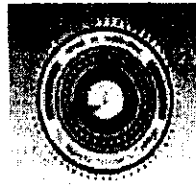


RANCHI WOMEN'S COLLEGE,
RANCHI
(Autonomous College)



Constituent Unit
of
Ranchi University, Ranchi

Courses of Study
For
M.Sc. Botany

From 2013 onwards
(Under Semester System)

M.Sc. Part-I

FIRST SEMESTER

- Core Course – 1 (Theory) BOT 101 : Biology and diversity of Algae, Fungi and Lichens
- Core Course – 2 (Theory) BOT 102 : Biology and Diversity of Bryophytes, Pteridophytes, Gymnosperms and Fossils
- Core Course – 3 (Theory) BOT 103 : Microbiology
- Core Course – 4 (Theory) BOT 104 : Cell and Molecular Biology of Plants
- Core Course – 5 (Practical) BOT 105 : Practical's Based on Course 1 and 2
- Core Course – 6 (Practical) BOT 106 : Practical's Based on Course 3 and 4

SECOND SEMESTER

- Core Course – 7 (Theory) BOT 201 : Taxonomy of Angiosperms and brief knowledge of Ethnobotany and Medicinal plants
- Core Course – 8 (Theory) BOT 202 : Genetics and Cytogenetics
- Core Course – 9 (Theory) BOT 203 : Plant physiology
- Core Course – 10 (Theory) BOT 204 : Plant Biochemistry
- Core Course – 11 (Practical) BOT 205 : Practicals Based on Core Course 7 and 8
Taxonomy, Cytogenetics, Economic Botany, Anatomy & Embryology
- Core Course – 12 (Practical) BOT 206 : Practical's Based on Course 9 and 10 including field work
Plant Physiology and Biochemistry, Plant Ecology

M.Sc. Part-II

THIRD SEMESTER

- Core Course – 13 (Theory) BOT 301 : Fundamental Ecology, Applied Ecology and Biodiversity
- Core Course – 14 (Theory) BOT 302 : Anatomy, Embryology and Plant Resource.
- Elective Course – 15 (Theory) BOT 303 : Special paper – I (303A, 303B)
- Elective Course – 16 (Theory) BOT 304 : Special paper – II (304A, 304B)
- Elective Course – 17 (Practical) BOT 305 : Practicals (Elective) (305A, 305B)
- Elective Course – 18 (Practical) BOT 306 : Practicals (Elective) (306A, 306B)

FOURTH SEMESTER

- Core Course – 19 (Theory) BOT 401 : Biochemical, Molecular Techniques and Biostatistics
- Elective Course – 20 (Theory) BOT 402 : Special Paper III (402A, 402B)
- Elective Course – 21 (Theory) BOT 403 : Special Paper IV (403A, 403B)
- Elective Course – 22 (Theory) BOT 404 : Special Paper V (404A, 404B)
- Elective Course – 23 (Practical) BOT 405 : Practicals Based on courses 20, 21 and 22 (Elective course BOT 405A, BOT 405B)
- Dissertation/Project work-24 (Practical) : Project Dissertation (BOT 406A, BOT 406B)
BOT 406

ELECTIVE/SPECIAL PAPERS

1. ALGOLOGY
2. CYTOGENETICS, PLANT BREEDING, MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Kumar
27/8/13
Anand
Sharan
27.8.13
Kishor
27/8/13
Manoj
27/8/13
Praveen
27/8/13
A.P. Kumar
27.8.13

TABLE – I FIRST SEMESTER

| Sl. No. | Course Components | Course Paper | Inst. Hours Per Week | Credit hrs | Tutorial Per week | Max Marks | |
|---------|----------------------------|--------------|----------------------|------------|-------------------|------------|-----------|
| | | | | | | Univ. Exam | Sessional |
| 1. | Core Paper – 1 (Theory) | BOT 101 | 3 | 3 | 1 | 75 | 25 |
| 2. | Core Paper – 2 (Theory) | BOT 102 | 3 | 3 | 1 | 75 | 25 |
| 3. | Core Paper – 3 (Theory) | BOT 103 | 3 | 3 | 1 | 75 | 25 |
| 4. | Core Paper – 4 (Theory) | BOT 104 | 3 | 3 | 1 | 75 | 25 |
| 5. | Core Paper – 5 (Practical) | BOT 105 | 6 | 3 | 0 | 75 | 25 |
| 6. | Core Paper – 2 (Practical) | BOT 106 | 6 | 3 | 0 | 75 | 25 |

