

**NILAMBER PITAMBER
UNIVERSITY**

DEPARTMENT OF BOTANY

B.Sc. BOTANY HONOURS/ RESEARCH

IMPLEMENTED FROM 2022

**FOUR-YEAR UNDERGRADUATE
PROGRAMME (FYUGP)**

(NEP, 2020)

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HIGHLIGHTS OF REGULATIONS OF FYUGP

PROGRAMME DURATION

- The Full-time, Regular UG programme for a regular student shall be for a period of four years with multiple entries and multiple exit options.

ELIGIBILITY

- The selection for admission will be primarily based on availability of seats in the Major subject and marks imposed by the institution. Merit point for selection will be based on marks obtained in Major subject at Class 12 (or equivalent level) or the aggregate marks of Class 12 (or equivalent level) if Marks of the Major subject is not available. Reservation norms of The Government of Jharkhand must be followed as and when amended in times.

ADMISSION PROCEDURE

- The reservation policy of the Government of Jharkhand shall apply in admission and the benefit of the same shall be given to the candidates belonging to the State of Jharkhand only. The candidates of other states in the reserved category shall be treated as General category candidates. Other relaxations or reservations shall be applicable as per the prevailing guidelines of the University for FYUGP.

ACADEMIC CALENDAR

- Each year the University shall draw out a calendar of academic and associated activities, which shall be strictly adhered to. The same is non-negotiable. Further, the Department will make all reasonable endeavors to deliver the programmes of study and other educational services as mentioned in its Information Brochure and website. However, circumstances may change prompting the Department to reserve the right to change the

content and delivery of courses, discontinue or combine courses and introduce or withdraw areas of specialization.

PROGRAMME OVERVIEW/ SCHEME OF THE PROGRAMME

- Undergraduate degree programmes of either 3 or 4-year duration, with multiple entries and exit points and re-entry options within this period, with appropriate certifications such as:
 - a Certificate after completing 1 year (2 semesters) of study in the chosen fields of study,
 - a Diploma after 2 years (4 semesters) of study,
 - a Bachelor after a 3-year (6 semesters) programme of study,
 - a Bachelor (with Hons. / Research) after a 4-year (8 semesters) programme of study

VALIDITY OF REGISTRATION

- Validity of a registration for FYUGP will be for maximum for Seven years from the date of registration.

CALCULATION OF MARKS FOR THE PURPOSE OF RESULT

- Student's final marks and the result will be based on the marks obtained in Semester Internal Examination and End Semester Examination organized taken together.
- Passing in a subject will depend on the collective marks obtained in Semester internal and End Semester University Examination both. However, students must pass in Theory and Practical Examinations separately.

PROMOTION AND SPAN PERIOD

- The Requisite Marks obtained by a student in a particular subject will be the criteria for promotion to the next Semester.
- To get promotion from Semester-II to Semester-III a student will be required to pass in at least 75% of Courses in an academic year (a student has to pass in minimum 9 papers out of the total 12 papers. However, it will be necessary to procure pass marks in each of the paper before completion of the course.
- To get promotion from Semester-IV to Semester-V (taken together of Semester I, II, III & IV) a student has to pass in minimum 16 papers out of the total 22 papers.
- Eligibility to get entry in Semester VII is to secure a minimum of 7.5 CGPA up to semester VI along with other criteria imposed by the Institution.

PUBLICATION OF RESULT

- The result of the examination shall be notified by the Controller of Examinations of the University in different newspapers and also on University website.
- If a student is found indulged in any kind of malpractice during examination, the examination taken by the student will be cancelled. The candidate will be awarded zero marks in that paper. The candidate may re-appear in the subsequent semesters as per the available provisions.
- There shall be no Supplementary or Re-examination for any subject. Students who have failed in any subject in an even semester may appear in the subsequent even semester examination for clearing the backlog. Similarly, the students who have failed in any subject in an odd semester may appear in the subsequent odd semester examination for clearing the backlog.
- Regulation related with any concern not mentioned above shall be guided by the Regulations of the University for FYUGP.

