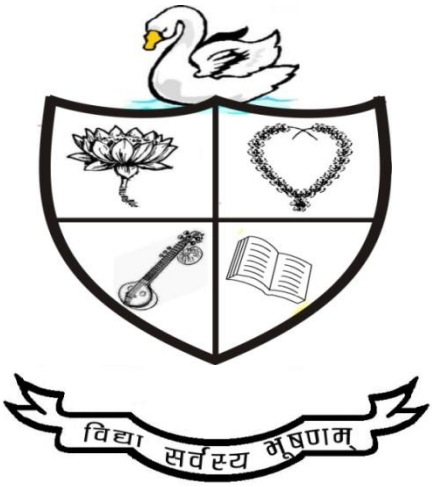
SYLLABUS FOR

THE FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP)

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

Semester: **I**	Session: **2025-26**
Course Type: **DSC**	Title: **Cell Biology and Biochemistry**



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

Part A: Introduction			
Program: Bachelor in Life Sciences (Certificate/Diploma/Degree/Honors)		Semester: **I Sem**	Session:**2025-2026**
1	Course Code	**BTSC-01-T**	
2	Course Title	**Cell Biology and Biochemistry**	
3	Course Type	Core Course	
4	Pre-requisite (if any)	As per program	
5	Course Learning Outcomes (CLO)	After completing this course, the students will be able to – • Explore and validate the Indian knowledge system and its significance in the field of biotechnology. • Understand cellular organization, their division for the continuation of life, and the natural cellular death mechanism. • Understand the basic biochemicals for organizational and functional expression of life. • Understand the metabolic regulations for survival and continuation of life.	
6	Credit Value	03 Credits (Credit = 15 Hours - learning & observation)	
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

Part B: Content of Course (Theory)		
Total No. of Teaching–learning Periods (01 Hr. per period)- 45 Periods (45 Hours)		
Unit	Topic (Course content)	No. of Period
I	**Basics and IKS** 1. The modern concept of the origin of life. 2. Contribution of Indian scientists in biology. 3. Significance of ancient Indian knowledge system in medical science. 4. Structure of cell.	12 (12 Hrs)
II	**Cell structure and division** 1. Ultrastructure of cell organelles. 2. Ultrastructure of chromosomes. 3. Cell division- Mitosis and meiosis. 4. Biology of cancer cells and apoptosis.	11 (11 Hrs)
III	**Basics of biochemistry** 1. Carbohydrates- Structure and classification. 2. Lipid- Structure and classification. 3. Amino acids - Structure and classification. 4. Three-dimensional structure of proteins.	11 (11 Hrs)
IV	**Metabolism** 1. Enzymes- Nomenclature and classification, mechanism of action, and factors affecting enzyme action. 2. Carbohydrate metabolism- Glycolysis, Kreb cycle, gluconeogenesis, glycogenesis. 3. Lipid metabolism- Beta oxidation of fatty acids, fatty acid biosynthesis.	11 (11 Hrs)

	4. Protein metabolism- Transamination, deamination, and synthesis of amino acids.	
Keywords	Cell, Biomolecules, Cell Division.	

• **Part C - Learning Resource**
Text Books, Reference Books, Other Resources -
➢ Text Book- ➢ Biotechnology- U Satyanarayana. ➢ Cell Biology- C B Powar ➢ Cell and Molecular Biology- P K Gupta
Reference Book- • Practical Biochemistry- Wilson & Walker. o Cell biology – C.B.Powar o Molecular Biology of the Cell – Alberts o Molecular Cell Biology – Lodish o Cell and Molecular Biology – Gerald Karp o The Cell – Cooper o Lehninger- Principles of Biochemistry o Nelson & Cox. - Biochemistry o Voet& Pratt. - Biochemistry
Online resources- ➢ https://onlinecourses.nptel.ac.in/noc22_cy06/preview ➢ https://nptel.ac.in/courses/104105076

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: **Maximum Marks: 100 Marks** **Continuous Internal Assessment (CIA): 30 Marks** **End Semester Exam (ESE): 70 Marks**		
Continuous Internal Assessment (CIA) (By course teacher):	Internal Test / Quiz-(2): **20 +20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz **+** obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Approval of the Board of Studies