TABLE – II SECOND SEMESTER

| Sl. No. | Course Components | Course Paper | Inst. Hours Per Week | Credit hrs | Tutorial Per week | Max Marks | |
|---------|-----------------------------|--------------|----------------------|------------|-------------------|------------|-----------|
| | | | | | | Univ. Exam | Sessional |
| 1. | Core Paper – 7 (Theory) | BOT 201 | 3 | 3 | 1 | 75 | 25 |
| 2. | Core Paper – 8 (Theory) | BOT 202 | 3 | 3 | 1 | 75 | 25 |
| 3. | Core Paper – 9 (Theory) | BOT 203 | 3 | 3 | 1 | 75 | 25 |
| 4. | Core Paper – 10 (Theory) | BOT 204 | 3 | 3 | 1 | 75 | 25 |
| 5. | Core Paper – 11 (Practical) | BOT 205 | 6 | 3 | 0 | 75 | 25 |
| 6. | Core Paper – 12 (Practical) | BOT 206 | 6 | 3 | 0 | 75 | 25 |

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TABLE – III THIRD SEMESTER

| Sl. No. | Course Components | Course Paper | Inst. Hours Per Week | Credit hrs | Tutorial Per week | Max Marks | |
|---------|---------------------------------|--------------|----------------------|------------|-------------------|------------|-----------|
| | | | | | | Univ. Exam | Sessional |
| 1. | Core Paper – 13 (Theory) | BOT 301 | 3 | 3 | 1 | 75 | 25 |
| 2. | Core Paper – 14 (Theory) | BOT 302 | 3 | 3 | 1 | 75 | 25 |
| 3. | Elective Paper – 15 (Theory) | BOT 303 | 3 | 3 | 1 | 75 | 25 |
| 4. | Elective Paper – 16 (Theory) | BOT 304 | 3 | 3 | 1 | 75 | 25 |
| 5. | Elective Paper – 17 (Practical) | BOT 305 | 6 | 3 | 0 | 75 | 25 |
| 6. | Elective Paper – 18 (Practical) | BOT 306 | 6 | 3 | 0 | 75 | 25 |

TABLE – IV FOURTH SEMESTER

| Sl. No. | Course Components | Course Paper | Inst. Hours Per Week | Credit hrs | Tutorial Per week | Max Marks | |
|---------|---|--------------|----------------------|------------|-------------------|------------|-----------|
| | | | | | | Univ. Exam | Sessional |
| 1. | Core Paper – 19 (Theory) | BOT 401 | 3 | 3 | 1 | 75 | 25 |
| 2. | Elective Paper – 20 (Theory) | BOT 402 | 3 | 3 | 1 | 75 | 25 |
| 3. | Elective Paper – 21 (Theory) | BOT 403 | 3 | 3 | 1 | 75 | 25 |
| 4. | Elective Paper – 22 (Theory) | BOT 404 | 3 | 3 | 1 | 75 | 25 |
| 5. | Elective Paper – 23 (Practical) | BOT 405 | 6 | 3 | 0 | 75 | 25 |
| 6. | Project/Dissertation Paper – 24 (Practical) | BOT 406 | 6 | 3 | 0 | 75 | 25 |

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CONTENTS

| <u>Course</u> | | <u>Page No.</u> |
|----------------------------|-------------------|-----------------|
| Core Course -1 (Theory) | BOT 101 | 1 |
| Core Course -2(Theory) | BOT 102 | 2 |
| Core Course -3(Theory) | BOT 103 | 3 |
| Core Course -4(Theory) | BOT 104 | 4 |
| Core Course -5(Practical) | BOT 105 | 5 |
| Core Course -6(Practical) | BOT 106 | 5 |
| Core Course -7(Theory) | BOT 201 | 6 |
| Core Course -8(Theory) | BOT 202 | 7 |
| Core Course -9(Theory) | BOT 203 | 8 |
| Core Course -10(Theory) | BOT 204 | 9 |
| Core Course -11(Practical) | BOT 205 | 10 |
| Core Course -12(Practical) | BOT 206 | 10 |
| Core Course -13(Theory) | BOT 301 | 11 |
| Core Course -14(Theory) | BOT 302 | 12 |
| Core Course -15(Theory) | BOT 303A | 13 |
| Core Course -15(Theory) | BOT 303B | 14 |
| Core Course -16(Theory) | BOT 304A | 15 |
| Core Course -16(Theory) | BOT 304B | 16 |
| Core Course -17(Practical) | BOT 305A and 305B | 17 |
| Core Course -18(Practical) | BOT 306A and 306B | 17 |
| Core Course -19(Theory) | BOT 401 | 18 |
| Core Course -20(Theory) | BOT 402A | 19 |
| Core Course -20(Theory) | BOT 402B | 20 |
| Core Course -21(Theory) | BOT 403A | 21 |
| Core Course -21(Theory) | BOT 403B | 22 |
| Core Course -22(Theory) | BOT 404A | 23 |
| Core Course -22(Theory) | BOT 404 B | 24 |
| Core Course -23(Practical) | BOT 405A and 405B | 25 |
| Core Course -24(Practical) | BOT 406 | 26 |



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- A signature that appears to be "Harsh" with a long horizontal line extending to the left.
- A signature that appears to be "Anshu" with a long horizontal line extending to the left.
- A signature that appears to be "Manoj" with a long horizontal line extending to the left.
- A signature that appears to be "Sharan" with the date "27.8.13" written below it.
- A signature that appears to be "K. Lal" with a long horizontal line extending to the left.
- A signature that appears to be "S. P. Chandra" with the date "27/8/13" written below it.
- A signature that appears to be "S/W" with the date "27.8.13" written below it.
- A signature that appears to be "K. Lal" with a long horizontal line extending to the left.
- A signature that appears to be "Anshu" with the date "27.08.13" written below it.

