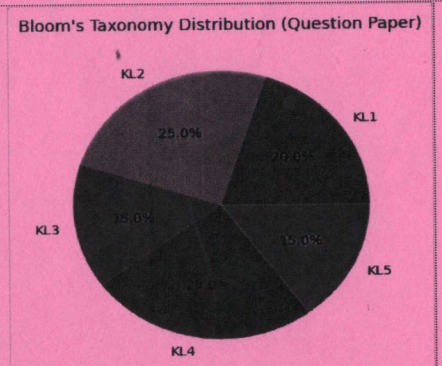
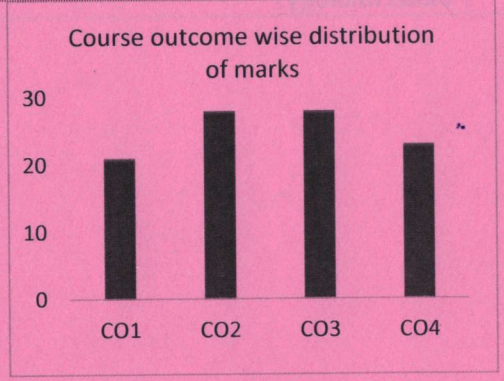
CO- Course Outcomes, KL- Knowledge Level, PO – Program Outcome

Course Outcomes	CO1	The student will be able to evaluate the potential of biodegradation of organic pollutants, taking microbial and physical/chemical environments, as well as the chemical structure of the compound itself, into consideration
	CO2	Students will understand the phenomenon of phytoremediation for the decontamination of soil and water, wetlands as treatment processes, biofilms/biofilters for vapor-phase wastes, and composting
	CO3	Students will learn about the environmental quality evaluation, monitoring, and remediation of contaminated environments
	CO4	Students will learn about the use of biosensors in environmental analysis, environmental engineering.

GRAPHICAL REPRESENTATION





ARKA JAIN University
Jharkhand

NAAC GRADE A ACCREDITED UNIVERSITY

[01-05-2026]
END SEM EXAMINATION
School of Health and Allied Sciences

Program	**Bachelor of Science-Biotechnology**		
Subject Name	**Environmental Biotechnology**	**Session**	**Even, 2025-26**
Semester	**VI**	**Year**	**April, 2026**

Time: 3 Hour
Max. Marks : 60

- 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 Two out of Four of Section C**
- **Possession of Mobile Phones** or any kind of **Written Material, Arguments with the Invigilator or Discussing with Co-Student** will comes under **Unfair Means** and will **Result** in the **Cancellation of the Papers.**

Knowledge Level (KL)	**K1 :** Remembering	**K3 :** Applying	**K5 :** Evaluating
	K2 : Understanding	**K4 :** Analysing	**K6 :** Creating

Section A (Each question Carry 01 Marks from Q1-i to x) – 10 Marks

Q. N 1	QUESTIONS	Marks	COs	KL
i	Which process uses microorganisms to treat sewage? a) Incineration b) Activated sludge process c) Filtration d) Distillation	01	CO1	KL1
ii	Which method would you use to clean heavy metal contaminated soil? a) Incineration b) Phytoremediation c) Filtration d) Distillation	01	CO2	KL3
iii	Oil spills have been considered as a major threat to world environment, especially a) Marine ecosystem b) Terrestrial ecosystem c) Land ecosystem d) Vertebrate	01	CO2	KL2
iv	The use of biotechnology and microorganism to breakdown hazardous waste into relatively harmless components is termed as	01	CO3	KL1

