MODIFIED CBCS CURRICULUM OF

M.Sc. BOTANY PROGRAMME

SUBJECT CODE = BOT

ST. XAVIER'S COLLEGE, RANCHI

(AN AUTONOMOUS COLLEGE AFFILIATED TO RANCHI UNIVERSITY, RANCHI)

Implemented w.e.f. Academic Session 2025-2027

Members of Board of Studies for preparing Provisional Syllabus of the Four-Year Undergraduate Programme (FYUGP)

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   Ms. RIMA JULIE BHAURNA
   Botany Honours batch 10-13 alumnus

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COURSE STUCTURE FOR M.Sc. BOTANY

Table AI-1: Distribution of 80 Credits for Subjects having Practical Papers

[*wherever there is practical examination there will be no tutorial and vice versa]

Course	Papers	Credits Theory + Practical	Credits Theory + Tutorial
I. Foundation Course (FC)			
1. Foundation Course Compulsory Foundation/ Elective Foundation	**(FC)** 1 Paper	1x5=5	1x5=5
II. Core Course (CC)	**(CC 1 to 10/11)**		
Theory	7 Papers/11 Papers	7x5=35	11x5=55
Practical/ Tutorial*	3 Papers/----------	3x5=15	
Project	1 Paper	1x5=5	1x5=5
III. Elective Course (EC)			
A. Ability Enhancement Course of the Core Course opted	**(AE/EC 1)** 1 Paper	1x5=5	1x5=5
B. Discipline Centric Elective	**(DC/EC 2&3)**		
Theory +	2 Papers	2x5=10	
Practical	1 Paper	1x5=5	
OR Theory/Practical/Tutorial*	1Paper + 1 Practical/Dissertation		2x5=10
OR Generic Elective/ Interdisciplinary	**(GE/EC 2&3)**		
Theory OR	2 Papers		
Theory/Practical/Tutorial*	1 Paper + 1 Practical/Dissertation		
	Total Credit = 80		**= 80**

Table AI-1.1: Course structure for M.Sc. Programme with Practical Papers

Semester	Subject (Core Courses) 11 Papers	Allied (Elective Courses) 4 Papers	Foundation Course (Compulsory Course) 1 Paper	Total Credits
Sem-I	C-1, C-2, C-3 (5+5+5=15 Credits)		Foundation Course FC (05 Credits)	**20 Credits**
Sem-II	C-4, C-5, C-6, C-7 (5+5+5+5=20 Credits)			**20 Credits**
Sem-III	C-8, C-9, C-10 (5+5+5=15 Credits)	EC1 (05 Credits)		**20 Credits**
Sem-IV	C-11 (Project) (05 Credits)	EC2, EC3, EP (5+5+5=15Credits)		**20 Credits**
				Total = 80 Credits

Rima Julie Bharuda 5.12.2025

COURSES OF STUDY FOR M.Sc. BOTANY

2018 onwards

Table AI-2 Subject Combinations allowed for M. Sc. Programme (80 Credits)

Foundation Course **FC** **1 Paper**	Core Subject **CC** **11 Papers**	Ability Enhancement Course **AE** **1 Paper**	Discipline Centric Elective/ Generic Elective Course **DC/ GE/ EC** **3 Papers**

Table AI-2.1 Semester wise Examination Structure for Mid Sem & End Sem Examinations:

Sem	Core, SE/ GE/ DC/ EC & Compulsory FC Courses				Examination Structure		
	Paper	Paper Code	Credit	Name of Paper	Mid Semester Evaluation (F.M.)	End Semester Evaluation (F.M.)	End Semester Practical/ Viva (F.M.)
I	Foundation Course	FCBOT101	5	Foundation Course	30	70	----
	Core Course	CCBOT102	5	Microbiology, Algae, Fungi and Plant Pathology	30	70	----
	Core Course	CCBOT103	5	Biology and Diversity of Bryophytes, Pteridophytes, Gymnosperms and Fossils	30	70	----
	Practicals on Core	CPBOT104	5	Practical-I	----	----	70 + 30
II	Core Course	CCBOT201	5	Fundamental and Applied Ecology	30	70	----
	Core Course	CCBOT202	5	Cytogenetics, Taxonomy, Ethnobotany and Medicinal Plants	30	70	----
	Core Course	CCBOT203	5	Plant Physiology, Biochemistry, Biotechnology and Molecular Biology	30	70	----
	Practicals on Core	CPBOT204	5	Practical-II	----	----	70 + 30
III	Ability Enhancement Course	CCBOT301	5	A. Biofertilizers/ B. Mushroom Cultivation	30	70	----
	Core Course	CCBOT302	5	Anatomy, Plant Embryology and Economic Botany	30	70	----
	Core Course	CCBOT303	5	Biochemicals and Molecular Techniques	30	70	----
	Practicals on Core	CPBOT304	5	Practical-III	----	----	70 + 30
IV	Elective	ECBOT401	5	A. Algal Biotechnology-I/ B. Microbiology and Plant Pathology-I/ C. Cytogenetics, Plant Breeding, Molecular Biology and Biotechnology-I/ D. Plant Physiology, Biotechnology and molecular Biology-I/ E. Plant Taxonomy, Ethnobotany and Medicinal Plants-I	30	70	----

