

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

B. Sc. GENERAL (SEMESTER PATTERN)

B. Sc. SECOND YEAR

BOTANY – CURRICULUM

With Effect from June – 2010

B.Sc. SECOND YEAR**BOTANY CURRICULUM (SEMESTER PATTERN)**

Semester	Paper No.	Title of Paper	Periods/ Practicals	Time duration of Examination	Marks
III	VI (Th.)	Morphology and Taxonomy of Angiosperms	45	3 Hrs.	50
	VII (Th.)	Plant Physiology	45	3 Hrs.	50
IV	VIII (Th.)	Seed Plants and Their Utilization	45	3 Hrs.	50
	IX (Th.)	Plant Metabolism and Biochemistry	45	3 Hrs.	50
	X (Pr.)	Based on Theory Paper-VI&VIII	24	4 Hrs	50
	XI (Pr.)	Based on Theory Paper-VII& IX	24	4 Hrs	50

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

B. Sc. Second Year

Semester-III

Botany

Theory Paper- VI

(Morphology and Taxonomy of Angiosperms)

Periods: 45

Marks: 50

Unit-I: Morphology of Angiosperms:

Morphology of Root, stem and leaf (Margin, apex, stipule, types, venation pattern and phyllotaxy), Inflorescence, flower (Types and floral whorls) and types of fruit.

Unit-II: Taxonomy of Angiosperms:

Introduction, Scope and objectives of angiosperm taxonomy, Binomial nomenclature, taxonomic ranks, Artificial, natural and phylogenetic systems of classification, Salient features of Bentham & Hooker's, Engler & Prantle's system of classification with merits and demerits.

Unit III: Study of families-I:

Distribution, habitat, habit, root, stem, leaf, inflorescence, general description of flower, calyx, corolla, androecium, gynoecium, floral formula, floral diagram, pollination, fruit, Systematic position (as per Bentham & Hooker system) distinguishing characters and economic importance of plants of the following families:

Annonaceae, Brassicaceae, Malvaceae, Caesalpinaceae, Mimosaceae, Fabaceae, Apiaceae.

Unit IV: Study of families-II:

Distribution, habitat, habit, root, stem, leaf, inflorescence, general description of flower, calyx, corolla, androecium, gynoecium, floral formula, floral diagram, pollination, fruit, Systematic position (as per Bentham & Hooker system) distinguishing characters and economic importance of plants of the following families:

Asteraceae, Solanaceae, Acanthaceae, Euphorbiaceae, Lamiaceae, Liliaceae and Poaceae.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

B. Sc. Second Year

Semester-III

Botany

Theory Paper- VII

(Plant Physiology)

Periods: 45

Marks: 50

Unit I: Plant water relations

1. Plant-water relations: Importance of water to Plant life, Physiological Properties of water.
2. Different bio-physico-chemical phenomenon: Definition, phenomenon and Importance of permeability, diffusion, osmosis (exosmosis and endosmosis) Plasmolysis, imbibition.
3. Absorption of water: Introduction, mechanism of water absorption (Active and passive theories)
4. Ascent of sap: Definition, mechanism of root pressure theory, capillary theory, imbibition and transpiration pull theories.
5. Transpiration: Definition, types, structure of stomata, mechanism of opening and closing of stomata- Starch- sugar theory and K^+ pump theory.

Unit II: Mineral nutrition

1. Essential macro elements and microelements and their role in plants (deficiency, symptoms, disease and functions)
2. Mineral salt absorption: introduction, mechanism of Passive absorption (ion exchange theory) and Active absorption (carrier concept theory)
3. Introduction, direction of translocation, mechanism of translocation (Mass flow or munch hypothesis, protoplasmic streaming theory)

Unit III: Growth and development

1. Growth and growth hormones: Introduction, phases of growth, measurement of growth (arc indicator and Pfeffer's auxanometer) factors affecting growth.
2. Plant growth substances and other hormones: Auxin, Gibberellins, Cytokinins, Abscisic acid, ethylene (only practical applications)
3. Seed dormancy and seed germination: Introduction, methods of breaking seed Dormancy, factors affecting seed dormancy.
4. Seed germination: types, factors affecting seed germination.

Unit IV: Physiology of flowering and plant movements

1. Physiology of flowering: Photoperiodism (Long Day Plants, Short Day Plants, Day Neutral Plants) Vernalization and Devernalization.
2. Plants movements: Introduction, Classification of movement, Movements of curvature and Movements of variation (paratonic and nastic movements)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

B. Sc. Second Year

Semester-IV

Botany

Theory Paper- VIII

(Seed Plants and Their Utilization)

Periods: 45

Marks: 50

Unit I: Gymnosperms-I:

Introduction, general characters, classification (Arnold 1948), Origin and Evolution of seed habit.

