SWAMI RAMANANAD TEERTH MARATHWADA UNIVERSITY, NANDED

B.Sc General (Annual Pattern)

B.Sc. IInd Year

Botany –Curriculum

(400 Marks)

2009

PAPER NO	TITLE OF THE PAPER	PERIODS/ PRACTICALS	MARKS	TIME DURATION OF EXAM
IV- Theory	Diversity of Seed Plants, their Systematic and Utilization of Plants	80	100	3 Hrs
V -Theory	Plant Physiology and Biochemistry	80	100	3 Hrs
VI – Practical	Based on Theory Paper -IV	20 + 4	100	4 Hrs
VII - Practical	Based on Theory Paper - V	20 + 4	100	4 Hrs

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B.Sc. S.Y

Botany Theory Paper IV
Diversity of seed plants, their systematic and utilization of plants.

Periods: 80 Marks: 100

Unit I: Gymnosperms:

a. Introduction, general characters, classification (Arnold 1948) Origin & Evolution
Of seed habit.
b. Morphology of vegetative and reproductive structures, anatomy of steam & leaf
(Primary and Secondary growth), Reproductive structures (Developmental stages
Are not expected) and life cycle of the following types.
i) Cycas
ii) Pinus
iii) Gnetum

Unit II: Morphology and taxonomy of angiosperms:

a. Morphology vegetative-Root, stem, leaf (margin apex stipule types venation pattern,
Phylotaxy) fioral morphology – Inflorescence / Flower (detailed aspects of Androecium,
Ggynoecium) Fruits.
b.Taxanomy: Introduction, Scope and objectives, Binomial Nomenclature, Taxanomic
Ranks, Systems of classification – artificial, natural, phylogenetic. Salient features of
Benthem and Hooker, Engler and Prantle, Merits and Demerits.

Unit III: Diversity of flowering Plants:

Systematic postion (Benthem & Hooker system) distribution, general characters,

Floral formula, floral diagram, distinguishing characters and economically important

Plants of the following families.

1. Annonaceae, 2.Brassicaceae, 3.Malvaceae, 4. Fabaceae, 5. Caesalpinaceae, 6. Mimosaceae
7. Apiaceae, 8. Asteraceae, 9, Solanaceae, 10. Acanthaceae, 11. Euphorbiaceous, 12. Lamiaceae
13. Liliaceae, 14. Poaceae.

Unit IV: Utilization of plants:

Botanical name, Family, Cultivation practices and Economic Importance of the following.

1. Food Plants
a) Cereals -Wheat, Jowar
b) Pulses - Pigeon pea, Gram
2. Fiber Yielding Plants - Cotton, Ambadi
3. Oil Yielding Plants - Groundnut, Sunflower
4. Timber Yielding Plants – Teak, Neem
5. Medicinal Plants – Aloe, Ocimum, Adathoda, withania

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B.Sc. S.Y

Botany Theory Paper V
(Plant Physiology and Biochemistry)

Periods: 80 marks: 100

Unit I: Plant water relations and Plant nutrients.

I 1. Plant-water relations: Importance of water to Plant life. Physiological Properties of water.
2. Different bio-physio-Chemical phenomenon: definition, phenomenon and Importance of permeability, diffusion, osmosis (exo and endosmosis) Plasmolysis, imbibition.
3. Absorption of water-Introduction, mechanism of water absorption (Active and passive theories)
4. Ascent of sap: Definition, mechanism- (root pressure theory, capillarity, imbibitional
And transpiration pul theories)
5. Transpiration : Definition , types, structure of stomata. Mechanism of opening And closing of stomata. (Starch- sugar, k + pump theory)

II: Mineral nutrition:
1. Essential macro and micro elements and their role in plants (deficiency, symptoms, disease and functions)
2. Mineral salt absorption : introduction mechanism : Passive (ion exchange) Active (carrier concept theory)

III Translocation of organic solutes: Introduction, direction of translocation, mechanism:
(Mass flow or munch hypothesis, protoplasmic streaming theory)

Unit II: Plant metabolism.

I Photosynthesis: introduction, Ultra structure of chloroplast, photosynthetic Pigments, concepts of two Photo systems, mechanism of photosynthesis. Light phase : Hill reaction/cyclic and non cyclic photophoshorylation (z-

scheme)
Dark phase : calvin cycle (C3) Hatch and slack cycle (C4) and craesulacean acid metabolism significance of photosynthesis

II Photorespiration: Introduction (C2) cycle (Glycolate metabolism) significance.

