobile.	02	CO1	K2
iii	What is the function of a spark plug in the ignition system?	02	CO2	K1
iv	Define catalytic convertor with its uses.	02	CO2	K2
v	Mention two types of cooling systems used in automobiles.	02	CO3	K3
vi	State the role and importance of differential unit.	02	CO3	K1
vii	Name the main components of a manual transmission system.	02	CO4	K3
viii	Describe the ssignificance of Toe-In and Toe-Out Adjustments.	02	CO4	K1
ix	What is the role of an alternator in an automobile?	02	CO5	K2
x	Define Necessity and Advantages of Compressed Natural Gas (CNG)?	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	Discuss about the chassis and body components in automobile.	05	CO1	K4
3	Explain the working of Solex carburetor.	05	CO2	K3
4	What are the functions of universal joint and Propeller shaft?	05	CO3	K6
5	Sketch and explain various steering geometries.	05	CO4	K1
6	Briefly discuss the mechanism of formation of pollutants in engine exhaust.	05	CO5	K1
7	How bio diesel is produced? Explain and its usage in automobiles.	05	CO5	K1

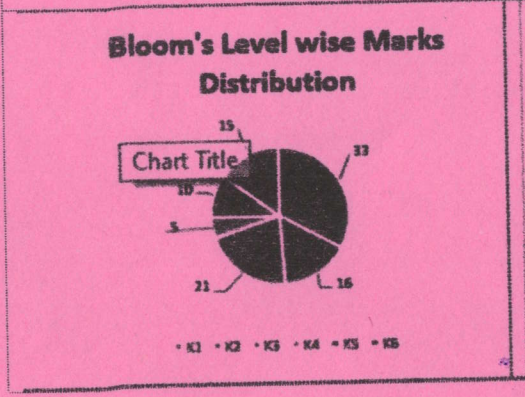
Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

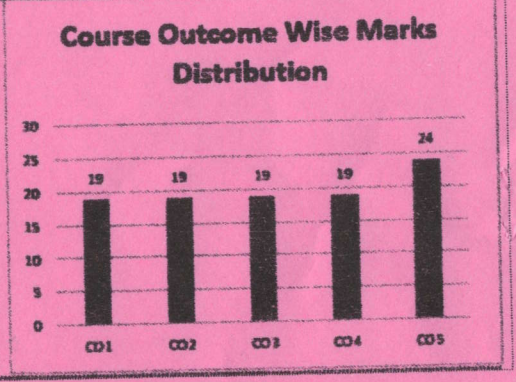
Q. No.	QUESTIONS	Marks	COs	KL
8	Explain front engine rear wheel drive's salient features, advantage and disadvantages.	10	CO1	K5
9	Explain the key features and working principle of Battery ignition system.	10	CO2	K6
10	What are the functional requirements of a gear box and explain working of a synchromesh gear box.	10	CO3	K2
11	Discuss the various types of steering systems used in vehicles. Compare their merits and demerits.	10	CO4	K3
12	Explain the working principle of fuel cell with neat sketch.	10	CO5	K1

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

Course Outcomes	CO1	Evaluate the suitability of different automobile chassis designs.
	CO2	Understand efficient engine systems through advanced electronic and mechanical integration.
	CO3	Analyse emission control with 3-way catalytic converters adhering to global standards.
	CO4	Understand transmission mechanisms for diverse vehicle propulsion and operation systems.
	CO5	Analyse steering mechanisms and braking systems for optimal vehicle control.