	a) Phytoremediation b) Bioremediation c) Reduction process d) Waste management			
v	Activated sludge process is mainly used in a) Air purification b) Soil treatment c) Wastewater treatment d) Solid waste incineration	01	CO1	KL2
vi	Which microorganism is commonly used in oil spill cleanup? a) Rhizobium b) Lactobacillus c) Pseudomonas d) Plasmodium	01	CO2	KL1
vii	An example of environmental biotechnology application is a) Vaccine production b) Sewage treatment plants c) Plastic manufacturing d) Nuclear power generation	01	CO1	KL2
viii	Addition of specific microbes to contaminated soil is called: a) Bioaccumulation b) Bioaugmentation c) Biotransformation d) Biosorption	01	CO4	KL3
ix	Which enzyme is involved in degradation of lignin? a) Amylase b) Protease c) Laccase d) Lipase	01	CO4	Kl3
x	Which parameter indicates organic pollution in water? a) pH b) BOD c) Temperature d) Turbidity	01	CO4	KL4

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 5 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	How Bioleaching process is beneficial?	05	CO3	KL4
3	Define Bioremediation. Discuss about Insitu and Exsitu Bioremediation	05	CO1	KL2
4	Discuss Degradation of cellulose.	05	CO2	KL4
5	Describe degradation of pesticides by microorganisms.	05	CO4	KL2
6	Describe various types of Biofertilizer and their role.	05	CO3	KL1
7	How different types of waste can be classified?	05	CO2	KL5

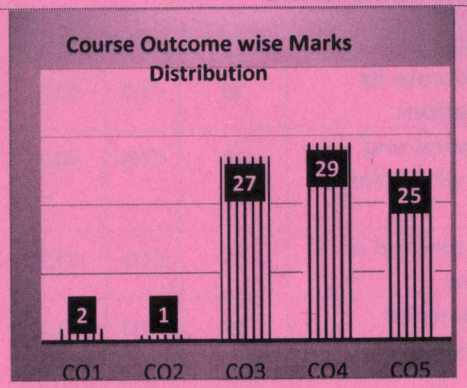
Section C (Answer any TWO out of FOUR) – 30 Marks
(Each question Carry 15 Marks)

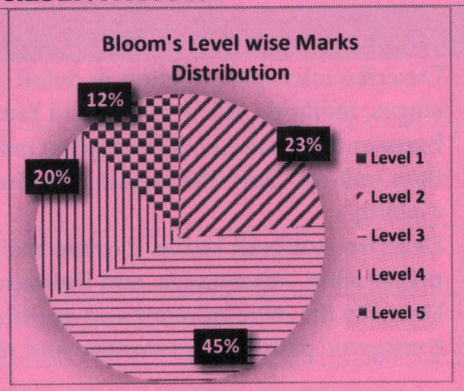
Q. No.	QUESTIONS	Marks	COs	KL
8	What is the role of environmental Biotechnology in solving environmental problems?	15	CO1	KL5
9	Discuss in details about solid waste management	15	CO4	KL4
10	Discuss global, regional and local issues related to environment.	15	CO2	KL5
11	Discuss treatment of industrial effluents using biotechnology.	15	CO3	KL4

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

Course Outcomes	CO1	Define, classify and explain the principles of plant tissue culture, cryopreservation, organogenic differentiation, and various in vitro culture techniques including seed, embryo, callus, organ, cell, and protoplast culture.
	CO 2	Apply different micropropagation techniques such as axillary bud proliferation, meristem culture, shoot tip culture, organogenesis, and somatic embryogenesis for large-scale plant multiplication.
	CO3	Analyze methods of in vitro haploid production (anther culture, microspore culture), ploidy manipulation, gynogenesis, and chromosome elimination techniques for their role in crop improvement programs.
	CO4	Evaluate the procedures of protoplast isolation, somatic hybridization, cybrid production, and regeneration techniques in terms of efficiency, feasibility, and limitations.
	CO5	Analyze and assess the genetic basis, mechanisms, applications, and limitations of somaclonal variation in plant breeding.