M.Sc. Part – I

FIRST SEMESTER

CORE COURSE – 01**(Course Paper BOT 101)****BIOLOGY AND DIVERSITY OF ALGAE, FUNGI & LICHENS****F. M. – 75****P. M. – 30****Lecture Hrs – 45**

Candidates are required to answer questions as far as practicable in their own words within **THREE** hours. Question **One** is short-type and compulsory. Ten short type questions covering the whole syllabus are to be set- **five** questions are to be answered (5 x 5 = 25 Marks). Ten long type questions are to be set-Five from group A and Five from group B. Candidates are required to answer **four** questions – **two** from each group (12.5 x 4 = 50 Marks).

GROUP – A : PHYCOLOGY

1. Algae in diversified habitats (terrestrial, freshwater, marine)
2. Classification of algae as proposed by Round
3. Range of thallus structure and reproduction in (a) Cyanophyta (b) Chlorophyta (c) Charophyta (d) Phaeophyta (e) Rhodophyta
4. General conception of life cycle patterns in algae.
5. Algal blooms.
6. Algal biofertilizers.
7. Use of algae as food and feed, role of algae in industry.

GROUP – B : FUNGI AND LICHEN

1. Classification of Fungi as proposed by Ainsworth
2. General account of the following sub-divisions with special reference to the orders mentioned against them:
 - (a) Mastigomycotina – Peronosporales
 - (b) Zygomycotina – Mucorales
 - (c) Ascomycotina – Erysiphales
 - (d) Basidiomycotina – Uredinales, Ustilaginales, Agaricales.
 - (e) Deuteromycotina – Moniliales
3. Heterothallism and parasexuality
4. Importance of fungi in agriculture and industry
5. Symptoms, etiology and disease management of the following
 - (a) Early Blight of Potato.
 - (b) Tikka Disease of Groundnut.
 - (c) Wilt of Arhar
 - (d) Red Rot of Sugarcane.
6. Lichens – Thallus structure, reproduction and economic importance.

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Dharan
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K. Lal

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SA
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SVS
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S. Kumar
27.8.13

Shanku

CORE COURSE – 02**(Course Paper BOT 102)****BIOLOGY AND DIVERSITY OF BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS
AND FOSSILS****F. M. – 75****P. M. – 30****Lecture Hrs – 45**

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. Question no. 1 is short-type and compulsory. **TEN** questions covering the whole syllabus are to be set- **Five** questions are to be answered 05 marks each (5 x 5). **NINE** long type questions are to be set-three from each group A, B and C. Candidates are required to answer **Four** questions, selecting at least **ONE** question from each group (12.5 x 4 = 50 Marks).

GROUP – A : BRYOPHYTES

1. Classification of Bryophytes
2. Thallus organization in Hepaticopsida, Anthocerotopsida & Bryopsida
3. Sporophyte evolution in Bryophytes
4. Distribution of photosynthetic tissues in Bryophytes
5. Progressive sterilization of sporogenous tissue in Bryophytes

GROUP – B : PTERIDOPHYTA

1. Classification of Pteridophytes
2. Origin and evolution of sporophyte in pteridophyte – Telome Concept
3. Evolution of stele in Pteridophytes
4. Heterospory and Seed Habit
5. Main features in Morphology, Anatomy, Life History and affinities of the following orders :-
 - (a) Psilopsida
 - (b) Lycopsidea
 - (c) Sphenopsida
 - (d) Pteropsida

GROUP – C : GYMNOSPERMS AND FOSSILS

1. Classification, Distribution and Economic Importance of Gymnosperms
2. Structure and reproduction in Pteridospermales , Bennettitales , Cycadales , Ginkgoales , Coniferales , Gnetales , Ephedrales and Welwitschiales
3. Fossil- Mode of preservation, Geological time table, Distribution and examples of Indian Fossils

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Dharan
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Apurva
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K. Lal
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J. S. S.
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S. S. S.
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Shelley
Shelley

CORE COURSE – 03
(Course Paper BOT 103)
MICROBIOLOGY

F. M. – 75
P. M. – 30
Lecture Hrs – 45

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; Eight questions are to be set, out of which FOUR are to be answered, of 12.5 marks each (12.5 x 4 = 50 Marks).