	Elective	ECBOT402	5	A. Algal Biotechnology-II/ B. Microbiology and Plant Pathology-II/ C. Cytogenetics, Plant Breeding, Molecular Biology and Biotechnology-II/ D. Plant Physiology, Biotechnology and molecular Biology-II/ E. Plant Taxonomy, Ethnobotany and Medicinal Plants-II	30	70	----
	Practical s on Elective	EPBOT403	5	A. Practical-IV: Algal Biotechnology / B. Practical-IV: Microbiology and Plant Pathology/ C. Practical-IV: Cytogenetics, Plant Breeding, Molecular Biology and Biotechnology/ D. Practical-IV: Biotechnology and molecular Biology/ E. Practical-IV: Plant Taxonomy, Ethnobotany and Medicinal Plants	----	----	70 + 30
	PROJECT	PRBOT404	5	Project Work	----	----	70 + 30

SEMESTER I — 4 Papers

Total 100 x 4 = 400 Marks

I. COMPULSORY FOUNDATION COURSE [FCBOT101]:

(Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) =100	Pass Marks (MSE:17 + ESE:28) =45

Instruction to Question Setter:

Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*
*The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "**Better of Two**" shall be applicable for computation of marks for SIA.*

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

FOUNDATION COURSE

Theory: 60 Hours; Tutorial: 15 Hours

1. Economic importance of Bacteria.
2. Classification of algae as proposed by F.E. Fritsch.
3. Thallus organization and economic importance of Algae.
4. Classification of Fungi as proposed by Gwynne-Vaughan & Barnes.
5. Classification of Bryophytes and alternation of generation.
6. Classification of Pteridophytes K.R. Sporne and alternation of generation.
7. Geological time period, types and process of fossilization.
8. Classification of Gymnosperms K.R. Sporne (1975) and alternation of generation.
9. International code of Botanical Nomenclature – an Introduction.
10. Taxonomy and its relevance.
11. Ethnobotany: Definition, Method of study.
12. Biomolecules: Structure and Function of Primary Metabolites-Carbohydrates, Fats and Proteins.
13. Role of biotechnology in plant and product improvement. Basic concept of nanobiotechnology.
14. Green House Gases, Global warming and sustainable development.
15. Cell division- A preliminary idea.
16. Introduction of Cancer Biology.
17. Basic concepts of Biostatistics and Bioinformatics.

II. CORE COURSE [CCBOT102]: (Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) =100	Pass Marks (MSE:17 + ESE:28= 45

Instruction to Question Setter:

Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*
*The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "**Better of Two**" shall be applicable for computation of marks for SIA.*

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

MICROBIOLOGY, ALGAE, FUNGI AND PLANT PATHOLOGY

Theory: 60 Hours; Tutorial: 15 Hours

GROUP-A

Microbiology

1. Structure and Reproduction in Bacteria.
2. Mechanism of bacterial recombination: Conjugation, transformation and transduction.
3. Bacteriophage – Structure and is multiplication.
4. General account of Mycoplasma and its role in causing plant diseases.

Phycology

1. Range of thallus structures and reproduction in
    a) Cyanophyta
    b) Chloropyta
    c) Charophyta
    d) Phaeophyta
    e) Rhodophyta
2. General conception of life cycle pattern in algae.
3. Algal blooms.
4. Algal biofertilizers.
5. Algae as food, feed and uses in industry.

GROUP-B

Mycology

6. Saprolegniales, Peronosporoles, Mucorales with special reference to Evolution in asexual reproductive structure in class Phycomycetes.
7. Sexual reproduction and types of fructifications in Ascomycetes.
8. Development of Basidium (Holobasidium, Phragmobasidium).

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GROUP-C

Plant Pathology:

9. Symptoms, etiology and disease management of following diseases:
   i. Late blight of potato
   ii. Powdery Mildews of pea
   iii. Black rust of wheat
   iv. Early blight of Potato
   v. Citrus canker
   vi. Leaf curl of Papaya
   vii. Leaf curl of Tomato

III. CORE COURSE [CCBOT103]: (Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) =100 **Pass Marks (MSE:17 + ESE:28) =45**

Instruction to Question Setter:

Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*
*The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "**Better of Two**" shall be applicable for computation of marks for SIA.*

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

BIOLOGY AND DIVERSITY OF BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND FOSSILS

Theory: 60 Hours; Tutorial:15 Hours

GROUP-A

Bryophytes

1. Range of thallus structure in Bryophytes.
2. Evolution of Gametophyte and Sporophyte in Bryophytes.
3. Distribution of photosynthetic tissues in Bryophytes.
4. Economic importance of Bryophytes.

GROUP-B

Pteridophyta

1. Evolution of stele in Pteridophyte.
2. Origin and evolution of sporophyte in pteridophyte – Telome Concept.
3. Heterospory and Seed Habit.
4. Economic importance of Pteridophytes.

GROUP-C

Gymnosperms and Fossils

1. Fossil- Mode of preservation, Distribution and examples of Indian Fossils.
2. Brief account of families of Pteridospermales, Pentoxylales, Glossopteridaceae and Caytoniaceae.
3. Comparative study of families of Gnetals: Gentaceae, Ephedraceae and Welwitschiaceae.
4. A general account of Ginkgoales

IV. CORE COURSE PRACTICAL [CPBOT104]: (Credits: Practical-05)

Marks: 100 (ESE Pr: 6Hrs) **Pass Marks =45**

Instruction to Question Setter:

End Semester Practical Examination (ESE Pr):

The questions in practical examination will be of equal to 70 marks and will be so framed that the students are able to answer them within the stipulated time. 20 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.

