SYLLABUS FOR

THE FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP)

As per provisions of NEP_2020 to be implemented from academic year 2022 onwards.

Semester: **V**	Session: **2025-26**
Course Type: **DSC**	Title: **Genetics**

Department of Biotechnology

GOVT. DIGVIJAY AUTONOMOUS POST GRADUATE COLLEGE, RAJNANDGAON (C.G.)

GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE, RAJNANDGAON (C.G.)

FYUGP (NEP 2020 Course)

Department: Biotechnology

Session: **2025-26**	Program: **B.Sc.**
Semester: **V**	Subject: **Biotechnology**
Course Type: **DSC**	Course Code: **.....**
Course Title: **Genetics**	
Credit: **4 (3+1)**	Lecture: **60**
M.M. 100 = **(ESE 80+IA 20)**	Minimum Passing Marks: **40%**

Title	**Calculus**
Course Learning Outcome:	After the present course student will be able to - (i) to describe the Mendel's law, chromosomal changes and mutation. (ii) gain understanding of Genomic organization (iii) describe the chromosomal change (iv) understand the concept of Linkage

Title	**Calculus**
Programe Specific Outcome:	Upon completion of this course student will be able to – (i) to discuss about the pattern of inheritance, (ii) know genomic sequence of organisms (iii) understand the concept of deletion, duplication etc. (iv) explain crossing over

Approval of the Board of Studies

Date: 14/05/25

Name	Prof. S. K. Jadhav	Sabiha Naz	Dr. Shubha Diwan	Shri Sanjay Bhagwat	Ku. Varsha Meshram	Dr. Pramod Kumar Mahish
Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature			2nd online	2nd online		

Theory

Units	Lectures	Lectures	Credit
I	**15**	Introduction: Historical developments in the field of genetics. Organisms suitable for genetic experimentation and their genetic significance. Mendel's laws of Inheritance – Selection of plant, experiment and laws – Concept of dominance, recessiveness, incomplete dominance, Law of segregation & Principle of independent assortment.	1
II	**10**	Chromosome and genomic organization: Eukaryotic nuclear genome, nucleotide sequence composition –unique & repetitive DNA, satellite DNA. Genetic organization of prokaryotic and viral genome. Exons, introns, genetic code.	2
III	**10**	Structural changes in chromosomes - Deletion, Duplication, Translocation, Inversion etc. Numerical changes in chromosomes - Aneuploidy, Euploidy. Mutation – History, physical and chemical mutagens.	
IV	**10**	Linkage and crossing over. Autosomal and Sex-linked inheritance. Extra chromosomal inheritance - cytoplasmic inheritance, organelle heredity.	

Practical Course

Credit = 01; Lecture/Lab hour = 15

- Problems based on monohybrid and dihybrid cross
- Mendels law based problems
- Problems based on sex inked inheritance
- Autosomal disease based problems
- Pedigree analysis based problems
- Mutation in bacteria
- Permanent and temporary mount of mitosis.
- Permanent and temporary mount of meiosis

Approval of the Board of Studies

Date: 14/05/25

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Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature			Joined online	Joined online		

List of Books	• 1. Gardner et al. 2003. Principle of Genetics - 8th edition. John Wiley and Sons, New York. • 2. Pierce, Benjamin A. 2012. Genetics: a conceptual approach. New York: W.H. Freeman. • 3. Hartl, D. L., & Jones, E. W. (1998). Genetics: Principles and analysis. Sudbury, Mass: Jones and Bartlett Publishers. • 4. Prescott, L. M., Harley, J. P., Klein, D. A., Willey, J. M., Sherwood, L. M., & Woolverton, C. J. (2008). Microbiology. Estados Unidos: McGraw-Hill. • 5. Pelczar, M. J., Chan, E. C. S., & Krieg, N. R. (2010). Microbiology. New Delhi: Tata McGraw-Hill.