1. Structure and Reproduction in Bacteria.
2. Economic importance of Bacteria.
3. Mechanism of conjugation, transformation & transduction.
4. Bacteriophage – Structure and ~~plant~~ multiplication.
5. Methods of transmission of plant viruses.
6. Economic importance of plant viruses.
7. General Account of Mycoplasma and its role in causing plant diseases.
8. Important plant diseases caused by plant pathogenic bacteria :
 - (i) Citrus Canker
 - (ii) Bacterial Blight of Paddy.
9. Important plant diseases caused by plant viruses :
 - (i) Leaf curl of Papaya
 - (ii) Leaf curl of Tomato

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S. S. S.
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R. S. S.

S. S. S.
27-8-13

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27-8-13

S. S. S.
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S. S. S.

CORE COURSE – 04

(Course Paper BOT 104)

CELL AND MOLECULAR BIOLOGY OF PLANTS

F. M. – 75

P. M. – 30

Lecture Hrs – 45

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; **Eight** questions are to be set, out of which **FOUR** are to be answered of 12.5 marks each (12.5 x 4 = 50 Marks).

1. Prokaryotic and Eukaryotic cells
2. **Nucleus** : Structure, organization of nuclear pore, DNA structure A, B & Z forms, replication transcription, promoters and transcription factors, splicing, mRNA transport, structure and role of tRNA
3. **Chloroplast** : Structure, genome organization, gene expression, RNA editing, nucleochloroplastic interaction
4. **Mitochondria** : Structure, genome organization, biogenesis
5. **Other cellular organelles** : Structure and function of microbodies, Golgi apparatus, Endoplasmic reticulum.
6. **Ribosome** : Structure, site of protein synthesis, mechanism of translation
7. **Plant vacuole** : Tonoplast membrane; ATPases, transporters as storage organelles
8. **Protein sorting** : Targeting of proteins to organelles
9. **Cell shape and motility** : The cytoskeleton, organization and role of microtubules

A. 27.8.13
 Anuran 27.8.13
 M. 27.8.13
 SWS 27.8.13
 K. Lal
 Anur 27.08.13
 S. P. Kumbhar 27/8/13
 A. K.

CORE COURSE – 05 : PRACTICAL**(Course Paper BOT 105)****Based on Core Course 01 and 02****(Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms,
Lichens, Biology and diversity of Bryophytes, Pteridophytes,
Gymnosperms and fossils)****F. M. – 75****P. M. – 30****Time 6 hrs****CORE COURSE – 06 : PRACTICAL****(Course Paper BOT 106)****Based on Core Course 03 and 04****(Microbiology, Cell and Molecular Biology of plants)****F. M. – 75****P. M. – 30****Time 6 hrs***Sharan*
*27.8.13**S. K. Sankar*
*27.8.13**Manish*
*27.8.13**Kal**Shella**Shreya**Pranav**As*
27.8.13

M.Sc. Part – I

SECOND SEMESTER

M. Sc. II Semester

CORE PAPER – 08**(Course Paper BOT 202)****GENETIC AND CYTOGENETICS****F. M. – 75****P. M. – 30****Lecture Hrs – 45**

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. **Chromatin organization** : Chromosome structure and packaging of DNA, histone, euchromatin , heterochromatin , chromosome banding and karyotype study
2. **Cell division and cell cycle** : Mitosis and meiosis, their regulation, steps in cell cycle and control of cell cycle.
3. **Structural alterations in chromosomes** : Deficiency , Duplication , Inversion, Translocation heterozygotes and their behaviour during meiosis .
4. **Structure and numerical alteration in chromosomes** : Origin occurrence, production and meiosis of haploids.

Aneu-and euploid : Introduction and characterization of monosomics, trisomic, origin and production of autopolyploids; allopolyploids, status of allopolyploids in plant evolution.
5. **Mutation** : Type, causes and detection, mutant type : lethal, conditional, biochemical, loss of function, germinal versus somatic mutants, molecular basis of mutation, Physical and chemical mutagenesis
6. **Molecular cytogenetics** : Nuclear DNA content, C-value paradox, nuclear acid denaturation and renaturation. Introns and RNA splicing repetitive DNA split gene overlapping gene, regulation of gene expression in prokaryotes and eukaryotes.

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- A signature that appears to be 'Manu' with the date '27.8.13' written below it.
- A signature that appears to be 'Darshan' with the date '27.8.13' written below it.
- A signature that appears to be 'K. Kar' with the date '27.8.13' written below it.
- A signature that appears to be 'S. S.' with the date '27.8.13' written below it.
- A signature that appears to be 'S. P. Chandra' with the date '27.8.13' written below it.
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M. Sc. II Semester

CORE PAPER – 09
(Course Paper BOT 203)