COURSE STRUCTURE FOR FYUGP ‘HONOURS/ RESEARCH’

Table 1: Credit Framework for Four Year Undergraduate Programme (FYUGP) under State Universities of Jharkhand [Total Credits = 176]

- There will be four disciplinary areas: A-Natural Science, B-Humanities, C-Social Science, and D-Commerce; each having basket of courses. A student will have to select a ‘Major’ from any of the four disciplinary areas (out of A, B, C & D). The selection for admission will be primarily based on availability of seats in Major and marks imposed by the institution.
- A student has to select three subjects for ‘Introductory Regular Courses’ from a pool of subjects associated with the Major offered by the institution. One of the three subjects will continue as ‘Minor’ from semester IV onwards, based on the academic interest and performance of the student.

Table 1: Credit Framework for Four Year Undergraduate Programme (FYUGP) under State Universities of Jharkhand [Total Credits = 176]

		Common Courses (29)										Introductory Courses (15)		Minor* (32)			Research Courses (18)				Total Credit		
Semester		1	2	3	4	5	6	7	8	9	10	Internship/ Project (4)			14	15	16	17	18	19	20	21	176
												Major* (54) + Adv. Major (24)	Natural Sc/ Humanities/ Social Sc./ Commerce (18)	Vocational Studies (14)		Research Methodology Courses (6)		Research Proposal, Review of Literature (4)		Research Internship/ Field Work (4)		Preparation of the Research Project Report (4)	
I	6				2	2				3	3	6											22
II	6								2	2	3	3	6										22
Exit Point: Undergraduate Certificate																							
III	3					3				3	3	4	6										22
IV												6+6	6	4									22
Exit Point: Undergraduate Diploma																							
V												6+6	6	4									22
VI												6+6	6	4									22
Exit Point: Bachelor's Degree																							
VII												6+6			6	4							22
VIII												6+6 (Adv. Topics)				6	4				4	4	22
Exit Point: Bachelor's Degree with Honors/Research																							
VIII												6+6 (Adv. Topics)				6	4				4	4	22

*There will be four disciplinary areas: A-Natural Science, B-Humanities, C-Social Science, and D-Commerce; each having basket of courses. A student will have to select a 'Major' from any of the four disciplinary areas (out of A, B, C & D). The selection for admission will be primarily based on availability of seats in Major and marks imposed by the institution.

** A student has to select three subjects for 'Introductory Regular Courses' from a pool of subjects associated with the Major offered by the institution. One of the three subjects will continue as 'Minor' from semester IV onwards, based on the academic interest and performance of the student.

Table 2: Course structure for Undergraduate Certificate Programme [May Exit after Sem.-II]

Semester	Common Courses			Introductory Courses		Major	Total Credits
Sem.-I	LCS (MIL/TRL) (6 Credits)	Understanding India (2 Credits)	Health & Wellness, Yoga Education, Sports & Fitness (2 Credits)	IRC-1 (3 Credits)	IVS-1A (3 Credits)	MJ-1 (6 Credits)	(22)
Sem.-II	LCS (English) (6 Credits)	Global Citizenship Education (2 Credits)	Mathematical & Computational Thinking (2 Credits)	IRC-2 (3 Credits)	IVS-1B (3 Credits)	MJ-2 (6 Credits)	(22)

Total = 44 Credits

(LCS: Language and Communication Skills; MIL: Modern Indian Languages; TRL: Tribal Regional Languages;

IRC: Introductory Regular Courses; IVS: Introductory Vocational Studies, MJ: Major)

Table 3: Course structure for Undergraduate Diploma Programme [May Exit after Sem.-IV]

Semester	Common Courses			Introductory Courses	Major	Minor	Internship/ Project	Vocational	Total Credits
Sem.-III	Environmental Studies (3 Credits)	Community Engagement/ NCC/ NSS (3 Credits)	Digital Education (3 Credits)	IRC-3 (3 Credits)	MJ-3 (6 Credits)		Internship/ Project (4 Credits)		(22)
Sem.-IV					MJ-4, MJ-5 (6+6=12 Credits)	MN-1 (6 Credits)		VS-1 (4 Credits)	(22)

Total = 88 Credits

(MN: Minor; VS: Vocational Studies)

Table 4: Course structure for Bachelor's Degree Programme

[May Exit after Sem.-VI]