III Respiration: Intorduction , ultra structure of mitochondria RQ (carbohydrates, Fats, proteins) Types of respi-Aerobic : Glycolysis, TCA cycle ETS (oxidative phosphorylation) respiration ATP- structure and function. Anaerobic : fermentation (alcoholic and lactic acid) significance of respiration.

Unit III: Growth and development

I. a. Growth and growth hormones : Introduction, phases of growth/measurement
Of growth (arc-indicator-Differs auxanometer) factors affecting growth.
b. Plant growth substances and other hormones. Auxin/Gibberallins.Cytokinins.
Abscisic acid, ethylene (only practical applications)

II Seed dormancy and seed germination : Introduction, methods of breaking seed
Dormancy/ factors affecting seed dormancy. Seed germination –types, factors
Affecting seed germination .

III Physiology of flowering : Photoperiodism (LD/SD/DN plants) Vernalization and Devernalization.

IV Plants movements : Introduction , classification Movements of curvature. Movements of variation (paratoniic –nastic)

Unit IV: Biochemistry

I Elementary biochemistry : Introduction different organic constituents of the Cell ,Functions of carbohydrates (mono /oligo / polysaccharides) starch, Cellulose.
Hemicellulose, Waxes proteins and nucleic acids, lipid Essential oils, resins, tannins, alkaloids, gums, Mucilage and organic acids

II Nitrogen metabolism : Introduction, physical and biological nitrogen

fixation
(asymblotic – symbiotic) nitrogen in soil, ammonification and nitrification, Denitrification.

III Enzymes : Introduction- nomenclature and classification (IUB) mechanism Of mode of action (lock and key, induced fit)
Concept of holoenzymes, apoenzymes, coenzymes and cofactors.

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Syllabus for Practical Paper IV

Question wise list of Materials/ Slides / Specimens to be given

Q.1 Make Temporary Preparation of the following

A) Plant Materials : I) Pinus-stem / Needle

II) Gnetum-stem / Leaf

III) Cycas –stem /leaf

Q.2 Identify & describe the plants to their families –Any two plants mentioned In Theory Syllabus may be given alternately (B & C)

Q.3 Give Botanical name, family (at least two distinguishing characters) describe Methods of Cultivation & Economic importance of any two specimens, Mentioned in the theory syllabus. (D & E)

Q.4 Spotting - 5 spots

F) Pinus – Specimen / Pinus Male cone / Female cone
Gnetum – Male cone / Female cone
Cycas – Ovules / Corolloid –roots

G & H) Morphology – Inflorescence/Flower ; Androecium/ Placemtation type/ Fruit type belonging to the families mentioned in theory syllabus.

Spot I & J) Give Botanical Name, Family (at least two distinguishing characters) Method of cultivation & Economic importance of any two plants Materials mentioned in Theory syllabus.

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B.Sc. II: Practical Syllabus

Paper VII (Plant Physiology & Biochemistry) Marks: 100

Construct the standard Graph of the following using O.D of different concentrations Or Spectrophotometer

1) Starch 2) Glucose 3) Protein 4) Estimate the percentage of oil content in given oily seeds using Soxhlet extractor.

5) Record the pigment leaked out of plasma membrane (Beet root) in terms of O. D. due to temperature effect with the help of colorimeter and plot a graph.
6) Record the O. D due to effect of different organic solvents
7) Record the O. D due to effect of different concentrations of organic Solvents
8) Separate the Photosynthetic pigments by paper chromatography
9) Determine the Osmotic Potential of Vacuolar Sap by plaspmolysis
10) Determine the water potential of a potato tuber
11) Identify the amino acids in a mixture and findout 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)
1) Moll's half leaf experiments 2) Khune's apparatus (fermentation)
3) R. Q (Carbohydrate / fat/ protenis)
15) 1) Arc indicator (lever auxanoameter)2) clinostat (Geotropism)
16) 1) Imbibition: To demonstrate the imbibitional (by Dilatometer) protine by Germinating seeds.

Micro chemical tests: Histochemical tests.

17) Test for proteins (Biuret/xanthoprotein /tests) (Millon's Test)
18) Carbohydrate (Fehlings /Benedict's)
Lipid fats & oils.
19) Cellulose, cutin, Hemicellulose, Latex, Lignin, Pectin, Tannin
20) Test of organicacids – Tartaric, citric acid, oxalic and malic acid

(21 to 24) Botanical Excursions
21) Short excursion
22) Long excursion
23) Visits to laboratories etc

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FACULTY OF SCIENCE

B.Sc. Second Year (BOTANY PAPER VI)

PRACTICAL EXAMINATION

(Diversity of Seeds Plants, their Systematics and Utilization of Plants)

Time: 4 Hours Marks: 100

Note: 1. Draw a neat and well labeled diagrams wherever necessary.
2. Show your preparation to examiner.

