Affiliated by Sant Gadge Baba Amravati University
Amravati.

Department of Botany

B.Sc.- III Year Sem- V

(Effective from session 2014-15)

- **The examination in Botany of Fifth semester shall comprise of one theory paper,internal assessment and practical examination.**
- **Theory paper will be of 3 Hrs. duration and carry 80 marks.The internal assessment will carry 20 marks.**
- **The practical examination will be of 4 hours duration and carry 50 marks.**
- **The following syllabi is prescribed on the basis of 6 lectures per week and 6 practical periods per batch per week.**
- **Each theory paper has been divided into 6 units.**
- **There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-III (8 marks).**

B.Sc. Part- III (Semester- V)

Marks: 80

5S - BOTANY
Plant Physiology and Ecology

Unit - I: Plant Water Relations

1.1 Importance of water to plant life.
Imbibition , Diffusion, Osmosis, Plasmolysis.
1.2 Active and passive Absorption of water.
1.3 Ascent of sap - Root Pressure and Transpiration PullTheory.
1.4 Transpiration - Types of transpiration, Stomatal movements, Mechanism of transpiration (Starch) sugarhypothesis), Significance. Antitranspirant, Guttation.
1.5 Mineral uptake - Active uptake - Career Concept, Passive up take – Ion Exchange.

Unit - II: Metabolism-

2.1 Photosynthesis - Introduction, Role of Light, Photo- synthetic Apparatus and Pigments, Two Pigment Systems, Photophosphorylation, C3 and C4 cycle, CAM Pathway.
2.2 Respiration - Introduction, Mitochondria as a Respiratory centre, Types of Respiration - Aerobic and Anaerobic, Mechanism of aerobic respiration- Glycolysis, Kreb cycle, Electron transport system and Chemiosmotic ATP generation, RespiratoryQuotient.

Unit - III: Metabolism and growth

3.1 Nitrogen Metabolism- Sources of nitrogen, Symbi-otic nitrogen fixation, Role of Nitrate reductase.

3.2 Growth - Phases of growth, Growth curve, Physi-ological role of growth hormones (Auxins, Gibber-ellins, Cytokinins, Abscisic acid, and Ethylene).

3.3 Physiology of Senescence and Abscission.

Unit – IV: Plant responses

4.1 Photoperiodism - Concept of Florigen, Role ofPhytochrome,

4.2 Vernalization- Concept and Significance.

4.3 Plant movement- Tropic (Phototropic and Geotropic) and Nastic (Epinasty, Hyponasty and Seismonasty)

4.4 Stress physiology- Concept, Types of stress, Waterand Salinity stress.

Unit – V: Ecology and Environment:

5.1 Concept of environment, Concept and scope ofecology.

5.2 Ecological factors- Climatic- Light, Temperature andWater.

5.3 Atmosphere and its composition.

5.4 Edaphic factor- Process of soil formation, soil pro-file, soil biota and their role.

5.5 Ecological Adaptations - Morphological and Anatomical adaptation in Hydrophytes, and Xerophytes

Unit – VI: Ecosystem:

6.1 Population Ecology- Natality and Mortality, Community characteristics – Frequency, Density andAbundance

6.2 Ecological Succession - Hydrosere and Xerosere

6.3 Ecosystem – Definition, Structure and Function, Food chain, Food web, Energy flow model (Singlechannel model)

6.4 Types of Ecosystem- Pond ecosystem, Desert eco-system

Laboratory Exercise :

Plant Physiology: Major experiment (Any Seven)

1. To study the effect of temperature and organic solvent onpermeability of plasma membrane.
2. To study osmotic pressure of cell sap by plasmolytic method.
3. To determine water potential of plant tissue.
4. To determine the path of water (ascent of sap)
5. To determine the rate of transpiration by Ganongs photometer.
6. To determine rate of photosynthesis under varying quality oflight and CO_2 concentration.
7. To study the rate of photosynthesis in terrestrial plants withthe help of Ganongs Photosynthometer.
8. Separation of chloroplast pigments by paper chromatography/solvent extraction method.
9. Separation of amino acids by paper chromatography method.

10. To determine R.Q. using different substrates.
11. To determine the rate of respiration by Ganongs respirometer.
12. To study antagonism of salts.
13. To study phenomenon of adsorption.
14. To study effect of IAA and Gibberellins on seed germination.
15. Test for secondary metabolites- Alkaloid, Phenolics, Tannin,Flavonoids and Lignin
16. To study Endo and Exo-osmosis by egg membrane osmoscope

Plant Physiology: Minor experiment- (Any Three)

1. To demonstrate fermentation.
2. To demonstrate exo and endosmosis
3. To demonstrate transpiration by Bell jar.
4. To demonstrate light is necessary for photosynthesis
5. To demonstrate anaerobic respiration in germinating seeds
6. To demonstrate the evolution of CO2 in respiration
7. To demonstrate the phenomenon of nastic movement with help of *Mimosa pudica* / or *Biophytum sensitivum.*

Ecology: Major experiment (Any Three)

8. **S**tudy of morphological and anatomical adaptations in hydrophytes – *Hydrilla, Eichhornia, Typha, Vallisneria* and *Nymphaea* (any two)

Study of morphological and anatomical adaptations in xero- phytes -*Asparagus*, *Nerium*, *Casuarina*, *Euphorbia*,*Cycas*, *Opuntia* (any two)

- Study of community characterstics by quadrat method.
- Determination of water holding capacity of different soils.
- To determine the texture of different soils by sieve method.