Semester	Major Courses	Minor Courses	Vocational	Total Credits
Sem.-V	MJ-6, MJ-7 (6+6 = 12 Credits)	MN-2 (6 Credits)	VS-2 (4 Credits)	(22)
Sem.-VI	MJ-8, MJ-9 (6+6= 12 Credits)	MN-3 (6 Credits)	VS-3 (4 Credits)	(22)

Total = 132 Credits

Table 5: Course structure for Bachelor's Degree with Hons./Research Programme

Semester	Advance Courses	Research Courses	Vocational	Total Credit
Sem.-VII	AMJ-1, AMJ-2 (6+6=12 Credits)	Research Methodology (6 Credits)	Research Proposal (4 Credits)	(22)
Sem.-VIII	AMJ-3, AMJ-4 (6+6=12 Credits)	Research Int./Field Work (4 Credits)	Research Report (4 Credits)	VSR (2 Credits)

Total = 176 Credits

(AMJ: Advance Major; VSR: Vocational Studies associated with Research)

**SEMESTER WISE COURSES OF STUDY FOR FOUR YEAR
UNDERGRADUATE PROGRAMME**

Semester	Common, Introductory, Major, Minor, Vocational & Internship Courses		Credits
	Code	Paper	
I	CC-1	Language and Communication Skills (Modern Indian language including TRL)	6
	CC-2	Understanding India	2
	CC-3	Health & Wellness, Yoga Education, Sports & Fitness	2
	IRC-1	Introductory Regular Course-1	3
	IVS-1A	Introductory Vocational Studies-1	3
	MJ-1	Major paper 1 (Disciplinary/Interdisciplinary Major)	6
II	CC-4	Language and Communication Skills (English)	6
	CC-5	Mathematical & Computation Thinking Analysis	2
	CC-6	Global Citizenship Education & Education for Sustainable Development	2
	IRC-2	Introductory Regular Course-2	3
	IVS-2B	Introductory Vocational Studies-2	3
	MJ-2	Major paper 2 (Disciplinary/Interdisciplinary Major)	6
III	CC-7	Environmental Studies	3
	CC-8	Digital Education (Elementary Computer Applications)	3
	CC-9	Community Engagement & Service (NSS/ NCC/ Adult Education)	3
	IRC-3	Introductory Regular Course-3	3
	IAP	Internship/Apprenticeship/ Project	4
	MJ-3	Major paper 3 (Disciplinary/Interdisciplinary Major)	6
IV	MJ-4	Major paper 4 (Disciplinary/Interdisciplinary Major)	6
	MJ-5	Major paper 5 (Disciplinary/Interdisciplinary Major)	6
	MN-1	Minor Paper 1 (Disciplinary/Interdisciplinary Minor)	6
	VS-1	Vocational Studies-1 (Minor)	4
V	MJ-6	Major paper 6 (Disciplinary/Interdisciplinary Major)	6
	MJ-7	Major paper 7 (Disciplinary/Interdisciplinary Major)	6
	MN-2	Minor Paper 2 (Disciplinary/Interdisciplinary Minor)	6
	VS-2	Vocational Studies 2 (Minor)	4
VI	MJ-8	Major paper 8 (Disciplinary/Interdisciplinary Major)	6
	MJ-9	Major paper 9 (Disciplinary/Interdisciplinary Major)	6
	MN-3	Minor Paper 3 (Disciplinary/Interdisciplinary Minor)	6
	VS-3	Vocational Studies 3 (Minor)	4

VII	AMJ-1	Advance Major paper 1 (Disciplinary/Interdisciplinary Major)	6
	AMJ-2	Advance Major paper 2 (Disciplinary/Interdisciplinary Major)	6
	RC-1	Research Methodology	6
	RC-2	Research Proposal	4
VIII	AMJ-3	Advance Major paper 3 (Disciplinary/Interdisciplinary Major)	6
	AMJ-4	Advance Major paper 4 (Disciplinary/Interdisciplinary Major)	6
	RC-3	Research Internship/Field Work	4
	RC-4	Research Report	4
	VSR	Vocational Studies (Associated with Research)	2
		Total Credit	176

Abbreviations:

CC - Common Courses

IRC - Introductory Regular Courses

IVS - Introductory Vocational Studies

IAP - Internship/Apprenticeship/ Project

VS - Vocational Studies

MJ - Major Disciplinary/Interdisciplinary Courses

MN - Minor Disciplinary/Interdisciplinary Courses

AMJ - Advance Major Disciplinary/Interdisciplinary Courses

RC - Research Courses

VSR - Vocational Studies associated with Research

SEMESTER WISE COURSES IN BOTANY FOR FYUGP

Semester wise Examination Structure in Discipline Courses:

Semester	Common, Introductory, Major, Minor, Vocational & Internship Courses		Examination Structure			
	Code	Papers	Credits	Mid Semester Theory (F.M.)	End Semester Theory (F.M.)	End Semester Practical/ Viva (F.M.)
I	MJ-1	Microbiology and Phycology (Theory + Practical)	6			
II	MJ-2	Biomolecules and Cell Biology (Theory + Practical)	6			
III	MJ-3	Mycology and Phytopathology (Theory + Practical)	6			
IV	MJ-4	Archegoniates and Palaeobotany (Theory + Practical)	6			
	MJ-5	Plant Systematics and Economic Botany	6			

		(Theory + Practical)				
V	MJ-6	Reproductive Biology of Angiosperms (Theory + Practical)	6			
	MJ-7	Plant Anatomy and Ecology (Theory + Practical)	6			
VI	MJ-8	Cytogenetics and Molecular Biology (Theory + Practical)	6			
	MJ-9	Plant Physiology, Biochemistry and Biotechnology (Theory + Practical)	6			
VII	AMJ-1	Advance Plant Biotechnology	6			
	AMJ-2	Analytical Techniques in Plant Sciences	6			
	RC-1	Research Methodology	6			
	RC-2	Research Proposal	4			
VIII	AMJ-3	Applied Botany	6			
	AMJ-4	Advance Molecular Biology	6			
	RC-3	Research Internship/Field Work	4			
	RC-4	Research Report	4			
	VSR	Vocational Studies (Associated with Research)	2			
	Total Credit		98			

Semester wise Course Code and Credit Points:

Semester	Introductory and Minor Courses		Examination Structure			
	Code	Papers	Credits	Mid Semester Theory (F.M.)	End Semester Theory (F.M.)	End Semester Practical/ Viva (F.M.)
I/II/III	IRC	Basic Concept of Botany	3			
IV	MN-1	Diversity of Plants , Ecology and Environmental Science	6			
V	MN-2	Taxonomy, Plant Anatomy and Embryology	6			
VI	MN-3	Plant Physiology, Biotechnology and Genetics	6			
	Total Credits		21			

AIM OF BACHELOR'S DEGREE PROGRAMME IN BOTANY

- To create the facilities and learning environment in educational institutions to consolidate the knowledge acquired at +2 level, motivate students to develop a deep interest in Botany, and to gain a broad and balanced knowledge and understanding of physical concepts, principles and theories of Botany. A dialogue about plants and their significance is fostered in this framework.
- To provide the latest subject matter, both theoretical as well as practical, such a way to foster their core competency and discovery learning. A botany graduate as envisioned in this framework would be sufficiently competent in the field to undertake further discipline-specific studies, as well as to begin domain-related employment.
- The student will be able to identify major groups of plants and compare the characteristics of lower (e.g., algae and fungi) and higher (angiosperms and gymnosperms) plants. They will be able to use the evidence-based comparative botany approach to explain the evolution of organisms and understand the genetic diversity on the earth. The students will also be able to explain various plant processes and functions, metabolism, concepts of gene, genome, and how organism's function is influenced at the cell, tissue, and organ level.
- Students will be able to understand the adaptation, development, and behaviour of different forms of life. The understanding of networked life on earth and tracing the energy pyramids through nutrient flow is expected from the students. Students will be

able to demonstrate the experimental techniques and methods of their area of specialization in Botany.

- In light of all of the above to provide students with the knowledge and skill base that would enable them to undertake further studies in Botany and related areas, or in Interdisciplinary/multidisciplinary areas, or join and be successful in diverse professional streams including entrepreneurship.