Morphology of vegetative and reproductive structures, anatomy of stem and leaf (Primary and Secondary growth), Reproductive structures (Developmental stages are not expected) and life cycle of Cycas

Unit II: Gymnosperms-II

Morphology of vegetative and reproductive structures, anatomy of stem and leaf (Primary and Secondary growth), Reproductive structures (Developmental stages are not expected) and life cycle of Pinus and Gnetum

Unit III: - Utilization of plants -I

Botanical name, Family, Cultivation practices and Economic Importance of the following.
Food Plants – Cereals (Wheat, Jawar), Pulses (Pigeon pea, Gram) and Fiber Yielding Plants (Cotton, Ambadi)

Unit III: - Utilization of plants -II

Botanical name, Family, Cultivation practices and Economic Importance of the following.
Oil Yielding Plants (Groundnut, Sunflower), Timber Yielding Plants (Teak, Neem) and Medicinal Plants (Aloe, Ocimum, Adathoda, Withania).

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

B. Sc. Second Year

Semester-IV

Botany

Theory Paper- IX

(Plant Metabolism and Biochemistry)

Periods: 45

Marks: 50

Unit I: Photosynthesis and Photorespiration

1. Photosynthesis: introduction, Ultra structure of chloroplast, photosynthetic Pigments, concepts of two Photo systems, mechanism of photosynthesis.
2. Light phase: Hill reaction, Cyclic and Non cyclic photophosphorylation (Z- scheme)
3. Dark phase: Calvin cycle (C₃ pathway), Hatch and Slack cycle (C₄ pathway) and Crassulacean acid metabolism (CAM), significance of photosynthesis
4. Photorespiration: Introduction, Glycolate metabolism (C₂ cycle), significance.

Unit II: Respiration

1. Respiration: Introduction, Ultra structure of mitochondria, Respiratory quotient and its significance.
2. Types of respiration: Aerobic respiration - Glycolysis, Krebs' cycle, Electron Transport System (oxidative phosphorylation), ATP structure and function.
3. Anaerobic respiration - fermentation (alcoholic and lactic acid) significance of respiration.

Unit III: Basic Biochemistry

1. Basic Biochemistry: Introduction different organic constituents of the Cell,
2. Biological Functions of carbohydrates (Monosaccharides /Oligosaccharides / polysaccharides) Starch, Cellulose, Hemicellulose, Waxes and lipid, proteins and nucleic acids,
3. Biological importance of Essential oils, resins, tannins, alkaloids, organic acids, gums and mucilage.

Unit IV: Enzymes and Nitrogen metabolism

1. Enzymes: Introduction, nomenclature and classification (IUB), mechanism of mode of enzyme action (lock and key model, induced fit model) Concept of holoenzyme, apoenzyme, co-enzymes and co-factors.
2. Nitrogen metabolism: Introduction, general aspects of nitrogen fixation, Asymbiotic and symbiotic nitrogen fixation, ammonification, nitrification and denitrification.

SUGGESTED READINGS :

1. Davis P. H. and Heywood V.H. (1993) – Principles of Angiosperms Taxonomy
2. Tobert E. Kreigher Pub. Co. New York
3. Grant. V. (1971) – Plant Speciation – Columbia University Press New York.
4. Harrison, H.J. (1971) – New concepts in flowering plant Taxonomy – Hieman
- Educational Books Ltd. London
5. Heslop – Harrison J. (1967) – Plant Taxonomy- English Language Book Soc.
- and Edward Arnold Pub. Ltd. UK.
6. Hey wood. V.H. and Moore D.M. (1984) – Current concepts in plant Taxonomy,
- Academic press, London.
7. Jones A.D. and Wilbins, A.D. (1971) – Variation and adaptations in plant
- species. Hieman & Co-Educational Books Ltd. London.
8. Jones S.B. Jr. and Luchsinger, A.E. (1986) – Plant systematics (2nd edition)
- Mc Graw Hill Book Co., New York.
9. Nordenstam, B.EL Gazaly, G. and Kassas, M. Zooo – Plant systematic for 21st
- Century. Portland press Ltd. London.
10. Radford, A.E. (1986) – Fundamentals of plant systematics – Harper & Row
Publications, USA.
11. Stebbins G.L. (1974) – Flowering plant Evolution Above species level –
- Edward Arnold Ltd., London.
12. Plant Taxonomy and Bio Systematics (2nd, edition) – Edward Arnold Ltd. London
13. Takhtajan A.L. (1997) Diversity and classification of flowering plant – Colubia
- University, press New York.
14. Woodland, D.W. (1991) – Contemporary plant systematics : Pentice Hall, New Jersey.
15. Flora of Osmanabad – V. N. Naik.
16. Flora of Marathwada – Chief Ed. By Dr. V.N. Naik.
17. Plant Physiology by Gill P.S. (2000) S.Chand & Co. New Delhi
18. Text book of Plant Physiology by Verma V. (1995) Emkay Publication N.Delhi
19. Plant Physiology by Salisbury P.B. & W. Ross (1992) New York Pub. Co.
California USA
20. Plant Physiology by Subhash Chandra Dutta (1992) Wiley Eastern, New Delhi
21. Shrivastava H.S.(2000) Plant Physiology, Rastogi Publication, Meerut