GRAPHICAL REPRESENTATION



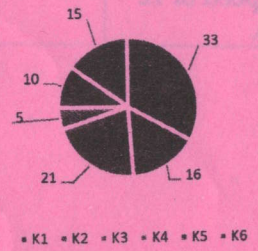


CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

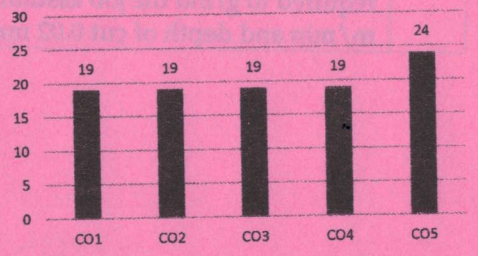
Course Outcomes	CO1	Discuss select the process, equipment and tools for various industrial products.
	CO2	Explain the prepare process planning activity chart.
	CO3	Explain the concept of cost estimation.
	CO4	Compute the job order cost for different type of shop floor.
	CO5	Calculate the machining time for various machining operations.

GRAPHICAL REPRESENTATION

Bloom's Level wise Marks Distribution



Course Outcome Wise Marks Distribution



ARKA JAIN University Jharkhand | NAAC GRADE A ACCREDITED UNIVERSITY

[01-05-2026]
END SEM EXAMINATION
School of Engineering & IT

Program	**Mechanical Engineering**	**Branch**	**B. Tech**
Subject Name	**Process Planning and Cost Estimation**	**Session**	**Even, 2025-26**
Semester	**VIII**	**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	Define – Process Planning.	02	CO1	K1
ii	What are the factors should be considered for process and equipment selection	02	CO1	K2
iii	What you mean by break-even point?	02	CO2	K1
iv	How jigs are classified.	02	CO2	K2
v	Define Cost estimation.	02	CO3	K3
vi	List a few objectives of the cost estimation?	02	CO3	K1
vii	Define – Shear Loss.	02	CO4	K3
viii	A butt joint between two square metal plates of 250 x 250 cm is made using electric arc welding. If the rate of welding is 5metre/hr, calculate the time required to complete ten such welding operations.	02	CO4	K1
ix	What is meant by machining time?	02	CO5	K2

x	What do you mean by 'tool approach' and 'tool over travel?	02	CO5	K3

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

Q. No.	QUESTIONS	Marks	CO's	KL
2	Identify the steps involved in Process Design and also examine the basic factors affecting Process Design.	05	CO1	K4
3	Calculate the spindle speed required to turn a 75mm diameter shoulder on a low-carbon steel component using a high-speed steel tool. What is the percentage increase in cutting speed if a carbide tool is used instead?	05	CO2	K3
4	Describe step by step procedure for estimating the direct material cost.	05	CO3	K6
5	Explain the different types of jobs performed in a welding shop and the steps involved in estimating their costs.	05	CO4	K1
6	A 20 cm × 5 cm C.I. surface is to be faced on milling machine with a cutter having a dia of 10 cm and 16 teeth. If the cutting speed and feed are 50 m/min and 5 cm/min respectively, examine the milling time, r.p.m. of the cutter and feed per tooth.	05	CO5	K1
7	Calculate the machining time required to produce one piece of the component shown in fig. Starting from f 25mm bar. The following data is available. For turning: Cutting Speed = 40 m/ min; Feed = 0.4 mm/rev; Depth of cut = 2.5 mm/per pass; For thread cutting: Cutting speed = 8 m/ min;	05	CO5	K1

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

Q. No.	QUESTIONS	Marks	CO's	KL
8	Reframe the main inputs and outputs for process planning activity?	10	CO1	K5
9	Calculate the total machining time for plain milling a rectangular surface of length 100mm and width 50mm by a helical fluted plain HSS milling cutter of diameter 60mm, length 75mm and 6 teeth. Assume approach = over run = 5mm, cutting velocity = 40m/min and feed per tooth = 0.1 mm/tooth	10	CO2	K6
10	Data collected at a certain period show that for the manufacturing of a product, the labour cost Rs. 400,the ratio of direct material cost, direct labour cost and direct expenses are 1:3:2. If the factory overheads are Rs.200, administrative overheads are 20% of factory cost, selling and distribution overheads are 10% factory cost and profit required is 30% of the factory ,what should be the selling price.	10	CO3	K2
11	Evaluate the cost estimation methods used in a welding shop and their accuracy for different types of jobs.	10	CO4	K3
12	Mild steel shaft 30 cm long is to be rough ground from 43.3 mm dia to 43 mm dia using a grinding wheel of 40 mm face width. Calculate the time required to grind the job assuming work speed of 12 m/min and depth of cut 0.02 mm per pass.	10	CO5	K1