PROGRAM LEARNING OUTCOME

- The framework of curriculum for the Bachelor's program in Botany aims to transform the course content and pedagogy to provide a multidisciplinary, student-centric, and outcome-based, holistic education to the next generation of students.
- Aside from structuring the curriculum to be more in-depth, focused, and comprehensive with significant skill-set for all exit levels; keeping in mind the job prospects; the emphasis has been to maintain academic coherence and continuum throughout the program of study and help build a strong footing in the subject, thereby ensuring a seamless transition into their careers.
- Special attention is given to eliminate redundancy, discourage rote learning, and espouse a problem-solving, critical thinking, and inquisitive mindset among learners.
- The curriculum embraces the philosophy that science is best learned through experiential learning, not limited to the confines of a classroom but rather through hands-on training, projects, field studies, industrial visits, and internships.
- This updated syllabus, with modern technology, helps students stay informed on the leading-edge developments in plant sciences and promotes curiosity, innovation, and a passion for research, that will serve them well in their journey into scientific adventure and discovery beyond graduation.
- The goal is to equip students with holistic knowledge, competencies, professional skills, and a strong positive mindset that they can leverage while navigating the current stiff challenges of the job market.

SEMESTER I

MAJOR COURSE- 1 (MJ-1) THEORY

Microbiology and Phycology

(Credits: Theory- 4, Practical- 2)

Unit 1: Introduction to microbial world

(15 lectures)

Economic importance of viruses with reference to vaccine production, role in research, medicine and diagnostics, as causal organisms of plant diseases.

Economic importance of bacteria with reference to their role in agriculture and industry (fermentation and medicine).

Unit 2: Viruses and Bacteria (15 lectures)

General account of Viruses, Viroides and Prions. Structure, Replication of DNA virus (T4 and λ), RNA (TMV), lytic and lysogenic cycle.

General account of Bacteria, Archaeobacteria, Eubacteria: cell structure, reproduction.

Genetic Recombination in Bacteria (conjugation, transformation and transduction).

General account of Mycoplasma.

Unit 3: Algae, Cyanophyta and Xanthophyta (15 lectures)

Range of thallus organization; Classification (by Fritsch), Algal cell structure, Algal evolution, Algal bioprospecting. Ecology and occurrence; Range of thallus organization; Cell structure; Reproduction, Morphology and reproduction *Nostoc* and *Vaucheria*.

Unit 4: Chlorophyta and Phaeophyta and Rhodophyta (15 lectures)

General characteristics; Occurrence; Range of thallus organization; Cell structure; Reproduction. Morphology and life-cycles of *Volvox*, *Oedogonium* and *Chara*; Range of thallus organization; Cell structure; Reproduction. Morphology and life-cycles of *Ectocarpus* and *Polysiphonia*. Commercial cultivation and economic importance of brown and red algae.

MAJOR COURSE- 1 (MJ-1) PRACTICAL

Microbiology

1. Models of viruses and TMV.
2. Photographs of Lytic and Lysogenic cycle.
3. Types of bacteria to be observed from temporary/ permanent slides/photographs.
4. Gram's staining of bacteria.

Phycology

Study of vegetative and reproductive structures of:

1. *Nostoc*
2. *Volvox*
3. *Oedogonium*
4. *Chara*
5. *Vaucheria*
6. *Ectocarpus*
7. *Polysiphonia*

Suggested readings:

1. Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition
2. Wiley JM, Sherwood LM and Woolverton CJ. (2013) Prescott's Microbiology. 9th edition. McGraw Hill International.
3. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West Press, Delhi.
4. Pelczar, M.J. (2001). Microbiology, 5th edition, Tata McGraw Hill Co., New Delhi.

SEMESTER II

MAJOR COURSE- 2 (MJ-2) THEORY

Biomolecules and Cell Biology

(Credits: Theory- 4, Practical- 2)

Unit 1: Biomolecules

(20 lectures)

Carbohydrates: Nomenclature and classification; Monosaccharides; Disaccharides; Oligosaccharides and polysaccharides.

Proteins: Structure of amino acids; Levels of protein structure-primary, secondary, tertiary and quaternary; Protein denaturation and biological roles of proteins.

Nucleic acids: Structure of nitrogenous bases; Structure and function of nucleotides; Types of nucleic acids; Structure of A, B, Z types of DNA; Types of RNA; Structure of tRNA.

Lipids: Definition and major classes of storage and structural lipids. Fatty acids; structure and function, essential fatty acids.