Note:
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

PRACTICAL-I

Practical: 60Hours

1. Staining of gram positive/gram negative bacteria. (A) 10
2. Identification viral/bacterial/fungi disease. (B) 06+04=10
3. Study of algal materials from the algal mixture (C) identification of at least one genus giving diagnostic features. 10
4. Identify the provided Bryophyte (D) to you after thorough investigation made through temporary mounts. 10
5. Write a monograph on provided Pteridophyte material (E) to you after thorough investigation made through temporary mounts. 20

   OR

   Identify the gymnosperm material (F) provided to you after thorough investigation made through temporary mounts.
6. Spots 1 – 5. 10
7. Practical records, herbarium, field report, charts etc. 16+04=20
8. Viva-voce. 08+02=10

SEMESTER II **4 Papers**

Total 100 x 4 = 400 Marks

I. CORE COURSE [CCBOT201]:

(Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) =100	Pass Marks (MSE:17 + ESE:28) =45

Instruction to Question Setter:

Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*
*The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "**Better of Two**" shall be applicable for computation of marks for SIA.*

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

FUNDAMENTAL AND APPLIED ECOLOGY

Theory: 60 Hours; Tutorial:15 Hours

1. Ecological factors; Climatic, Topographic, Edaphic and Biotic.
2. Population and Community ecology: population characteristics, Population dynamics, Community characteristics, composition, structure, origin and development of a community, methods of study of community.
3. Ecological succession: Types and mechanisms of ecological successions (Hydrosere and Xerosere); Changes in ecological properties during succession.
4. Ecosystem organization: Types, Structure and Function, Flow of energy; Bio-geochemical cycles of C, N, P, S; mineral cycles (Pathway, Processes); Primary production, Decomposition and Feed chain, Food web of different types of ecosystems; Terrestrial (Forest and Grassland) and Aquatic (Freshwater); and Ecological pyramids.
5. Ecological adaptations: Hydrophytes, Xerophytes and Halophytes.
6. Phytogeography: Major plant communities of the world; Phytogeographic regions of the world; Floristic regions of India, vegetation of India.
7. Air, Water, Soil, Sound and Radiation Pollutions: Kinds, Sources, Quality parameters, Effects on plants & Ecosystem and control measures.
8. Climate Change (Global Environmental Problems): Global warming, Greenhouse Gases (CO_2, CH_4, O_3, CFC_5, N_2O), Sources, Trends & Role); Environmental effects of Global warming, Ozone depletion, Damage to the Ozone layer & Hole, Health effects of Ozone depletion and increased UV Radiation, Saving the Ozone layer.
9. Non-conventional source of energy: Solar, Wind, Nuclear, Biogas and Petroplants.

II. CORE COURSE [CCBOT202]: (Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) =100 **Pass Marks (MSE:17 + ESE:28) =45**

Instruction to Question Setter:

Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*
*The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "**Better of Two**" shall be applicable for computation of marks for SIA.*

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

CYTOGENETICS, TAXONOMY, ETHNOBOTANY AND MEDICINAL PLANTS

Theory: 60 Hours; Tutorial:15

GROUP-A

1. Chromatin Organization, Chromosome structure and packaging of DNA, Histones, Heterochromatin.
2. Cell division and cell cycle: Mitosis, Meiosis, their regulation, Overview of cell cycle, control mechanism: role of cyclins and cyclin dependent kinases.
3. Protein sorting: Targeting of proteins to organelles.
4. Mutations: Types, Detection, Molecular basis of mutation, Physical and Chemical Mutagenesis.
5. DNA damage and repair mechanism.
6. Brief account of Proto-oncogenes, Oncogenes, tumor suppressor genes, cancer, metastasis.
7. Structure and numerical alterations in chromosomes: Origin, Occurrence and production of haploid. Introduction and characterization of monosomics, trisomics, Origin and production of autopolyploids, allopolyploids.
8. Biostatistics: Standard deviation, Standard error, Chi square.

GROUP-B

1. Systematics: Outline, Classification of Angiosperms –Engler & Prantl, Hutchinson, Takhtajan and Cronquist's system. Their merits and demerits.
2. International code of Nomenclature for Algae, Fungi and Plants – Principle, Rules of effective and valid publication. Retention and choice of names.
3. Biosystematics: Concepts, Biosystematics categories, Methods in Experimental Taxonomy.

10. Strategies of Plant conservation: *In situ* conservation – Sanctuaries, National parks and sacred groves and *Ex situ* conservation – Botanical gardens, Gene bank, Seed banks and tissue culture techniques.
11. Natural resources and their Managements: Land resource, water resource, Air resource, agriculture and forestry resources and their management.
12. Indian Biological Diversity Act. Convention of Biological Diversity (CBD), People's Biodiversity Register, Green Book, Red Book, Blue Book.
13. Bioremediation: Definition need and scope of bioremediation, Phytoremediation, Microremediation

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4. Diagnostic characteristics, systematic phylogeny and economic importance of families Mangoliaceae, Ranunculaceae, Apocynaceae, Asclepiadaceae, Scrophulariaceae, Acanthaceae, Bignoniaceae, Lamiaceae, Verbenaceae, Polygonaceae, Euphorbiaceae, Rubiaceae, Orchidaceae, Araceae, Poaceae, Cyperaceae and Commelinaceae
5. Ethnobotany: Definition scope and method of study, socio-culture organization of the ethnic tribes of Jharkhand.