GRAPHICAL REPRESENTATION





ARKA JAIN University
Jharkhand

NAAC GRADE A
ACCREDITED UNIVERSITY

[05-05-2026]
END SEM EXAMINATION
School of Allied Health Science

Program	**Bachelor of Science-Biotechnology**		
Subject Name	**Plant Biotechnology**	**Session**	**Even, 2025-26**
Semester	**VI**	**Year**	**April, 2026**
Time: 3 Hour **Max. Marks : 60**	• 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 Two out of Four of Section C** • **Possession of Mobile Phones** or any kind of **Written Material, Arguments with the Invigilator or Discussing with Co-Student** will comes under **Unfair Means** and will **Result** in the **Cancellation of the Papers**.		
Knowledge Level (KL)	**K1 :** Remembering	**K3 :** Applying	**K5 :** Evaluating
	K2 : Understanding	**K4 :** Analysing	**K6 :** Creating

Section A (Each question Carry 01 Marks from Q1-i to x) – 10 Marks

Q. N 1	QUESTIONS	Marks	COs	KL
i	In plant tissue culture, the ratio of auxin to cytokinin determines morphogenesis. Which condition favors somatic embryogenesis? a) High auxin only b) High cytokinin only c) Balanced auxin and cytokinin followed by auxin reduction d) Absence of both hormones	01	CO1	KL5
ii	During somatic hybridization, PEG (polyethylene glycol) is used for: a) Cell wall formation b) Nuclear division c) Protoplast fusion d) DNA replication	01	CO4	KL3
iii	Cybrids are particularly useful when: a) Nuclear genes are required from both parents b) Only cytoplasmic traits need to be transferred c) Sexual reproduction is possible d) Mutation is required	01	CO4	KL5

iv	A culture shows shoot formation but no root development. What modification is required? a) Increase cytokinin b) Increase auxin c) Remove sucrose d) Increase light intensity	01	CO3	KL3
v	Which explant is most suitable for virus-free plant production? a) Leaf b) Root c) Meristem d) Callus	01	CO1	KL3
vi	Synthetic seeds are most advantageous for: a) Sexual reproduction b) Storage of elite genotypes c) Increasing mutation rate d) Reducing growth rate	01	CO4	KL5
vii	PGPB enhance plant growth mainly by: a) Reducing soil nutrients b) Fixing nitrogen and producing growth hormones c) Increasing pathogens d) Decreasing water uptake	01	CO4	KL5
viii	Why is somatic hybridization preferred over sexual hybridization in distant species crosses? a) Faster seed production b) Avoids genetic recombination c) Overcomes reproductive barriers d) Reduces mutation	01	CO2	KL4
ix	Haploids are highly valuable because they a) Increase genetic variability b) Allow immediate expression of recessive traits c) Prevent mutation d) Increase ploidy	01	CO3	KL5
x	Failure of androgenesis in certain species is mainly due to a) High nutrient availability b) Sporophytic development of microspores c) Excess light d) Low temperature	01	CO3	KL4

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 5 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Discuss the significance of haploids in plant breeding and methods of chromosome doubling.	05	CO3	KL4
3	Compare androgenesis and gynogenesis with suitable diagrams..	05	CO3	Kl4
4	Explain somaclonal variation, its genetic basis, methods of detection, and applications.	05	CO4	KL4
5	Write a detailed note on cybrids and their significance in plant improvement.	05	CO4	KL2
6	Discuss plant growth promoting bacteria (PGPB) and their role in agriculture.	05	CO5	KL3
7	Explain cytoplasmic male sterility (CMS) and its importance in hybrid seed production.	05	CO5	KL5

Section C (Answer any TWO out of FOUR) – 30 Marks
(Each question Carry 15 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	Describe micropropagation in detail. Discuss its stages, methods, advantages, and limitations.	15	CO2	KL3
9	Explain the methods of protoplast isolation and their culture. Describe factors affecting protoplast viability.	15	CO3	KL3
10	Describe synthetic seeds. Explain their method of preparation, advantages, and limitations.	15	CO4	KL2
11	Describe the development and applications of transgenic plants in agriculture and medicine.	15	CO5	KL3