JGI	ARKA JAIN University, Jharkhand — NAAC GRADE A ACCREDITED UNIVERSITY	[07-05-2026] END SEM EXAMINATION School of Engineering & IT	
Program	Mechanical Engineering	Branch	B. Tech
Subject Name	Renewable Energy Technologies	Session	Even, 2025-26
Semester	VIII	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	Define energy efficiency	02	CO1	KL1
ii	Write the importance of solar energy in the present day energy crisis.	02	CO1	KL2
iii	Define global radiation.	02	CO2	KL2
iv	Formulate the I-V Characteristics of PV System.	02	CO4	KL3
v	How biogas is obtained? What is the composition of biogas?	02	CO5	KL5
vi	What is average efficiency of photosynthetic conversion of solar energy in to biomass?	02	CO1	KL2
vii	What is meant by yaw control? What is the use of it?	02	CO2	KL3
viii	Classify different types of Wind power plant.	02	CO3	KL4
ix	What are the limitations of harnessing Geo-thermal energy?	02	CO5	KL3
x	What is Geo-thermal energy?	02	CO2	KL3

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

Q. No.	QUESTIONS	Marks	COs	KL
2	Explain the energy planning issues aiming to bridge the gap between the energy demand and supply situation in India.	05	CO2	KL4
3	Explain about the different types of energy sources	05	CO3	KL5
4	Explain the working of solar water heating with the help of a schematic diagram.	05	CO4	KL6
5	Describe the working of Bio gas plant and its components with a neat schematic diagram	05	CO5	KL6
6	Explain the peak power tracking in WECS	05	CO3	KL3
7	What is the Geo thermal energy? What are the various methods of harnessing this energy? What is the potential of geothermal energy in India?	05	CO1	KL2

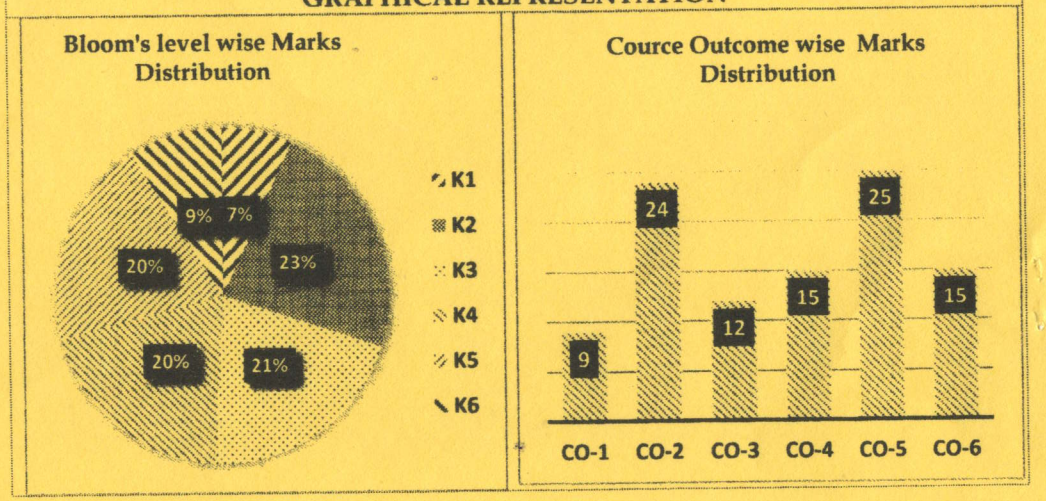
Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	Evaluate the important role of conventional and non-conventional energy sources.	10	CO4	KL4
9	Explain the construction and the principle operation of solar photovoltaic system with neat sketch.	10	CO5	KL6
10	Compare the relative performance of a floating drum and fixed one type biogas plants	10	CO4	KL6
11	Discuss the power versus wind speed characteristics of a wind turbine with the help of a diagram	10	CO4	KL4
12	Summarize in details about different types of hydro Electric Energy systems with neat diagram.	10	CO5	KL6