Books Suggested:

III. CORE COURSE [CCBOT203]: (Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) =100	Pass Marks (MSE:17 + ESE:28) =45

Instruction to Question Setter:

Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*
*The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "**Better of Two**" shall be applicable for computation of marks for SIA.*

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

PLANT PHYSIOLOGY, BIOCHEMISTRY, BIOTECHNOLOGY AND MOLECULAR BIOLOGY

Theory: 60 Hours; Tutorial:15Hours

GROUP-A: Plant Physiology

1. Transpiration: Types of Transpiration, Evaporation and Transpiration, Mechanism of Transpiration and Stomatal, Physiology, Factors Affecting the Rate of Transpiration, Significance of Transpiration, Anti-transpirants, Measurement of Transpiration.
2. Translocation in Plant: Phloem Transport; Phloem Sap Composition, Movement in Plant, Direction of Movement, Bidirectional Movement, Lateral Movement, Source – Sink relationship, Phloem loading, Phloem Unloading, Mechanism of Phloem Transport – Electroosmosis, Protoplasmic Streaming, Contractile Protein Variants, Mass Flow Hypothesis, Factors Affecting Translocation.
3. Phytohormone: History, Structure, Biosynthesis Physiological Response and Mechanism of Action of Auxins, Cytokinins, Gibberellins, Ethylene, Abscisic acid
4. Physiology of Flowering: Photoperiodism, Phytochrome, Molecular basis of Vernalization
5. Seed Dormancy and Germination: Definition, Types, Mechanism and Method Breaking the Dormancy.

GROUP-B: Plant Biochemistry

6. Photosynthesis: The Pigment System, Light Reaction, Dark (C_3 Cycle), Hatch and Slack Pathway (C_4 Cycle), Photorespiration and Factors Affecting Rate of Photosynthesis.
7. Respiration: Glycolysis, Fermentation, Krebs Cycle, Electron Transport System, Hexose Monophosphate Shunt, Theories of Phosphorylation – The Chemical Coupling Theory, The Conformational Coupling Theory, The Chemiosmotic Theory, Factors Affecting the Rate of Respiration.
8. Enzymes: Nomenclature and Classification, Nature, Properties, Enzyme Energetic, Mode and Mechanism of Action, Factors Affecting Enzyme Activities.

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9. Nitrogen Metabolism: Nitrogen Fixation; Non-biological Fixation; Biological Fixation – Symbiotic Nitrogen Fixers, Non-symbiotic Nitrogen Fixers, Biochemistry of Nitrogen Fixation.
10. Lipid Metabolism: Simple Lipids, Complex Lipid, Neutral Fats, Fatty Acids, Enzymatic Degradation of Fats, B-Oxidation of Fatty Acid and Oxidation of Fatty Acids, Biosynthesis of Fatty Acids.

GROUP-C: Biotechnology and Molecular Biology

11. Plant tissue culture and its significance
12. Micropropagation: Techniques, Multiplication by Auxiliary and Apical Shoots, Multiplication through Callus Embryoid Culture, Factors Affecting Shoot Multiplication.
13. Haploidy: Another culture, pollen Culture and ovary culture and its role in crop improvement
14. Molecular Cytogenetics: Brief account of DNA replication in Prokaryotes, Nuclear DNA content, C-value paradox, Introns and RNA splicing, repetitive DNA, Restriction mapping, Regulation of gene expression in Prokaryotes.
15. Molecular marker: RFLP, RAPD, AFLP and SSR.
16. Genetic transformation: Biotic and abiotic methods.

Books Suggested:

IV. CORE COURSE PRACTICAL [CPBOT204]: (Credits: Practical-05)

Marks: 100 (ESE Pr: 6Hrs) **Pass Marks =45**

Instruction to Question Setter:

End Semester Practical Examination (ESE Pr):

The questions in practical examination will be of equal to 70 marks and will be so framed that the students are able to answer them within the stipulated time. 20 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.

Note:

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

PRACTICAL-II **Practical: 60Hours**

CYTOGENETICS, TAXONOMY, PLANT PHYSIOLOGY, BIOTECHNOLOGY AND MOLECULAR BIOLOGY LAB

1. Problems based on Mendelian ratio and their modifications, statistics analysis and genetic explanation. 10
2. Show two stages of mitosis from the given onion root tip. 10
3. Compare and comment on the floral characters of the local flora A and B Provided and assign them to their respective families. 12
4. In a separate answer book provided, you have to write down botanical name family and used of plants C, D, E, F, G provided to you. 10
5. Separation of chlorophyll pigments by Paper chromatography. 10
6. Phytochemical screening of secondary metabolites (alkaloids, phenols and saponins): Any two. 08

OR

7. Estimate the quality of carbohydrate/ Protein through standard curve from the given sample with the help of spectrophotometer.
8. Comment upon the spot 1 – 5. 10
9. Practical records, herbarium, Charts model, Ingenuity design etc. 20
10. Viva-voce. 10

SEMESTER III — 4 Papers

Total 100 x 4 = 400 Marks

I. ABILITY ENHANCEMENT COURSE [ECBOT301A]: (Credits: Theory-05)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) =100	Pass Marks (MSE:17 + ESE:28) =45

Instruction to Question Setter:

Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*
*The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "**Better of Two**" shall be applicable for computation of marks for SIA.*

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

BIOFERTILIZERS

Theory: 60 Hours; Tutorial:15 Hours

1. General account about the eco-friendly organic agro-input as biofertilizer – *Rhizobium* inoculant, *Nostoc*, *Anabaena*, *Azotobacter*, identification, mass multiplication, Actinorrhizal symbiosis.
2. Industrial Application of microalgae.
3. Cyanobacteria (blue green algae) and association of BGA, nitrogen fixation, factors affecting growth, blue green algae and *Azolla* in rice cultivation.
4. Mycorrhizal association, types of mycorrhizal association, phosphorous nutrition, growth and yield.
5. Organic farming – green manuring and organic fertilizers, Recycling of bio-degradable municipal, agricultural and Industrial wastes. Water treatment and its use in agriculture.