Evaluation Scheme

Exam Type	Mode of Exam	Marks
Theory	External	80
	Internal	20
Practical	External	40
	Internal	10

Evaluation Scheme for Theory (External)

Type of Question	No. of questions	Marks	Word Limit	Choice	Total Marks
Very Short Answer	08	02	30	No	16
Short Answer	04	06	75	Yes	24
Long Answer	04	10	150	Yes	40
Evaluation Scheme for Theory (Internal)					
Based on Mid-term Exam					20
Total					**100**

Evaluation Scheme for Practical

S. No.	Evaluation	Type	Marks
1	Experiment 1	External	10
2	Experiment 2	External	10
3	Experiment 3/ Instrumentation	External	05
4	Spotting	External	10
5	Viva	External	05
6	Sessional	Internal	10
Total			**50**

Approval of the Board of Studies

Date:

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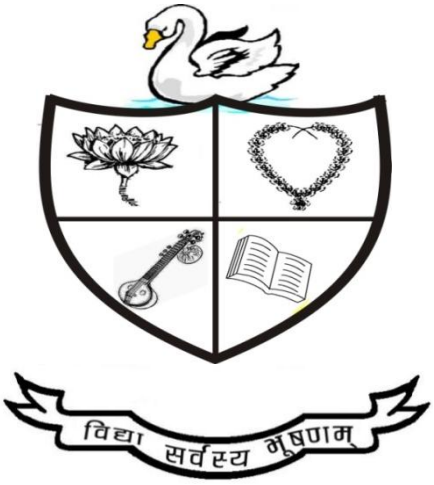
Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature						

SYLLABUS FOR

THE FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP)

As per provisions of NEP_2020 to be implemented from academic year 2022 onwards.

Semester: **V**	Session: **2025-26**
Course Type: **DSE I**	Title: **Bioanalytical Tools**



Department of Biotechnology

GOVT. DIGVIJAY AUTONOMOUS POST GRADUATE COLLEGE, RAJNANDGAON (C.G.)

GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE, RAJNANDGAON (C.G.)

FYUGP (NEP 2020 Course)

Department: Biotechnology

Session: **2025-26**	Program: **B.Sc.**
Semester: **V**	Subject: **Biotechnology**
Course Type: **DSE**	Course Code: **.....**
Course Title: **Bio-analytical Tools**	
Credit: **4 (3+1)**	Lecture: **60**
M.M. 100 = **(ESE 80+IA 20)**	Minimum Passing Marks: **40%**

Title	**Calculus**
Course Learning Outcome:	After the present course student will be able to - • describe Microscope • gain understanding of basic lab requirement • Understood to concept of chromatography • understand the concept of electrophoresis

Title	**Calculus**
Programe Specific Outcome:	Upon completion of this course student will be able to – • determine the principle and applications of microscope • describe the principle of spectrophotometer • understand the principle, types and use of chromatography • explain types of electrophoresis, biosensor and nanotech

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Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature			Joined online	Joined online		

Theory

Units	Lectures	Lectures	Credit
I	**15**	Microscope: simple microscopy, phase contrast microscopy, florescence and electron microscopy (TEM and SEM). pH meter.	1
II	**10**	Principle and law of colorimetry, spectrophotometry (visible, UV, infra-red). Centrifugation, Laminar Flow, Incubators.	2
III	**10**	Introduction to the principle of chromatography. Paper chromatography, thin layer chromatography, column chromatography: silica and gel filtration, affinity and ion exchange chromatography, HPLC.	
IV	**10**	Introduction to electrophoresis. Agarose gel, polyacrylamide gel (SDS-PAGE), isoelectric focusing. Introduction to Biosensors and Nanotechnology and their applications.	

Practical Course
Credit = 01; Lecture/Lab hour = 15
Experiment based on-

- Centrifugation
- Spectrophotometer/Colorimeter
- Paper chromatography/TLC
- PCR
- ELISA
- Electrophoresis
- Microscope
- pH meter

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Date: 14/05/25

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Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature			joined online	joined online		

List of Books	• Hofmann, Andreas, Samuel Clokie, Keith Wilson, and John Walker. Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology. 2018. • Upadhyay, A., Upadhyay, K., & Nath, N. (2009). Biophysical Chemistry (Principles and Techniques). Chandi Chowk: Global Media.