Unit 2: Enzymes

(10 lectures)

Structure of enzyme: holoenzyme, apoenzyme, cofactors, coenzymes and prosthetic group; Classification of enzymes; Features of active site, substrate specificity, mechanism of action (activation energy, lock and key hypothesis, induced - fit theory), Michaelis -Menten equation, enzyme inhibition and factors affecting enzyme activity.

Unit 3: Cell Biology and Signal transduction

(20 lectures)

Cell as a unit of structure and function; Characteristics of prokaryotic and eukaryotic cells; Plant and animal cells; Origin of eukaryotic cell (Endosymbiotic theory). Chemistry, structure and function of Plant cell wall.

Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport - Passive, active and facilitated transport, endocytosis and exocytosis. Chloroplast, mitochondria and peroxisomes:

Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast. Lysosomes and Vacuoles. Endomembrane system: Endoplasmic Reticulum - Types and Structure. Golgi Apparatus - organization, protein glycosylation, protein sorting and export from Golgi Apparatus. Nucleus-structure, nuclear envelope, nuclear pore complex and nuclear lamina.

Unit 4: Cell division

(10 lectures)

Phases of eukaryotic cell cycle, mitosis and meiosis; Regulation of cell cycle-checkpoints, role of protein kinases. Signal transduction: Receptors and primary and secondary signal transduction.

MAJOR COURSE- 2 (MJ-2) PRACTICAL

1. Qualitative tests for carbohydrates, lipids and proteins.
2. Measurement of cell size by the technique of micrometry.
3. Study of cell and its organelles with the help of electron micrographs/ photographs
4. Study the phenomenon of plasmolysis and deplasmolysis using Rhoeo leaf
5. Study different stages of mitosis and meiosis.

Suggested Readings

1. Campbell, MK (2012) Biochemistry, 7th ed., Published by Cengage Learning
2. Campbell, PN and Smith AD (2011) Biochemistry Illustrated, 4th ed., Published by Churchill Livingstone
3. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H.Freeman
4. Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company
5. Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition., W.H. Freeman and Company.
6. Karp, G. (2010). Cell Biology, John Wiley & Sons, U.S.A. 6th edition.
7. Hardin, J., Becker, G., Skliensmith, L.J. (2012). Becker's World of the Cell, Pearson Education Inc. U.S.A. 8th edition.

8. Cooper, G.M. and Hausman, R.E. (2009) The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.

IRC-1:Basic Concept of Botany

(3 Credits)

INTRODUCTORY REGULAR COURSE (IRC)

Unit 1: Introduction to Botany

(5 lectures)

General concept of Botany as a science subject.

Branches of Botany and related areas.

Scope and Future prospects of Botany

Unit 2: Cryptogams

(7 lectures)

General identifying features, structures, life cycle and economic importance of

Thallophyta, Bryophyta and Pteridophyta.

Unit 3: Phanerogams

(5 lectures)

Diversity of Plants: General identifying features, structures, life cycle and economic importance of Gymnosperms and Angiosperms.

Unit 4: Cytology and Genetics

(10 lectures)

General concept of structure and function of prokaryotic and eukaryotic cells.

Cell division- Mitosis and Meiosis and their significance; Plant cell and its organelles- structure and function. Genetics: Structure and Function of DNA, Mendel's Law.

Unit 5: Ecology and Environment

(8 lectures)

Pond Ecosystem, Forest Ecosystem; Biogeochemical cycle – Carbon and Nitrogen. Pollution: Causes and control of air, water, soil and noise pollution;

conservation of natural resources, biodiversity: definition, threats, loss and importance. Indigenous eco-friendly practices. An introduction to major global environmental issues and sustainable development. Disaster management. Peoples Biodiversity Register (PBR)

Unit 6: Plant Physiology and Basic Biochemistry(10 lectures)

1. Physiology of Plants: Ascent of Sap, Transpiration, Photosynthesis and Respiration. Fermentation- Role of microbes in food production and preservation. Biological Nitrogen fixation; general concept of ATP synthesis.