Books Suggested:

II. CORE COURSE [CCBOT302]: (Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) =100	Pass Marks (MSE:17 + ESE:28) =45

Instruction to Question Setter:

Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*
*The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "**Better of Two**" shall be applicable for computation of marks for SIA.*

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

ANATOMY, PLANT EMBRYOLOGY AND ECONOMIC BOTANY

Theory: 60 Hours; Tutorial:15 Hours

GROUP-A: Anatomy

1. Shoot Development and theories of Shoot Apex organization, Organization of Root, Apical Meristem, Root-Stem Transition, ABC Model of flowering
2. Mechanical Tissues and their Distribution
3. Vascular and Cork Cambium
4. Ecological anatomy and adaptations
5. Anomalous Secondary growth with reference *Dracaena* stem, *Tinospora* root, *Bignonia, Nyctanthes, Boerhaavia, Mirabilis* stem

GROUP-B: Embryology and Economic Botany

6. Microsporogenesis and Microgametophyte.
7. Megasporogenesis and Megagametophyte.
8. Fertilization.
9. Endosperm type, Physiology and cytology of endosperm.
10. Polyembryony – Types, adventive embryony, false embryony, twins & triplets, Sexual incompatibility.
11. Apomixis, Embryology in relation to taxonomy.
12. Experimental Embryology: Anther Ovary, Ovule, Endosperm and Embryo Culture.
13. Fibre yielding plants: Timber yielding plants; Oil Yielding plants and Drug yielding plants.

Books Suggested:

III. CORE COURSE [CCBOT303]: (Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) =100	Pass Marks (MSE:17 + ESE:28) =45

Instruction to Question Setter:

Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*
*The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "**Better of Two**" shall be applicable for computation of marks for SIA.*

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

BIOCHEMICALS AND MOLECULAR TECHNIQUES

Theory: 60 Hours; Tutorial: 15 Hours

1. Basic concept of Spectrophotometer and Electron microscope.
2. Chromatography: Paper, column, HPLC, GLC-basic concept, NMR
3. Elementary concept of electrophoresis: Polyacrylamide gel electrophoresis (PAGE), agarose gel electrophoresis.
4. Isolation and Purification:
    - Genomic and plasmid DNA
    - RNA
5. Blotting: Principles, types of blotting, blotting membranes, immunoblotting – Southern, Northern, Western and Dot blots.
6. Recombinant DNA technology: Molecular cloning.
7. DNA sequencing: Various methods of DNA sequencing and finger printing.
8. Gene Silencing (RNA interference RNAi) and genome editing.
9. Polymerase Chain Reaction (PCR).

Books Suggested:

IV. CORE COURSE PRACTICAL [CPBOT304]: (Credits: Practical-05)

Marks: 100 (ESE Pr: 6Hrs)	Pass Marks =45

Instruction to Question Setter:

End Semester Practical Examination (ESE Pr):

The questions in practical examination will be of equal to 70 marks and will be so framed that the students are able to answer them within the stipulated time. 20 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.

Note:
(Attendance Upto60%, 1mark; 60<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

PRACTICAL-III

Practical: 60Hours

ECOLOGY, ANATOMY, EMBRYOLOGY AND ECONOMIC BOTANY LAB

1. Cut T.S. section of the given material, (A) make temporary mount, draw a well labeled diagram and describe ecological adaptation. 10
2. Determination of frequency/density/abundance of plants in the local field by quadrate method. 15
3. Cut T.S. section of the given material, (B) make temporary mount, draw a well labeled diagram and describe anomalous structure. 15
4. Isolation of at least two stages of embryo from *Abelmoschus esculentum*. 10
5. Give botanical names and families of plants and mention their economic importance. 10
6. Comment upon spots 1-5. 10
7. Practical records, chart and Models etc. 20
8. Viva-voce. 10

SEMESTER IV — 4 Papers

Total 100 x 4 = 400 Marks

I. GENERIC/DISCIPLINE CENTRIC ELECTIVE [ECBOT401B]:

(Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) =100	Pass Marks (MSE:17 + ESE:28) =45

Instruction to Question Setter:

Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*
*The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "**Better of Two**" shall be applicable for computation of marks for SIA.*

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

A. MICROBIOLOGY AND PLANT PATHOLOGY-I

Theory: 60 Hours; Tutorial: 15 Hours

1. General symptoms of Plant Disease caused by Bacteria, Mycoplasma and Virus.
2. Koch's Postulates and its importance in identification of plant disease.
3. Classification of Gram +ve and gram -ve bacteria.
4. Microbial mechanism of pathogenicity.
5. Mechanism of Attack: Mechanical forces exerted by the pathogen on host tissues.
6. Chemical weapons of pathogens:
    a) Enzymes: Role of Enzymes in pathogenesis
    b) Toxins: Types of toxins and their role in pathogenesis.
7. Defense mechanism in plants:
    a) Structural defense mechanism
    b) Chemical defense mechanism
    c) Phenolic compounds: role in defense
    d) Phytoalexins

Books Suggested:

OR

GENERIC/ DISCIPLINE CENTRIC ELECTIVE [ECBOT401E]:

(Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) =100 **Pass Marks (MSE:17 + ESE:28) =45**

Instruction to Question Setter:

Mid Semester Examination (MSE):

*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):

*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*

*The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "**Better of Two**" shall be applicable for computation of marks for SIA.*