22. A laboratory Guide of Plant Physiology by Wadje S.S. & M.M.V. Baig, (2004) Satyajeet Pub. House, Aurangabad
23. Shrivastava H.S. (1993) Elements of Biochemistry Rastogi Publication, Meerut
24. Rastogi (2000) Biochemistry Tata McGraw Hill, New York
25. Biochemistry by Mathews C.F. (2003), Addison Wesley, New Delhi
26. Laboratory Manual in Biochemistry by Jayaraman J. (1992) Wiley Eastern Ltd., New Delhi
27. Plant physiology, Biochemistry and Biotechnology by Wadje S.S. & M.M.V. Baig, (2005) Satyajeet Pub. House, Aurangabad

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

B. Sc. Second Year (semester- III&IV)

Botany

Practical Paper- X

Practical based on theory Paper VI & VIII

Time: 4hours / practical

Mark: 50

Practical 1-4: Permanent preparation of the following

1. Pinus- stem/needle
2. Gnetum- Stem/ leaf
3. Cycas- leaf-pinna

Practical 5-18: Description, identification and classification of the plants with floral formulae and floral diagrams of their families (mentioned in theory syllabus)

Practical 19-22: Botanical name, family with least two distinguishing character, cultivation practices and economic importance of crops (mentioned in theory syllabus)

Practical 23-24: Excursions (One short and one long excursion)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

B. Sc. Second Year (semester- III&IV)

Botany

Practical Paper- XI

Practical based on theory Paper VII & IX

Time: 4hours / practical

Mark: 50

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1. Preparation of standard Graph of Starch using colorimeter/ Spectrophotometer and determination of Starch content from given plant material
 2. Preparation of standard Graph of Glucose using colorimeter/ Spectrophotometer and determination of Glucose content from given plant material
 3. Preparation of standard Graph of Protein using colorimeter/ Spectrophotometer and determination of Protein content from given plant material
 4. Estimate the percentage of oil content in given oilseeds using Soxhlet extractor.
 5. Effect of temperature on plasma membrane (Beet root) in terms of pigment leaked out.
 6. Effect of different organic solvents on plasma membrane (Beet root) in terms of pigment leaked out.
 7. Effect of different concentrations of organic Solvent on plasma membrane (Beet root) in terms of pigment leaked out.
 8. Separation of the Photosynthetic pigments by paper chromatography
 9. Determine the Osmotic Potential of Vacuolar Sap by plasmolysis
 10. Determine the water potential of potato tuber
 11. Identify the amino acids in a mixture and find out the RF value.
 12. Study of catalase activity under different pH
 13. Study of catalase activity under different temperature
 14. Demonstrations of: (Requirements, procedure, workings)
 - a) Moll's half leaf experiments
 - b) Kuhne's fermentation tube
 - c) R. Q (Carbohydrate / fat/ proteins)
 15. Demonstrations of: (Requirements, procedure, workings)
 - a) Arc indicator (lever auxanometer)
 - b) Clinostat (Geotropism)

16. Demonstration of osmosis by potato osmoscope.
17. Micro chemical Test for proteins (Biuret/ Xanthoproteic/ Millon tests)
18. Micro chemical Carbohydrate (Molisch /Fehlings /Benedict's) Glucose, sucrose, starch, Cellulose, Pectin,
19. Micro chemical tests for cutin, Latex, Lignin, Tannin Lipid, fats & oils.
20. Micro chemical Test of organic acids – Tartaric acid, Citric acid, Oxalic and Malic acid
- 21-24. Botanical Excursions (one Short excursion and one Long excursion and Visits to laboratories / companies/factory etc

Swami Ramanand Teerth Marathwada University, Nanded
Botany Practical Examination
B.Sc. II Year Paper-X
(Based on Theory paper-VI & VIII)

Date:

Batch No.

Time: 4 hours

Marks: 50

Note: Draw neat and well labeled diagram wherever necessary
Show your preparation to the examiner

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- Q.1 Make a permanent preparation of of the given specimens A identify & describe
08 marks
- Q. 2 Describe, Identity & classify the given specimens B and C to their families with floral formulae and floral diagrams.
12 marks
- Q. 3 Give Botanical name and family (at least two distinguishing character) method of cultivation and economic importance of the given specimens D and E
10 marks
- Q. 4 Spotting (5 spots) - describe & Identify giving reasons
(Spot F Gymnosperms / palaeobaotany 1 spots –
Spot G & H Morphology 2 spots,
Spot I & J Utilization of plants 2 spots)
10 marks
- Q. 5 a) Record Book **04 marks**
b) Submission of field notebook & excursion report **03 marks**
c) Viva-voce **03 marks**

Swami Ramanand Teerth Marathwada University, Nanded
Botany Practical Examination
B.Sc. II Year Paper-XI
(Based on Theory paper-VII & IX)

Date:

Batch No.

Time: 4 hours

Marks: 50

Note: Draw neat and well labeled diagram wherever necessary
Show your preparation to the examiner

Q.1 Perform any one experiment (from practical 1-7 by Lottery Method)	10
Q.2 Perform any one experiment (from practical 8 – 13 by Lottery Method)	10
Q.3 Perform any four Micro chemical Tests (from practical 17-20)	10
Q.4 Describe Procedure and working of any two Experiments (from practical 14 – 16)	10
Q.5 A) Record Book	05
B) Viva voce	05