Date: 14/05/25

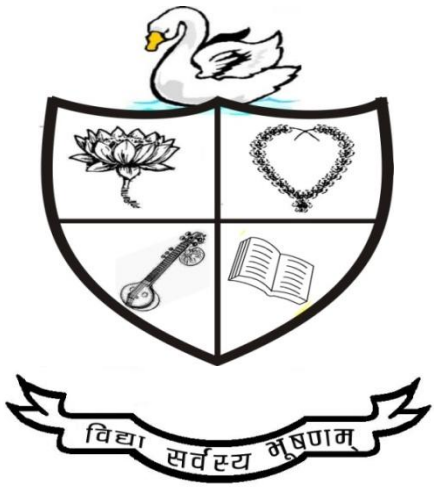
Name	Prof. S. K. Jadhav	Sabiha Naz	Dr. Shubha Diwan	Shri Sanjay Bhagwat	Ku. Varsha Meshram	Dr. Pramod Kumar Mahish
Designation	VC Nominee	Subject Expert	Subject Expert	Employment/ Industrial Member	Merit Alumni	Chairman/ HOD
Signature			Joined online	Joined online		

SYLLABUS FOR

THE FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP)

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

Semester: **I**	Session: **2025-26**
Course Type: **DSC: Practical**	Title: **Cell Biology and Biochemistry**



Department of Biotechnology

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FYUGP (NEP 2020 Course)

Department: Biotechnology

Four Year Undergraduate Program (2024-28)
Department of Biotechnology
Course Curriculum

Part A: Introduction			
Program: Bachelor in Life Sciences (Certificate/Diploma/Degree/Honors)		Semester: **I Sem**	Session:**2025-2026**
1	Course Code	**BTSC-01-P**	
2	Course Title	**Cell Biology and Biochemistry**	
3	Course Type	Core Course- Practical	
4	Pre-requisite (if any)	As per the program	
5	Course Learning Outcomes (CLO)	After completing this practical course, the students will be able to – • Identify animal and plant cells and its replication. • Understand karyogram. • Analyze biomolecules. • Develop expertise in chromatographic techniques.	
6	Credit Value	01 Credits Credit =30 Hours Laboratory or Field learning/Training	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20

Part B: Content of Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	Topic (Course content)	No. of Period
Lab./Field Training/ Experiment Contents of Course	1. Preparation of mitotic index from plants and animals. 2. Preparation of slide of blood cells. 3. Preparation of slide of giant chromosomes. 4. Preparation of slide of epithelial cells. 5. Biochemical test of carbohydrates. 6. Biochemical test of lipids. 7. Biochemical test of proteins. 8. The action of salivary amylase on starch. 9. The action of trypsin on proteins. 10. Separation of amino acids by chromatography. 11. Separation of chlorophyll by chromatography.	30
Keywords	Mitotic index, Giant chromosome, biomolecules.	

• **Part C - Learning Resource**
Text Books, Reference Books, Other Resources -
➢ Text Book- ➢ Biotechnology- U Satyanarayana. ➢ Cell Biology- C B Powar ➢ Cell and Molecular Biology- P K Gupta
Reference Book- • Practical Biochemistry- Wilson & Walker. o Cell biology – C.B.Powar

○ Molecular Biology of the Cell – Alberts ○ Molecular Cell Biology – Lodish ○ Cell and Molecular Biology – Gerald Karp ○ The Cell – Cooper ○ Lehninger- Principles of Biochemistry ○ Nelson & Cox. - Biochemistry ○ Voet& Pratt. - Biochemistry
Online resources- ➢ https://onlinecourses.nptel.ac.in/noc22_cy06/preview ➢ https://nptel.ac.in/courses/104105076

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: **Maximum Marks: 50 Marks** **Continuous Internal Assessment (CIA): 15 Marks** **End Semester Exam (ESE): 35 Marks**		
Continuous Internal Assessment (CIA) (By course teacher):	Internal Test / Quiz-(2): **10 +10** Assignment / Seminar + Attendance- 05 Total Marks - **15**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance:** **A. On spot Assessment - 20** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	Managed by course teacher as per lab status