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

B. PLANT TAXONOMY, ETHNOBOTANY AND MEDICINAL PLANTS-I

Theory: 60 Hours; Tutorial: 15 Hours

1. The species concept: Taxonomic hierarchy, species, genus family and other categories principles used in assessing relationship, delimitation of taxa.
2. Outline of classification: Bentham & Hooker and Hutchinson system. Merits and demerits.
3. Recent trends in taxonomy with special reference to: Morphology, Anatomy, Phytochemistry, Cytology and Embryology.
4. International Code of Nomenclature for Algae, Fungi and Plants- Principles, Rules and Recommendations, Priority of publication, Typification, Rules of effective and valid publications, Retention and choice of names.
5. Taxonomical features and economic importance of the dominant Angiospermic families of Jharkhand: Magnoliaceae, Apocynaceae, Rubiaceae, Verbenaceae, Convolvulaceae, Asclepiadaceae, Scrophulariaceae, Acanthaceae, Bignoniaceae, Lamiaceae, Euphorbiaceae, Orchidaceae, Zingiberaceae, Araceae, Cyperaceae and Poaceae.
6. Definition, scope and method of study of ethnobotany.
7. Contribution of ethnic communities on traditional medicinal knowledge.
8. Preparation of herbarium including-digital herbarium.
9. Methods of conservation of valuable plants.
10. Ethnomedicinal plants used in the following diseases:

a) Diabetes
b) Jaundice
c) Malaria
d) Skin diseases
e) Gynaecological Problems

Books Suggested:

OR

GENERIC/ DISCIPLINE CENTRIC ELECTIVE [ECBOT402E]:

(Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs)= 100	Pass Marks (MSE:17 + ESE:28)= 45

Instruction to Question Setter:

Mid Semester Examination (MSE):
*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):
*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*
*The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "**Better of Two**" shall be applicable for computation of marks for SIA.*
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

a. PLANT TAXONOMY, ETHNOBOTANY AND MEDICINAL PLANTS-II

Theory: 60 Hours; Tutorial: 15 Hours

i. Outline of classification of angiosperms with their merits and demerits:
   (a) Cronquist system of classification
   (b) Angiosperm Phylogeny Group (APG) system of classification.
ii. Origin and evolution of Angiosperms.
iii. Molecular approaches in plant taxonomy: Application of DNA markers in angiosperm taxonomy, molecular phylogeny.
iv. Remote sensing – GIS.
v. Ethnic community of world. Biological conservation of ethnic society of world.
vi. Role of some Govt. and other organization involved in the promotion of ethnobotany in India.
vii. Some important National Botanical Gardens. National Parks and Herbarium Centres of India
viii. Phytochemistry and standardization of herbal drugs.
ix. Study of the following Nutraceutical and Under – utilized plants used by ethnic communities of Jharkhand state: Nutritional and medicinal values;
   Centella asiatica, Moringa oleifera, Eleusine coracana, Madhuca indica, Psidium guajava, Syzygium cumini, Annona squamosa, Carica papaya, Emblica officinalis, Boerhaavia diffusa, Aegle marmelos, Cassia tora, Ficus glabella, Dolichos biflorus, Cucumis sativus.
x. Detailed study of the following ethnomedicinal plants used by ethnic communities with floral formula, floral diagram, mode of drug preparation, dose and bioactive compounds. *Andrographis paniculata, Asparagus racemosus, Rauwolfia serpentina, Azadirachta indica, Achyranthes aspera, Catharanthus roseus, Tinospora cordifolia, Mimosa pudica, Acorus calamus, Ocimum sanctum, Curcuma longa, Stevia sp., Gymnema sylvestre, Bacopa monneri, Vitex negundo, Calotropis procera.*

Books Suggested:

v) **GE/DC PRACTICAL [EPBOT403B]:** (Credits: Practical-05)

Marks: 100 (ESE Pr: 6Hrs)	Pass Marks =45

Instruction to Question Setter:

End Semester Practical Examination (ESE Pr):

The questions in practical examination will be of equal to 70 marks and will be so framed that the students are able to answer them within the stipulated time. 20 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.

Note:
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

PRACTICAL –IV

MICROBIOLOGY & PLANT PATHOLOGY LAB

1. Make suitable stained preparations of material "A". Study the symptoms of the disease and comment upon the host parasite relationship. Identify the pathogen giving suitable diagrams and reasons. Leave your preparation for examination. 10
2. Determine the value of one small division of ocular micrometer in microns. Measure ten spores of the given material "B". Find out the average size of the material given. 08
3. Make suitable stained temporary preparations of materials "C" to exhibit the structure of the pathogen in it. Identify the pathogen giving suitable diagrams and reasons. Leave your preparation for examination. 10
4. Prepare slide of bacterial specimen "D" stain it with the Gram stain and state whether it is gram positive or gram negative. 10
5. Isolate the pathogen from the given material "E" from culture plate. 06
6. Describe the structure, make an illustrative diagram of given apparatus and describe its principle of working and uses. 06
7. Give the name of the disease and the causal organism of the specimen 1-5. 10
8. Comment upon the spots 1-5. 10
9. Practical records, Charts, Model etc. 20
10. Viva-voice. 10

II. GENERIC/DISCIPLINE CENTRIC ELECTIVE [ECBOT402B]:

(Credits: Theory-04, Tutorial-01)

Marks: 30 (MSE: 20Th. 1Hr + 5Attd. + 5Assign.) + 70 (ESE: 3Hrs) =100	Pass Marks (MSE:17 + ESE:28) =45

Instruction to Question Setter:

Mid Semester Examination (MSE):

*There will be **two** groups of questions in written examinations of 20 marks. **Group A is compulsory** and will contain five questions of **very short answer type** consisting of 1 mark each. **Group B will contain descriptive type five** questions of five marks each, out of which any three are to be answered.*