PLANT PHYSIOLOGY

F. M. – 75

P. M. – 30

Lecture Hrs – 45

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. **TRANSPIRATION:** Types of Transpiration, Evaporation and Transpiration, Mechanism of Transpiration and Stomatal, Physiology, Factors Affecting the Rate of Transpiration, Significance of Transpiration, Antitranspirant, Measurement of Transpiration.
2. **MINERAL NUTRITION :** Criteria of Essentiality, Chemical Analysis, Detection of Mineral Elements, General Functions of Essential Elements, Some Specific Function of Essential Elements and their Deficiency Symptoms.
Mineral Salt Absorption Non-mediated and Passive uptake, Mediated transport, Metabolic or Active uptake, Mineral nutrition Acquisition and Transport.
3. **TRANSLOCATION IN PLANT :** Phloem Transport : Phloem Sap Composition, Movement in Plant, Direction of Movement, Bidirectional Movement, Laterla Movement, Source- Sink relationship, Phloem loading, Phloem Unloading, Mechanism of Phloem Transport – Electroosmosis, Protoplasmic Streaming, Contractile Protein Variants, Mass Flow Hypothesis, factors Affective Translocation.
4. **PHYTOHORMONE :** History, Structure, Biosynthesis physiological Response and Mechanism of Action of Auxins, Gibberellins, Cytokinins, Ethylene and Abscisic Acid.
5. **MICROPROPAGATION :** Techniques, multiplication by Axillary and Apical Shoots, Multiplication Through Callus embryo Cultures, factors Affecting Shoot Multiplication.
6. **PHYSIOLOGY OF FLOWERING :** Photoperiodism and vernalization.
7. **SEED DORMANCY AND GERMINATION :** Definition, Types, Mechanism and methods breaking the Dormancy.

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D. R. S.
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M. Sc. II Semester

CORE PAPER – 10
(Course Paper BOT 204)

F. M. – 75
P. M. – 30
Lecture Hrs – 45

PLANT BIOCHEMISTRY

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. **BIOMOLECULES** : Structure and Function of Primary Metabolites- Carbohydrates, fats and Proteins.
2. **PHOTOSYNTHESIS** : The Pigment System, Light Reaction, Dark (C₃ Cycle). Hatch and Slack Pathway (C₄ Cycle), Photorespiration and Factors Affecting Rate of Photosynthesis.
3. **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.
4. **ENZYMES** : Nomenclature and Classification, Nature, Properties, Enzyme Energetic, Mode and Mechanism of action, Factors Affecting Enzyme Activities.
5. **NITROGEN METABOLISM** : Nitrogen Fixation : Non-biological Fixation; Biological Fixation – Symbiotic Nitrogen Fixers, Non- symbiotic Nitrogen Fixers, Biochemistry of Nitrogen Fixation.
6. **LIPID METABOLISM** : Simple Lipids, Complex Lipids, Neutral Fats, Fatty Acids, Enzymatic Degradation of Fats, B-Oxidation of Fatty Acid and Oxidation of Fatty Acids, Biosynthesis of Fatty Acids.

A collection of handwritten signatures and dates from students, including:

- Signature: [unclear], Date: 27-8-13
- Signature: Dragan, Date: 27-8-13
- Signature: [unclear], Date: 27-8-13
- Signature: K. Jay, Date: 24-8-13
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M. Sc. II Semester

CORE PAPER – 11 : PRACTICAL

(Course Paper BOT 205)

Based on Course 7 and 8

(Taxonomy, Cytogenetics, Economic Botany, Embryology and Anatomy)

F. M. – 75

P. M. – 30

Time 6 hrs

M. Sc. II Semester

CORE PAPER – 12 : PRACTICAL

(Course Paper BOT 206)

Based on Course 09 and 10

(Plant Physiology and Biochemistry and Plant Ecology)

F. M. – 75

P. M. – 30

Time 6 hrs

Dharam
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Manoj
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K. Lal

Prasanna

Sus
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Prabhu
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Shree

Shelli

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M.Sc. Part – II

THIRD SEMESTER

M. Sc. III Semester

CORE PAPER – 13
(Course Paper BOT 301)

**FUNDAMENTAL ECOLOGY, APPLIED ECOLOGY
AND BIODIVERSITY**

F. M. – 75

P. M. – 30

Lecture Hrs – 45

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50 Marks).

1. Ecological succession : Type and mechanisms of ecological successions; Change in ecological properties during succession.
2. Ecosystem organization : Types, Structure and function, flow of energy; biogeochemical cycles of C, N, P, S; mineral cycles (pathway, processes); primary production, decomposition and food chain, food web of different types of ecosystems : Terrestrial (Forest and grassland) and aquatic (Freshwater); and Ecological pyramids.
3. Air, Water, Soil, Sound and radiation pollutions : Kinds, Sources, Quality parameters, effect on plants & ecosystem and control measures.
4. Climate Change (Global Environmental problems) : Global warming, Green house effect (gases : CO₂, CH₄, H₂O, CFC₂ : 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.
5. Ecological management : concept; sustainable developments, sustainability indicators.
6. Plant biodiversity: concept and levels; role of biodiversity in ecosystems functions and stability, IUCN categories of threat and principles of conservation.