FORMAT OF QUESTION PAPER FOR SEMESTER INTERNAL EXAMINATION

Question format for 10 Marks:

F.M. =10	Subject/ Code Time=1Hr.	Exam Year
General Instructions:		
i. Group A carries very short answer type compulsory questions. ii. Answer 1 out of 2 subjective/ descriptive questions given in Group B . iii. Answer in your own words as far as practicable. iv. Answer all sub parts of a question at one place. v. Numbers in right indicate full marks of the question.		
<u>Group A</u>		
1.		[5x1=5]
i.	
ii.	
iii.	
iv.	
v.	
<u>Group B</u>		
2.	[5]
3.	[5]
Note: There may be subdivisions in each question asked in Theory Examination.		

Question format for 20 Marks:

F.M. =20	Subject/ Code Time=1Hr.	Exam Year
General Instructions:		
i. Group A carries very short answer type compulsory questions. ii. Answer 1 out of 2 subjective/ descriptive questions given in Group B . iii. Answer in your own words as far as practicable. iv. Answer all sub parts of a question at one place. v. Numbers in right indicate full marks of the question.		
<u>Group A</u>		
1.		[5x1=5]
i.	
ii.	
iii.	
iv.	
v.	
2.	[5]
<u>Group B</u>		
3.	[10]
4.	[10]
Note: There may be subdivisions in each question asked in Theory Examination.		

FORMAT OF QUESTION PAPER FOR END SEMESTER UNIVERSITY EXAMINATION
Question format for 50 Marks:

F.M. =50	Subject/ Code Time=3Hrs.	Exam Year
General Instructions:		
i. Group A carries very short answer type compulsory questions. ii. Answer 3 out of 5 subjective/ descriptive questions given in Group B . iii. Answer in your own words as far as practicable. iv. Answer all sub parts of a question at one place. v. Numbers in right indicate full marks of the question.		
<u>Group A</u>		
1.		[5x1=5]
i.		
ii.		
iii.		
iv.		
v.		
<u>Group B</u>		
2.		[15]
3.		[15]
4.		[15]
5.		[15]
6.		[15]
Note: There may be subdivisions in each question asked in Theory Examination.		

Question format for 60 Marks:

F.M. =60	Subject/ Code Time=3Hrs.	Exam Year
General Instructions:		
i. Group A carries very short answer type compulsory questions. ii. Answer 3 out of 5 subjective/ descriptive questions given in Group B . iii. Answer in your own words as far as practicable. iv. Answer all sub parts of a question at one place. v. Numbers in right indicate full marks of the question.		
<u>Group A</u>		
1.		[5x1=5]
i.		
ii.		
iii.		
iv.		
v.		
2.		[5]
3.		[5]
<u>Group B</u>		
4.		[15]
5.		[15]
6.		[15]
7.		[15]
8.		[15]
Note: There may be subdivisions in each question asked in Theory Examination.		

Question format for 75 Marks:

F.M. = 75	Subject/ Code	Exam Year
Time=3Hrs.		
General Instructions:		
i. Group A carries very short answer type compulsory questions.		
ii. Answer 4 out of 6 subjective/ descriptive questions given in Group B .		
iii. Answer in your own words as far as practicable.		
iv. Answer all sub parts of a question at one place.		
v. Numbers in right indicate full marks of the question.		
<u>Group A</u>		
1.		[5x1=5]
i.	
ii.	
iii.	
iv.	
v.	
2.	[5]
3.	[5]
<u>Group B</u>		
4.	[15]
5.	[15]
6.	[15]
7.	[15]
8.	[15]
9.	[15]
Note: There may be subdivisions in each question asked in Theory Examination.		

Question format for 100 Marks:

F.M. = 100	Subject/ Code	Exam Year
Time=3Hrs.		
General Instructions:		
i. Group A carries very short answer type compulsory questions.		
ii. Answer 4 out of 6 subjective/ descriptive questions given in Group B .		
iii. Answer in your own words as far as practicable.		
iv. Answer all sub parts of a question at one place.		
v. Numbers in right indicate full marks of the question.		
<u>Group A</u>		
1.		[10x1=10]
i.	
ii.	
iii.	
iv.	
v.	
vi.	
vii.	
viii.	
ix.	
x.	
2.	[5]
3.	[5]
<u>Group B</u>		
4.	[20]
5.	[20]
6.	[20]
7.	[20]
8.	[20]
9.	[20]
Note: There may be subdivisions in each question asked in Theory Examination.		