Ecology: Minor experiment (Any Two)

- To determine the porosity of soil.
- To determine the transparency and temperature of waterbodies.
- Estimation of salinity of different water samples
- Determination of pH of different soils and water samplesby pH papers/ pH meter.
- Study of meteorological instruments -Rain gauge,Hygrometer, Barometer

Practical Examination

Time: 4 Hours		**Marks: 50**
Q. 1 -	Physiology- major experiment-.	15
Q. 2 -	Comment one Minor Physiology experiment-	5
Q. 3 -	Ecology major experiment.	10
Q. 4 -	Ecology minor experiment.	5
Q. 5 -	Viva – voce	5
Q.6 -	Class record.	5
Q. 7 -	Co-curricular Activity Report	5

Co-curricular Activity Report" which mean the report on the activity Such as Study Tour, Industrial visit to Research Institute, Ex-cursion Tour to be submitted by the students at the time of practical examination.

Books Recommended:

Plant Physiology and Ecology:

1. Curtis & Clark. : Introduction of Plant Physiology.
2. H.N.Shrivastav. : Plant Physiology
3. Devlin R.M. : Plant Physiology
4. Salisbury F.B and Ross C.W. (1992).: Plant physiology (FourthEdition) Wadsworth Publishing Company, California,USA.
5. William G. Hopkins. (1995): Introduction to Plant Physiology,Published by – John Wiley and Sons, Inc.
6. V.Verma : Plant Physiology Verlag, New York.Vol. II.
7. Mayer & Anderson.: Plant Physiology.
8. Lincoln Taiz and Eduardo Zeiger (2003). Plant Physiology (3rdedition), Published by Panima Publishing Corporation
9. Galston, A. W. 1989: Life processes in plants. Scientific Ameri-can Library, Springer
10. Jain V.K.: Fundamental of plant Physiology. S. Chand Publica-tion New Delhi.
11. Kocchar P.C.: Text Book of Plant Physiology.
12. Mohr, H. and Schopfer, P. 1995 : Plant Physiology 4th : Edition,Wordsworth
13. Moore, T.C. 1974: Research Experiences in Plant Physiology. ALaboratory Manual.
14. Mr./Mrs.Pillei : Plant Physiology New York, U.S.A.
15. P.S.Gill: Plant Physiology, S.Chand & Co. New Delhi, Edition -Pradip's, Botany
16. Purekar and Singh: Plant Physiology,
17. R. G. S. Bidwell (revised edn.)-Plant Physiology
18. Verma S.K. and Verma Mohit (2007). A.Text Book of Plant Physi-ology, Biochemistry and Biotechnology, S. Chand Publications.
19. Dennis D.T., Turpin, D.H. Lefebvre D.D. and Layzell D.B. (eds) 1997. Plant Metabolism (Second Edition) Longman, Essex, England.
20. Galstone A.W. 1989. Life processes in Plants. Scientific Ameri- can Library, Springer Verlag, New York, USA..
21. Moore T.C. 1989. Biochemistry and Physiology of Plant Hormones Springer – Verlag, New York,USA.
22. Singhal G.S., Renger G., Sopory, S.K. Irrgang K.D and Govindjee 1999. Concept in Photobiology; Photosynthesis and Photomor- phogenesis. Narosa Publishing House, New Delhi
23. Verma S.K. and Mohit Verma 2007. A.T.B of Plant Physiology, Biochemistry and Biotechnology, S. Chand Publications.
24. Ambasht. R.S. 1988.0 A Text Book of Plant Ecology Students FriendsCo.Varanasi.
25. Sharma P. D. 2003. Ecology and environment. Rastogi publication.
26. Botkin, D.B. and Keller, E.A. 2000. Environmental Plane (2nd edition).JohnWiley & Sons Inc. New York.
27. Chapman. J.L. and Reiss. M.J. 1995. Ecology: Principles and ApplicationsCambridge University Press. College Publishers, USA.
28. Cunningham.W.P. and Saifo S.W. 1997. Environmental Science:A Global Concern WCB. McGraw Hill.
29. Dash M.C. 1993. Fundamentals of Ecology. Tata McGraw HillPublishing Co. Ltd., New Delhi.

30. Kumar.H.D. 1996. Modern Concepts of Ecology (3rd edition). Vikas Publishing House Pvt., Ltd. Delhi.
31. Kumar.H.D. 1997. General Ecology. Vikas Publishing Pvt. Ltd., Delhi.
32. Miller.W.R. and Donahue. R.L. 1992. Soils-An Introduction to Soil and Plant Growth (6th edition). Prentice Hall of India Pvt. Ltd., New Delhil.
33. Odum.E.P. 1996. Fundamentals of Ecology. Natraj Publishing, Dehradun.
34. Pickering.K.T. and Owen L.A. 1997. An Introduction to Global Environmental Issues (2nd edition). Butter and Tanner Ltd., Great Britain.
35. Smith L.R. and Mith T.M. 1998. Elements of Ecology. (4th edi-tion). Animprint of Addison Wesley, Longman ink. California.
36. Smith.L.R. 1996. Ecology and Field Biology (5th edition). Harper Collns
37. Tyler. M.G. Jr. 1997. Environmental Science: Working with Earth (6^{th} edition). Wordsworth Publishing Co.
38. Weaver. J.E. and Clements. S.E. 1966. Plant Ecology. Tata McGraw publishing Co. Ltd. Bombay.
39. Chaudhari M.A. and Gupta K.K. 2009. Practical plant physiol- ogy. New Central Book agency Ltd. Kolkata.
40. Bendre: Practical Botany for B.Sc.III year. Rastogi Publications, Meerut.