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Dharan
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K. Lal

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M. Sc. III Semester

CORE PAPER – 14

(Course Paper BOT 302)

**ANATOMY, EMBRYOLOGY AND PLANT
RESOURCE**

F. M. – 75

P. M. – 30

Lecture Hrs – 45

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. Question no. 01 is short type compulsory. TEN questions covering the whole syllabus are to be set – FIVE questions are to be answered of 05 marks each (5 x 5). NINE long type questions are to be set – three from each group A, B and C. Candidates are required to answer FOUR questions, selecting at least ONE question from each group (12.5 x 4 = 50).

GROUP – A : ANATOMY

Shoot Development and theories of shoot Apex organization.

Organization of root Apical Meristem

Mechanical Tissues and their Distribution

Cambium

Anomalous Secondary growth with reference *Dracaena* stem, *Tinospora* root, *Bignonia*, and *Strychnos* stems.**GROUP – B : EMBRYOLOGY**

Microsporogenesis and Microgametophyte.

Megasporogenesis and Megagametophyte.

Fertilization

Endosperm type, physiology and cytology of endosperm.

Polyembryony – adverntative embryony, false embryony, twins & triplets.

Sexual incompatibility

Apomixis.

Embryology in relation to taxonomy.

Experimental Embryology : Anther, Ovary, Ovule, Endosperm and Embryo culture.

GROUP – C : PLANT RESOURCES AND UTILIZATION

1. Economic Botany : Food , fibre , beverages , timber , tannins , dyes , resins , vegetables , fruits , spices and oil yielding plants .
2. Medicinal and aromatic plants
3. Forage and fodder plants

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SPECIAL THEORY PAPER : ALGOLOGY

ELECTIVE COURSE :15 A

(Elective Course Paper BOT 303 A)

F.M. – 75

P.M.-30

Lecture Hrs – 45

Paper – I

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. Prokaryotic Algae
2. Cyanophyceae: Cell structure, Heterocysts, thallus organization and reproduction
3. Genetic organisation of Cyanophyceae
4. Commercial production of *Spirulina*
5. Algal Biotechnology: Recent biotechnological developments with algae as experimental material
6. Nitrogen fixation by Cyanophyceae
7. Tolerance in Cyanophyceae against desiccation and UV radiation

Madan
27.8.13
Harek
Anita

Special

Praran
27.8.13

27.8.13

SWS
27.8.13

K. Jay
Shikhar

Shikhar
27.8.13

**SPECIAL THEORY PAPER : CYTOGENETICS, PLANT BREEDING, MOLECULAR BIOLOGY
& BIOTECHNOLOGY**

ELECTIVE COURSE – 15 B

(Elective Course Paper BOT 303B)

F. M. – 75

P. M. – 30

Lecture Hrs – 45

PAPER – I : CYTOGENETICS

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. Structure and organization of the nucleus.
2. Structure and Organization of Chromosomes
3. Accessory chromosomes : Structure, cytological behaviour, significance, and effects.
4. Special types of Chromosomes
5. Heterochromatin.
6. Chromosome banding.
7. Karyotype analysis and karyotype evolution.
8. Molecular basis of chromosome pairing.
9. Microbial genetics; Method of genetic transformation Conjugation, transduction and sex-duction.

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27.8.13

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SPECIAL THEORY PAPER : ALGOLOGY

ELECTIVE COURSE – 16 A

(Elective Course Paper BOT 304A)

F. M. – 75

P. M. – 30

Lecture Hrs – 45

PAPER – II

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. Classification of Algae by Fritsch, Round and Chapman
2. Algae of diverse habitats (Terrestrial, Fresh water and Marine), Epiphytic and parasitic algae
3. Cell structure of algae: Cell wall components, Flagella, Plastids and Reserve food
4. Nuclear characteristics and chromosome studies with special reference to Green algae
5. Green algae: Evolutionary trends in thallus structure, life cycle patterns and reproduction
6. Commercial production of *Chlorella* and *Scenedesmus*

Medha 27.8.13
 Farah
 Dhavan 27.8.13
 K. Lal
 Anshu
 Srus 27.8.13
 A. P. Kulkarni 27.8.13
 Anshu 27.08.13

M. Sc. III Semester

**SPECIAL THEORY PAPER :
CYTOGENETICS, PLANT BREEDING, MOLECULAR BIOLOGY & BIOTECHNOLOGY**

Special Paper – 16B

(Elective Course Paper BOT 304B)

F. M. – 75

P. M. – 30

Lecture Hrs – 45

PAPER – II : MOLECULAR GENETICS

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. Mutation : Spontaneous and induced mutation
Mutagens and mechanism of mutation.
2. Effect of various kinds of radiations on plant cell, chromosome and DNA.
3. Insertion elements and transposons : Transposons in prokaryotes, mechanism of transposition, genetic organization of TnA and its role in transposition
4. DNA replication in and eukaryotes.
5. RNA processing, RNA splicing. RNA editing and ribozymes.
6. Genetic engineering : Restriction endonucleases, Isolation DNA. Gene cloning vectors, plasmids, cosmids, phagemids, bacteriophages, PCR (cloning and amplification of DNA). DNA and genomic library, transgenic plants.