Evaluation Scheme		
Exam Type	Mode of Exam	Marks
Theory	External	80
	Internal	20
Practical	External	40
	Internal	10

Evaluation Scheme for Theory (External)					
Type of Question	No. of questions	Marks	Word Limit	Choice	Total Marks
Very Short Answer	08	02	30	No	16
Short Answer	04	06	75	Yes	24
Long Answer	04	10	150	Yes	40
Evaluation Scheme for Theory (Internal)					
Based on Mid-term Exam					20
Total					**100**

Evaluation Scheme for Practical			
S. No.	**Evaluation**	**Type**	**Marks**
1	Experiment 1	External	10
2	Experiment 2	External	10
3	Experiment 3/ Instrumentation	External	05
4	Spotting	External	10
5	Viva	External	05
6	Sessional	Internal	10
Total			**50**

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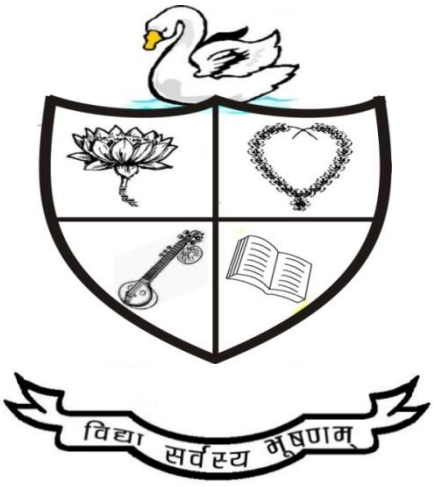
SYLLABUS FOR

THE FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP)

As per provisions of NEP_2020 to be implemented from academic year 2022 onwards.

Semester: **V**	Session: **2024-25**
Course Type: **DSE II**	Title: **Plant Biotechnology**



Department of Biotechnology

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GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE, RAJNANDGAON (C.G.)

FYUGP (NEP 2020 Course)

Department: Biotechnology

Session: **2024-25**	Program: FYUG
Semester: **V**	Subject: **Biotechnology**
Course Type: **DSE II**	Course Code: **.....**
Course Title: **Plant Biotechnology**	
Credit: **4 (3+1)**	Lecture: **60**
M.M. 100 = **(ESE 80+IA 20)**	Minimum Passing Marks: **40%**

Title	**Calculus**
Course Learning Outcome:	After the present course student will be able to - • explain about the basics of plant tissue culture, concept of the technique and uses in the different area. • gain understanding of PTC methods • read and analyse about culture of various cell type • understand the significance of PTC

Title	**Calculus**
Programme Specific Outcome:	Upon completion of this course student will be able to – • will gain proficiency in laboratory techniques such as sterilization, preparation of MS media, and process of micropropagation. • describe the sterilization and propagation • understand the concept of anther and ovary culture • explain Bt plants

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Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature			joined online	joined online		

Theory

Units	Lectures	Lectures	Credit
I	**15**	Scope of plant biotechnology. Structure and organization of plant cell. Basic principle of plant tissue culture. Totipotency – definition, example of some plant cells.	1
II	**10**	Methodology - Sterilization (physical and chemical methods), Culture media - MS and B5. Phytohormones – Shooting and rooting. Plant cell culture methods - Callus induction, subculture, plantlet formation and hardening.	2
III	**10**	Embryo culture and embryo rescue. Anther, pollen and ovary culture for production of haploid plants. Protoplast isolation, culture and fusion.	
IV	**10**	Plant transformation technology: Mechanism of DNA transfer – Ti, Ri plasmid, Microinjection. Applications – Production of virus free plant, micropropagation, insect resistance plant – Bt gene.	

Practical Course
Credit = 01; Lecture/Lab hour = 15

- Collection of plant sample
- Sterilization of explant
- Media preparation
- Meristem / bud culture, shoot multiplication & rooting
- Organogenesis
- Embryo culture
- Anther culture
- Seed culture

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Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature			Joined online	Joined online		

List of Books	• Razdan MK – Introduction to Plant Tissue Culture 2nd Edition; Oxford & Ibh Publishing Co. Pvt Ltd 2010 • Vasil IK – Plant Cell and Tissue Culture; Springer 1994 • Bhojwani SS and Razdan MK – Plant Tissue Culture; Elsevier • J Hammond, P McGarvey & V Yusibov (Eds): Plant Biotechnology, Springer Verlag.2000. • H.S. Chawla: Introduction to plant biotechnology. Oxford & IBH Publishing. • B.D. Singh, (2004) Biotechnology. Expending Horizons. First Edition. Kalyani Publishers, Ludhiana.