End Semester Examination (ESE):

*There will be **two** groups of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of five questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type six** questions of fifteen marks each, out of which any four are to be answered.*

Note: *There may be subdivisions in each question asked in Theory Examinations*

*The Mid Semester Examination shall have three components. (a) Two Semester Internal Assessment Test (SIA) of 20 Marks each, (b) Attendance/ regular interactions of 05 marks and (c) Seminar/ assignment of 05 marks. "**Better of Two**" shall be applicable for computation of marks for SIA.*

(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

A. MICROBIOLOGY AND PLANT PATHOLOGY-II

Theory: 60 Hours; Tutorial: 15 Hours

1. Characteristics features of plant pathogenic bacteria.
2. General characteristics of plant viruses:
   a) Classification of plant virus
   b) Structure and composition of virus
   c) Virus replication
3. Transmission of plant viruses.
4. Antigen and antibody- the immune response.
5. Antibiotics and their general mode of action and their general mode of action: an overview.
6. Management of plant diseases:
   a) Cultural methods
   b) Chemical methods
   c) Quarantine
   d) Biological control
7. Symptoms, etiology and methods of control of the following plant diseases caused by fungi, bacteria and virus:
   a) Downy mildew of maize
   b) White rust of crucifers
   c) Powdery mildew of cucurbits
   d) Ergot disease of Poaceae
   e) *Penicillium* ear rot disease in maize
   f) Loose smut of wheat
   g) Covered smut / Bunt of wheat
   h) Black stem rust of wheat (Recurrence)
   i) Wilt of arhar
   j) Red rot of sugarcane
   k) Tikka disease of groundnut

l) Bacterial blight of paddy
m) Tundu disease of wheat
n) Leaf spot of tomato
o) Bacterial bean blight
p) Bacterial stalk rot of maize
q) Gall disease of stone fruits
r) Yellow vein mosaic of bhindi
s) Tobacco mosaic
t) Rice tungro disease
u) Sugarcane mosaic disease

Books Suggested:

5/12/25

5/12/25

5/12/25

5/12/25

5/12/25

5/12/25

Rima Julie Bhaumza
5.12.2025

OR

GE/DC PRACTICAL [EPBOT403E]: (Credits: Practical-05)

Marks: 100 (ESE Pr: 6Hrs)	Pass Marks =45

Instruction to Question Setter:

End Semester Practical Examination (ESE Pr):

The questions in practical examination will be of equal to 70 marks and will be so framed that the students are able to answer them within the stipulated time. 20 marks will be awarded on the performance in viva voce whereas 10 marks will be awarded on cumulative assessment which is further subdivided as 5 marks for Practical record and 5 marks for Attendance.

Note:
(Attendance Upto75%, 1mark; 75<Attd.<80, 2 marks; 80<Attd.<85, 3 marks; 85<Attd.<90, 4 marks; 90<Attd, 5 marks).

PRACTICAL –IV

PLANT TAXONOMY, ETHNOBOTANY AND MEDICINAL PLANTS LAB

1. Workout Specimen A and identify the family and find out the botanical name of the specimen with the help of any flora. 10
2. Prepare suitable preparation of Specimen B and find out stomatal index. Draw suitable diagram and comment on your observation. 10
3. Prepare a key with suitable diagram for identification of specimen C, D and E. 12

OR

4. Comment on active principles of specimen F, G and H.
5. Identify at least two different cell tissue from macerated material F supplied to you. Comment on your observation. 08
6. Spotting - Identify herbarium 1-5 (Plants of medicinal value). 10
7. Identify the angiospermic plants on spots 6-10 (only botanical names and family). 10
8. Spotting – Give botanical name family and uses of Specimens 11-15 (Plants of Ethnomedicinal Values). 10
9. Practical record, Charts, Model, Specimen, Field report etc. 20
10. Viva-voice. 10

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w) **CORE COURSE (PROJECT) [PRBOT404]:** (Credits: 05)

Marks: 100 (ESE: 3Hrs)= 100	Pass Marks =45

Guidelines to Examiners for

End Semester Examination (ESE):

Overall project dissertation may be evaluated under the following heads:

- *Motivation for the choice of topic*
- *Project dissertation design*
- *Methodology and Content depth*
- *Results and Discussion*
- *Future Scope & References*
- *Participation in Internship programme with reputed organization*
- *Application of Research technique in Data collection*
- *Report Presentation*
- *Presentation style*
- *Viva-voce*

The distribution of marks will be as follows:

1.	*Assessment of Project Thesis.*	*70*
2.	*Describe in brief your work on project with its significance.*	*10*
3.	*Eminent Scientists related to your project work Scientific Journals related to your project work.*	*10*
4.	*Viva-voice.*	*10*

PROJECT WORK

Each student **must** submit two copies of the dissertation work duly forwarded by the **Head of the Department and duly signed by the supervisor concerned.** The forwarded copies will be submitted in the Department of Botany, Ranchi University, for evaluation (Seven days before the seminar).

Topics

Each students shall have to complete a project work on any topic of his choice, but relevant to a topic from the concerned special paper, or on a topic allotted by his/her Project Guide/ Supervisor/ Department in Semester -IV.

The topic of project should be completed under following heads:

1. Introduction
2. Review literature
3. Materials and Methods
4. Results
5. Discussion
6. Reference

The practical of project should be completed either in the Departmental laboratory/Institution.

NB:- Students will select topics for the project work in consultation with a teacher of the department. The Seminar will be held in the Department of Botany, Ranchi University, Ranchi.