Maddu
27.8.13

Sharan
27.8.13

Shella

Prudh

Prudh
27.8.13

27.8.13

Khal

SWS
27.8.13

S. Balakrishna
27.8.13

Shankar
27.08.13

M. Sc. III Semester :

ELECTIVE COURSE – 17 (PRACTICAL)

BOT 305

Practicals (BOT 305A AND BOT 305B) based on Elective papers

F. M. – 75

P. M. – 30

Time – 6 Hrs.

M. Sc. III Semester

ELECTIVE COURSE – 18 (PRACTICAL)

BOT 306

Practicals (BOT 306A AND BOT 306B) based on Elective papers

F. M. – 75

P. M. – 30

Time – 6 Hrs.

~~M. Sc.~~
27-8-13

~~Sharan~~
27-8-13

~~SS~~
27-8-13

~~K. Lal~~

~~Sharma~~
27-8-13

~~Sharma~~
27-08-13

~~Sharma~~
27-8-13

M.Sc. Part – II

FOURTH SEMESTER

M. Sc. Semester –IV

CORE PAPER - 19

(Course Paper BOT 401)

BIOTECHNOLOGY, MOLECULAR TECHNIQUES AND BIOSTATISTICS

F. M. – 75

P. M. – 30

Lecture Hrs – 45

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. Basic concept of Spectrophotometer and Electron microscope.
2. Chromatography : Paper, capillary, column, HPLC, HPLC-MS, GLC – basis concept, NMR.
3. Elementary concepts of electrophoresis : Polyacrylamide gel electrophoresis (PAGE), agarose gel electrophoresis.
4. Isolation and Purification : (a) genomic and plasmid DNA (b) RNA.
5. Blotting : Principles, types of blotting, blotting membranes, immunoblotting – Southern, Northern, Western and Dot blots.
6. DNA sequencing : Various methods of DNA sequencing and finger printing.
7. DNA Silencing : RNA interference (RNAi).
8. Biostatistics : Mean , Median , Mode , Standard Deviation and error , Correlation and tTest , Chi – square test

M. Anand
27.8.13

Sharan
27.8.13

A. S. S.

T. S.

P. S.
27.8.13

S. S.
27.8.13

S. S.
27.8.13

V. S.
27.8.13

S. S.
27.8.13

M. Sc. Semester –IV

SPECIAL THEORY PAPER : ALGOLOGY

ELECTIVE COURSE – 20 A

(Elective Course Paper BOT 402 A)

F. M. – 75

P. M. – 30

Lecture Hrs – 45

PAPER -III

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. General structure and reproduction in Xanthophyceae
2. General structure and reproduction in Bacillariophyceae
3. Mass cultivation of microalgae.
4. Algae causing diseases of plants and animals
5. Toxic algae

Madhavi
27.8.13

Sharan
27.8.13

S
27.8.13

K. Gop

S
27.8.13

S. S. S
27.8.13

S
25.08.13

S

S

M. Sc. Semester –IV

**SPECIAL THEORY PAPER : CYTOGENETICS, PLANT BREEDING MOLECULAR BIOLOGY
AND BIOTECHNOLOGY**

ELECTIVE COURSE – 20 B

(Elective Course Paper BOT 402 B)

F. M. – 75
P. M. – 30
Lecture Hrs – 45

PAPER -III

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. Mendel's Law of Inheritance.
2. Lethality and Interaction of Genes.
3. Linkage : Three Point test cross.
4. Mechanism of Crossing over.
5. Sex determination in Plants.
6. Stmctural changes in chromosomes.
7. Polyploidy in higher plants
 - (a) Haploidy
 - (b) Auto and Allopolyploidy
8. Cytoplasmic inheritance
9. Staistics : Mean, Standard Deviation, Standard Error, Chi square test and t-test.

M. M. / 27.8.13
 Anjali / 27.8.13
 Sharan / 27.8.13
 S. S. / 27.8.13
 K. L. / 27.8.13
 Anjali / 27.8.13
 Anjali / 27.8.13

M. Sc. Semester –IV

SPECIAL THEORY PAPER 21 A: ALGOLOGY

ELECTIVE COURSE – 21 A

(Elective Course Paper BOT 403 A)

F. M. – 75

P. M. – 30

Lecture Hrs – 45

PAPER-IV

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. Range of thallus organization and reproduction in Phaeophyceae
2. Range of thallus organization and reproduction in Rhodophyceae
3. Commercial utilization of marine macroalgae
4. Economic importance of algae as food, fodder, feed, medicine and biofertilizer
5. Algae as a source of energy

The bottom section of the page contains several handwritten signatures and dates, likely indicating the candidates who have completed the paper. The signatures are:

- Arun
- Anella
- Daron
- 27.8.13
- 27.8.13
- Madhani
- 22-8-13
- S. P. S. S.
- 27-8-13
- K. Lal
- 27.08.13

M. Sc. Semester –IV

**SPECIAL THEORY PAPER : CYTOGENETICS, PLANT BREEDING AND MOLECULAR
BIOLOGY & BIOTECHNOLOGY**

ELECTIVE COURSE – 21 B

(Elective Course Paper BOT 403 B)

PAPER –IV

F. M. – 75

P. M. – 30

Lecture Hrs – 45

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. Principle and objectives of crop improvement.
2. Theory of centre of origin of crop plants and law of homologous series of genetic variation.
3. Plant introduction and acclimatization, procedure and purpose merits and demerits.
4. Self-incompatibility system.
5. Inbreeding and heterosis.
6. Male sterility and its significance.
7. Analysis of variance, co-relation co-efficient.