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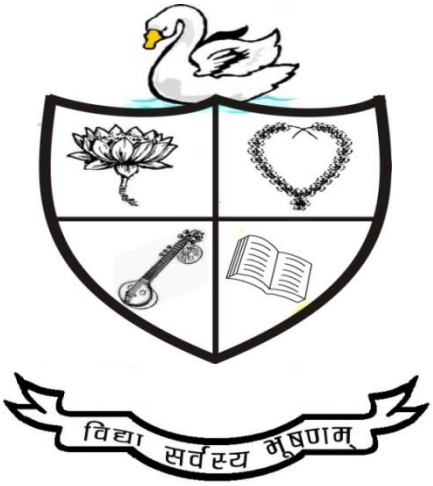
Signature			Joined online	Joined online		

SYLLABUS FOR

THE FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP)

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

Semester: **I**	Session: **2025-26**
Course Type: **VAC**	Title: **Plants-based Secondary Metabolites**



Department of Biotechnology

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

FYUGP (NEP 2020 Course)

Department: Biotechnology

Part A: Introduction			
Program: BSc in Life Sciences (Certificate/ Diploma/Degree/Honors)		Semester: **I Sem**	Session:**2025-2026**
1	Course Code	**VAC-01**	
2	Course Title	**Plants-based Secondary Metabolites**	
3	Course Type	Value Added Course	
4	Pre-requisite (if any)	As per requirement.	
5	Course Learning Outcomes (CLO)	After completing this course, the students will be able to - • Understand the medicinal values applicable to the Indian knowledge system. • Identify the plants with medicinal viability. • Explore the scientific validation of our traditional knowledge. • Develop competency for exploration of secondary metabolites and their application.	
6	Credit Value	02 credits (Credit = 15 Hours - learning & observation)	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20

Part B: Content of Course (Theory)		
Total No. of Teaching–learning Periods (01 Hr. per period)- 30 Periods (30 Hours)		
Unit	Topic (Course content)	No. of Period
I	**Medicinal plants and their viability** 1. General account of medicinal plant. 2. Scope of medicinal plants in the Indian market and abroad. 3. Role of medicinal plants in human health, advantage and limitation. 4. The basic theory of instrumental mechanism e.g. Soxhlet, oven, lyophilizer, etc.	08 (08 Hrs)
II	**Significance of the Indian knowledge system** 1. Extraction techniques used for secondary metabolite isolation. 2. Secondary metabolite storage. 3. Systems of Indian medicines: Ayurveda, Unani, Siddha, and Homeopathy. 4. Classification of crude drugs: Morphological, taxonomical, chemical, and pharmacological.	07 (07 Hrs)
III	**Methods for phytochemical screening** 1. Preparation technique of herbal infusions, decoctions, lotions, etc. 2. Introduction to phytochemical screening-alkaloids, polyphenolic compound 3. Introduction to phytochemical screening- glycosides. 4. Introduction to biological testing of herbal drugs (analgesics, anti-inflammatory and antianxiety agents).	08 (08 Hrs)
IV	**Essential industrial regulations** 1. Calibration and validation as per ICH and USFDA guidelines. 2. Production management, supply chain management & challenges 3. Government subsidy & industries, 4. Types of diseases by controlled bioagent formulations.	07 (07 Hrs)

Keywords	Secondary metabolite, alkaloids, medicinal plants, phytochemicals.	

• Part C - **Learning Resource**
Text Books, Reference Books, Other Resources -
Text Book- Plants Secondary Metabolites- AK Sharma **Plant Secondary Metabolites for Human Health- Dr. M M Abid Ali Khan**
• Ethnobiology – R.K.Sinha & Shweta Sinha – 2001. Surabhe Publications – Jaipur. • Tribal medicine – D.C. Pal & S.K. Jain 1998, Naya Prakash, 206, Bidhan Sarani, Calcutta – 700 006. • Contribution to Indian ethnobotany – S.K. Jain 1995, 3rd edition, Scientific publishers, P.B.No. 91, Jodhpur, India. • A Manual of Ethnobotany – S.K.Jain, 1995, 2nd edition.
Online resources- https://onlinecourses.nptel.ac.in/noc20_bt34/preview http://acl.digimat.in/nptel/courses/video/102106080/lec14.pdf

Part D: **Assessment and Evaluation**		
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