Q.1 Make a Temporary preparation of the given specimen 'A' Identity & Describe. 15

Q.2 Describe Identify and classify the given specimen B and C to their families With floral formula and floral diagrams. 30

Q.3 Give Botanical name family (at least two distinguishing characters methods Of cultivation and economic importance of the given specimen D & E.) 20

Q.4 Spotting (5 Spots) 15

Describe and identify giving reasons as per instructions.
Spot- F - Gymnosperms/paleobotany (1)
Spot – G & F –Morphology (2)
Spot - I & J – Utilization of plants (2)

Q.5 a. Record Book 10
b. Viva Voce 10

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B.Sc. Second Year (BOTANY PAPER VII)

Practical Pattern

Time: 4 Hours Marks: 100

Q.1 Perform any one experiment (Out of 1-6 by Lottery Method)	20
Q.2 Perform any one experiment (out of 7 – 13) by Lottery Method)	20
Q.3 Micro chemical Tests (any four)	20
Q.4 Describe Procedure and working of Experiment Demonstration 1 - 6 (any two)	20
Q.5 A) Record Book	10
B) Viva voce	10

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SKELETON OF QUESTION PAPER (THEORY)

Q. 1 From Unit I – Long answer 20
OR
a) Short answer 10
b) Short answer 10

Q. 2 From Unit II - Long answer 20
OR
a) Short answer 10
b) Short answer 10

Q. 3 From Unit III - Long answer 20
OR
a) Short answer 10
b) Short answer 10

Q. 4 From Unit IV - Long answer 20
OR
a) Short answer 10
b) Short answer 10

Q. 5 a) Short Notes (Any Two) from a, b, c, d

a) From Unit I 10
b) From Unit II
c) From Unit III
d) From unit IV

b) MCQ (Ten) 10

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SELECTED READINGS FOR PAPER IV

1. Vasishta P C (2003) College Botany for Degree Student Volume I Gymnosperms S.Chand & Co.Ltd. New Delhi

2. Pande S.N (1976) Text Book of Botany Vol.II Vikas Publishing House, Pvt.Ltd. New Delhi

3. S.Sundara Rajan (2000) College Botany Vol.II Himalaya Publishing House Mumbai

4. Saxena A.K.&Sarabhai R.P (1971) Text Book of Botany Vol.II Ratan Prakashan Agra 3

5. Kumar N.C (1995) An Introduction to Taxonomy Of Angiosperms Himalaya Publishing House Mumbai

6. Lawrence G.H.M.(1951) Taxonomy of Vascular Plants Macmillan N.Y,Tata McGraw Hill New York

7. Naik V.N. (1889) Taxonomy of Angiosperms Aurangabad

8. Takhtajan K.L.(1969) Flowering Plants Origin & Dispersal Oliver & Boyed Edinburgh

9. Pande B.P.(2000) Taxonomy of Angiosperms S.Chand & Co. Ltd N.Delhi

10. Arnold C.A.(1974) An Introduction to PaleoBotany Macmillan N.Y,Tata McGraw Hill New York

11. S.Sundara Rajan (2000) College Botany Vol III Himalaya Publishing House Mumbai

12. Vasishta P C (1974) Taxonomy of Angiosperms S.Chand & Co.Ltd N.Delhi

S E L E C T E D R E A D I N G S F O R P A P E R V

1. Gill P.S. (2000) Plant Physiology, S.Chand & Co. New Delhi

2. Varma V. (1995) A laboratory Guide Text book Of plant Physiology Emkay Publication N.Delhi

3. Salisbury P.B. & W.Ross (1992) Plant Physiology New York Pub. Co. California USA

4. Subhash Chandra Dutta) (1992) Plant Physiology, Wiley Eastern, New Delhi

5. Shrivastava H.S. (2000) Plant Physiology Rastogi Publication Meerut

6. Wadje S.S. & M.M.Baig (2004) Plant Physiology, A laboratory Guide Satyajeet Pub.House, Aurangabad

7. Shrivastava H.S. (1993) Elements of Biochemistry Rastogi Publication Meerut

8. Rastogi (2000) Biochemistry Tata McGraw Hill New York

9. Mathews C.F. (2003) Biochemistry Addison Wesley New Delhi

10. Jayaraman J. (1992) Laboratory Mannual in Biochmistry Wiley Eastern Ltd.N.Delhi