Manu
27.8.13
Aneta

Dharan
27.8.13
MS
27.8.13

Thiruv

Sudh
27.8.13

Shobha
27.8.13

Kilol

Sueh
27.8.13

M. Sc. Semester –IV

SPECIAL THEORY PAPER : ALGOLOGY

ELECTIVE COURSE – 22 A

(Elective Course Paper BOT 404 A)

F. M. – 75

P. M. – 30

Lecture Hrs – 45

PAPER-V

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. Water quality parameters: Physico-chemical characteristics of water
2. Algal blooms
3. Water pollution indices
4. Algal indicators of water pollution
5. Role of algae in sewage disposal , pollution control and reclamation of soil
6. Study of local phytoplankton: with special reference to Green Algae

Sharan
27.8.13

SWS
27.8.13

S.P. Subudya
27.8.13

Madhur
27.8.13

SS
27.8.13

K. Lal

Shree
27.08.13

Shelley

Shree

M. Sc. Semester –IV

**SPECIAL THEORY PAPER : SPECIAL THEORY PAPER CYTOGENETICS, PLANT BREEDING
AND BIOTECHNOLOGY**

ELECTIVE COURSE – 22 B

(Elective Course Paper BOT 404 B)

F. M. – 75

P. M. – 30

Lecture Hrs – 45

PAPER –V :PLANT BIOTECHNOLOGY

Candidates are required to answer the questions as far as practicable in their own words within THREE hours. There would be two categories of question. Group-A will be of short type questions, ten questions are to be set, out of which FIVE are to be answered of 05 marks each (5 x 5). Group-B will be of long type; EIGHT questions are to be set, out of which FOUR are to be answered of 12.5 marks each (12.5 x 4 = 50).

1. Principle of plant tissue culture

(Organisation of laboratory, sterilization. Composition and preparation of media (MS, B5 and white media) aseptic manipulation, cell culture, application of cell culture (mutant selection, production of secondary metabolites, transformation)

2. Pathway of differentiation : Embryogenesis and Organogenesis.

3. Production of haploids (anther, microspore, ovary and ovule culture, bulbosum technique) detection of haploids (morphology genetic markers) uses of haploids in plant breeding (hybrid sorting, homozygous lines, analytical and synthetic breeding).

4. Endosperm culture.

5. Somaclonal variation, significance and application.

6. Protoplast culture and Somatic hybridization technique, factors, limitations and its role in crop improvement.

7. Micro propagation : Technique, factors, limitations and its significance.

8. Transgenic plants for crop improvement (dicots and monocots) resistance to herbicides and insecticides, flavor tomato.

M. S. M.
M. S. M.
22-8-13

Daran
Daran
27-8-13
Ashu

9 p.w.e.
27-8-13
N
27-8-13
K. J.

S. P. S.
27-8-13
S. P. S.
27-08-13

M. Sc. Semester -IV

ELECTIVE COURSE - 23 : PRACTICAL

BOT 405

F. M. - 75

P. M. - 30

Practical (BOT 405A and BOT 405B) based on courses 20,21 and 22

Daran
27.8.13

Ma
27.8.13

SWS
27.8.13

Aella-

R. Lal

ABolunba
27.8.13

Alu
27.08.13

Tham

M. Sc. Semester –IV

ELECTIVE PRACTICAL COURSE – 24
PROJECT/DISSERTATION

(Elective Course Paper BOT 406)

Based on special papers

F. M. – 100

P. M. – 45

A project dissertation should be completed on a given topic from the concerned special paper.

The topic of project dissertation should be completed under following heads :

- a. Introduction
- b. Review literature.
- c. Material and Methods.
- d. Results
- e. Discussion
- f. Reference.

The practical of project dissertation should be completed in the Departmental laboratory.

The practical examination of the Dissertation will be conducted in the Department of Botany, Ranchi Women's College, Ranchi. The distribution of marks will be as follows :

1. Describe in brief your work on project dissertation with its significance.
2. Eminent Scientists related to your project work, Scientific Journals related to your project work.
3. Viva-voce on Project Dissertation.

M. K. Singh
27.8.13

Harsh
27.8.13

Arora
27.8.13

Praveen
27.8.13

Sharan
27.8.13

SS
27.8.13

Vedant

S. Kumar
27/8/13

Abhishek

Abhishek
27/8/2013

Sus
27.8.13

Shikha
27.08.13

Kumar