Rima Jyoti Bhaunza 5.12.2025

DISTRIBUTION OF CREDITS FOR P.G. PROGRAMME (SEMESTER-WISE) FOR POSTGRADUATE 'P.G. Voc./M.Sc./M.A./M. Com' PROGRAMME

Table B-1: Semester wise distribution of 80 Credits for Subjects with Practical Papers.

Semester	CC	FC	GE/DC	AE	Total credits
Semester I	15	05			20
Semester II	20				20
Semester III	15			05	20
Semester IV	5		15		20
	55	**05**	**15**	**05**	**80**

Table B-1: Semester wise distribution of 80 Credits for Subjects without Practical Papers.

Semester	CC	FC	GE/DC	AE	Total credits
Semester I	15	05			20
Semester II	20				20
Semester III	15			05	20
Semester IV	10		10		20
	60	**05**	**10**	**05**	**80**

CC=Core Course; FC=Foundation Compulsory/Elective Course; GE=Generic Elective; SE=Skill Enhancement Course; DC=Discipline Centric Elective

SAMPLE CALCULATION FOR SGPA & CGPA FOR POSTGRADUATE 'P.G. Voc./M.Sc./M.A./M. Com' PROGRAMME

Table B-2: Sample calculation for SGPA for M.Sc./M.A./M. Com Programme

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit X Grade)	SGPA (Credit Point/Credit)
Semester I					
FC	05	A	8	40	
C-1	05	B+	7	35	
C-2	05	B	6	30	
C-3/CP	05	B	6	30	
Total	**20**			**135**	**6.60 (135/20)**
Semester II					
C-4	05	B	6	30	
C-5	05	C	5	25	
C-6	05	B+	7	35	
C-7/CP	05	A+	9	45	
Total	**20**			**135**	**6.60 (135/20)**
Semester III					
EC-1	05	A+	9	45	
C-8	05	0	10	50	
C-9	05	A	8	40	
C-10/CP	05	A	8	40	
Total	**20**			**175**	**8.75 (175/20)**
Semester IV					
EC-2/EC-2	05	B	6	30	
EC-3/EC-3	05	A+	9	45	
C11/EP	05	B	6	30	
Project	05	A+	9	45	
Total	**20**			**150**	**7.50 (150/20)**
CGPA					
Grand Total	**80**			**595**	**7.44 (595/80)**

Table B-3: Sample calculation for CGPA for P.G. Vocational M.Sc./M.A./M. Com Programme

Semester I	Semester II	Semester III	Semester IV
Credit:20; SGPA:6.60	Credit:20; SGPA: 6.60	Credit:20; SGPA: 8.75	Credit:20; SGPA: 7.50

Thus CGPA= (20x6.60+20x6.60+20x8.75+20x7.50) /80=**7.36**

Rima Julie Bhaumik
5.12.2025

DISTRIBUTION OF MARKS FOR EXAMINATIONS AND FORMAT OF QUESTION PAPERS

Distribution of Marks for Mid Semester Evaluation:

Table No. 15: Distribution of marks of Theory Examinations of Mid Semester

Topic	Code	Full Marks	Pass Marks	Time	Group-A (Very short answer type Compulsory Questions) No. of Questions x Marks = F.M.	Group-B (Descriptive Questions) No. of Questions x Marks = F.M.	Total No. of Questions to Set	
							Group A	Group B
Mid Sem*	T30*	30 (20 +5 +5)	17	1 Hr	5 x1 =5	3 (out of 5) x5 =15	05	5

***There shall be 20 marks theory examination for mid semester, 05 marks for attendance/ regular interactions & 05 marks for seminar/ assignment/ term paper given by faculty concerned in classrooms.**

Distribution of Marks for End Semester Theory Examinations:

Table No. 16: Marks distribution of Theory Examinations of End Semester

Topic	Code	Full Marks	Pass Marks	Time	Group-A# (Very short answer type Compulsory Questions) No. of Questions x Marks = F.M.	Group-B (Descriptive Questions) No. of Questions x Marks = F.M.	Total No. of Questions to Set	
							Group A#	Group B
End Sem	T50	50	--	3 Hrs	2 x5 =10	2 (out of 3) x20 =40	2	3
	T70	70	28	3 Hrs	Q.No.1 (5x1) + 1x5 =10	4 (out of 6) x15 =60	2	6

 # Question No.1 in Group-A carries very short answer type questions of 1 Mark

Note : There may be subdivisions in each question asked in Theory Examinations.

FORMAT OF QUESTION PAPER FOR MID SEM EXAMINATION

20 MARKS

St. Xavier's College, Ranchi
(Autonomous) Ranchi University, Ranchi

Mid Sem Exam Year

Subject/ Code

F.M. =20 **Time**=1Hr.

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.

Group A

1 .....
3. .....
4. .....
5. .....
..... [5x1=5]

Group B

.....
.....
6. ..... [5]
7. ..... [5]
8. [5]
9. [5]
10. ..... [5]

Note: There may be subdivisions in each question asked in Theory Examination.

FORMAT OF QUESTION PAPER FOR END SEM EXAMINATION

70 MARKS

St. Xavier's College, Ranchi
(Autonomous) Ranchi University, Ranchi

End Sem Exam Year

Subject/ Code

F.M. =70 **P.M.**=28 **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.

Group A

1. [5x1=5]

   i. .....
   ii. .....
   iii. .....
   iv. .....
   v. .....

2. ..... [5]

Group B

3. ..... [15]
4. ..... [15]
5. ..... [15]
6. ..... [15]
7. ..... [15]
8. ..... [15]

Note: There may be subdivisions in each question asked in Theory Examination.

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