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

Course Outcomes	CO1	Explain the basic principles of energy conversion processes and devices used therein
	CO2	Identify suitable renewable source and technology for a given requirement
	CO3	Undertake field projects in these areas
	CO4	Develop capability to do basic design of bio gas plant
	CO5	Identify suitable renewable source and technology for a given requirement
	CO6	Undertake field projects in these areas

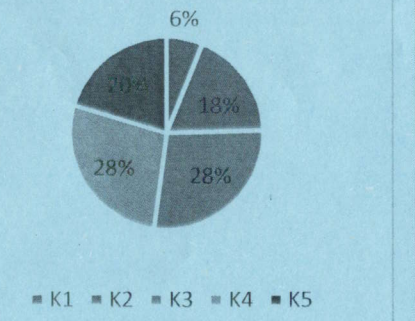
GRAPHICAL REPRESENTATION

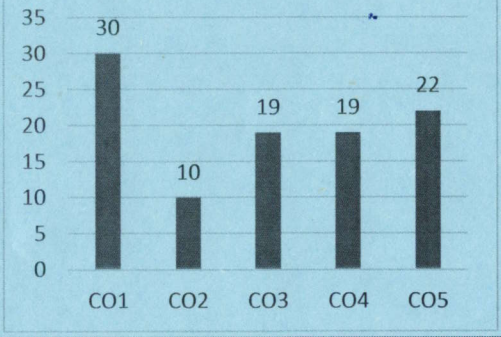


CO- Course Outcomes, **KL**- Knowledge Level, **PO** – Program Outcome

Course Outcomes	CO1	Identify problems that are amenable to solution by AI methods.
	CO2	Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.
	CO3	Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
	CO4	able to design and implement various machine learning algorithms in a range of real-world applications.
	CO5	Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

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**	**B. Tech**
Subject Name	**Artificial Intelligence and Machine Learning**	**Session**	**Even, 2025-26**
Semester	**VIII**	**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	Define Artificial Intelligence and mention its applications.	2	CO1	K2
ii	What is the difference between informed and uninformed search?	2	CO1	K1
iii	Define Constraint Satisfaction Problem (CSP).	2	CO1	K3
iv	What is adversarial search in AI?	2	CO1	K4
v	Define expert system with one example.	2	CO1	K1
vi	What is machine learning?	2	CO3	K1
vii	Define decision tree in machine learning.	2	CO4	K2
viii	What is reinforcement learning?	2	CO5	K2
ix	Define overfitting in machine learning.	2	CO3	K2
x	What is Naive Bayes classification?	2	CO4	K2

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

Q. No.	QUESTIONS	Marks	COs	KL
2	Explain the history and foundations of Artificial Intelligence.	05	CO1	K3
3	Describe informed and uninformed search techniques with examples.	05	CO2	K3
4	Explain Constraint Satisfaction Problems and constrained optimization techniques.	05	CO2	K2
5	Discuss adversarial search and two-player games in AI.	05	CO1	K4
6	Explain decision trees and ensemble learning in machine learning.	05	CO4	K3
7	Describe Linear Regression, SSE, and Gradient Descent.	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 knowledge representation, reasoning, and expert systems in Artificial Intelligence.	10	CO1	K5
9	Discuss machine learning paradigms including supervised and unsupervised learning in detail.	10	CO5	K3
10	Explain Linear Regression with normal equations, gradient descent, and overfitting concepts.	10	CO3	K4
11	Describe classification problems, decision boundaries, Bayes optimal decision, and Naive Bayes classifier.	10	CO4	K5
12	Explain neural networks, reinforcement learning, and evolutionary computation with suitable examples.	10	CO5	K4