Evaluation Scheme		
Exam Type	Mode of Exam	Marks
Theory	External	80
	Internal	20
Practical	External	40
	Internal	10

Evaluation Scheme for Theory (External)					
Type of Question	No. of questions	Marks	Word Limit	Choice	Total Marks
Very Short Answer	08	02	30	No	16
Short Answer	04	06	75	Yes	24
Long Answer	04	10	150	Yes	40
Evaluation Scheme for Theory (Internal)					
Based on Mid-term Exam					20
Total					**100**

Evaluation Scheme for Practical			
S. No.	**Evaluation**	**Type**	**Marks**
1	Experiment 1	External	10
2	Experiment 2	External	10
3	Experiment 3/ Instrumentation	External	05
4	Spotting	External	10
5	Viva	External	05
6	Sessional	Internal	10
Total			**50**

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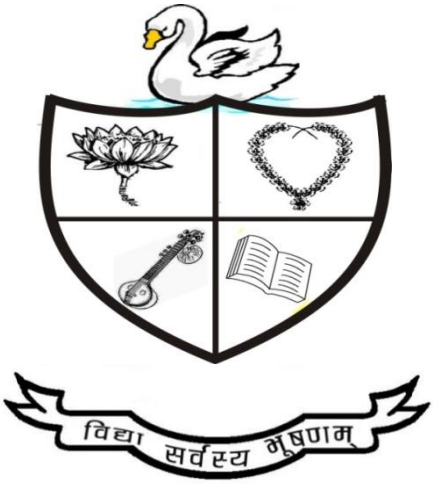
SYLLABUS FOR

THE FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP)

As per provisions of NEP_2020 to be implemented from academic year 2022 onwards.

Semester: **V**	Session: **2025-26**
Course Type: **SEC**	**Products of Industrial Fermentation and Food technology**



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GOVT. DIGVIJAY AUTONOMOUS P.G. COLLEGE, RAJNANDGAON (C.G.)

FYUGP (NEP 2020 Course)

Department: Biotechnology

Session: **2025-26**	Program: **B.Sc.**
Semester: **V**	Subject: **Biotechnology**
Course Type: **SEC**	Course Code: **.....**
Course Title: **Products of Industrial Fermentation and Processed Food**	
Credit: 2	Lecture: 3**0**
M.M. 50 = **(ESE 40+IA 10)**	Minimum Passing Marks: **40%**

Title	**Calculus**
Course Learning Outcome:	After the present course student will be able to - • Determine industrial products • Gain knowledge on uses of industrial products • Understand microbial based products • Describe food products

Title	**Calculus**
Programme Specific Outcome:	Upon completion of this course student will be able to – • Understand citric acid and biofuels • Describe industrial enzymes • Understand antibiotic • Explain food preservation

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Signature			Joined online	Joined online		

Theory

Units	Lectures	Lectures	Credit
I	**8**	Production of industrial chemicals – Citric acid, acetic acid Production of biofuels – Bioethanol, Biodiesel, Bioelectricity Anaerobic fermentation - methane and compost	1
II	**7**	Enzyme and cell immobilization – method of production and industrial uses Production of Secondary metabolites Enzymes in food technology Purification & characterization of proteins	
III	**8**	Solvents (glycerol, acetone, butanol), Antibiotics (penicillin, streptomycin, tetracycline) Amino acids (lysine, glutamic acid). Single cell protein.	1
IV	**7**	Introduction to food technology: Food Spoilage, Elementary idea of canning and packing, Sterilization and pasteurization, of food products, Food preservation.	

List of Books	• Laboratory Manual for Biotechnology by Surajit Das And Anchal Singh Ashish S Verma, S Chand Publishing • Biotechnology Procedures And Experiments Handbook, S. Harisha, Laxmi Publications Pvt Ltd • Shara L. Aranoff, Daniel R. Pearson, Deanna Tanner Okun, Irving A. Williamson, Dean A. Pinkert – Industrial Biotechnology; Nova Science 2009 • U Satayanarayan – Biotechnology, First Edition (2005) Books and Allied (P) Ltd. Kolkata.

Evaluation Scheme for Theory (External)					
Type of Question	No. of questions	Marks	Word Limit	Choice	Total Marks
Long Answer	05	08	150	Yes (attempt any 5 out of 8)	40
Evaluation Scheme for Theory (Internal)					
Based on Mid-term Exam I & II					10
Total					**50**

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