SOLAPUR UNIVERSITY, SOLAPUR

**B.Sc. Part – II (Botany)**

# Syllabus of semester pattern

**To be implemented from June, 2011**

# SOLAPUR UNIVERSITY, SOLAPUR

## B.Sc. Part – II (Botany)-Semester Pattern

## To be implemented from June-2011

**There shall be two papers of 50 marks each for each semester. Theory examination will be held at the end of each semester. The details of courses are as follows.**

## A) Semester-III

a) Theory paper- V: Development of plants - 50 Marks

a) Theory paper- VI: Plant Ecology - 50 Marks

## B) Semester-IV

a) Theory Paper-VII: Plant Physiology- 50 Marks

b) Theory paper-VIII: Utilization of plants- 50 Marks

## C) Total Marks for practical 100 Marks

a) Practical – I - 50 Marks

b) Practical – II - 50 Marks

The practical course is to be covered in 50 practicals .The practical course should be divided into practical no.I which will comprise 25 practicals based on Paper No.V & Paper No.VI where as the practical No.II will comprise 25 practicals based on Paper No.VII & VIII. The practical No I will carry 50 marks & practical II will also carry 50 marks. The practical examination will be conducted at the end of semester IV on two successive days.

# SOLAPUR UNIVERSITY, SOLAPUR

## SYLLABUS OF SEMESTER PATTERN B.Sc. Part – II (Botany)

## TO BE IMPLEMENTED FROM JUNE, 2011

### Semester – III Paper – V

## DEVELOPMENT OF PLANTS

**1 The organization of higher plant body: 06**

1.1 The plant organs

1.2 Development of the plant body

1.3 Internal organization

**2 Meristems: 06**

2.1 Introduction

2.2 Classification

2.3 Functions

2.4 Theories of structural development –

a) The Apical cell theory

b) Histogen Theory

c) Tunica corpus theory

**3 Tissue systems and their functions: 06**

3.1 Epidermal Tissue System

3.2 Secretary Tissue System

3.3 Mechanical Tissue System

**4 Plant tissue and primary structure of plant organs. 07**

4.1 Structure and functions of plant tissues.

4.2 Primary Structure of dicot and monocot root, stem, and leaf.

**5 Secondary body of the plant 08**

5.1 Vascular Cambium

5.2 Secondary xylem and secondary phloem

5.3 Periderm, Lenticels and Annual rings.

5.4 Basic structure of wood and its types.

**6 Anomalous secondary growth 07**

6.1 General account

6.2 Anomalous secondary growth in ***Bignonia*** and ***Dracaena*** stem

## Paper-VI

## PLANT ECOLOGY

**1 Introduction 03**

1.1 Holocoenotic nature of environment

1.2 Climatic factors

1.3 Edaphic factors

1.4 Water as a factor

1.5 Ecological amplitude

**2 Population ecology 06**

2.1 Concept

2.2 Density

2.3 Natality and Mortality

2.4 Age distribution of population

2.5 Carrying capacity – Brief account

2.6 Population Regulation: -

By abiotic Factors – nutrients, moisture, food availability.

By biotic Factors – competition, predation, density

**3 Community ecology 04**

3.1 Introduction

3.2 The form and structure of communities

3.3 Classification

3.4 Physiognomy

3.5 Community characteristics

3.6 Concept of species diversity –$\alpha$, $\beta$ and $\gamma$

| | | |
|---|---|---|
| **4** | **Ecosystems** | **08** |
| | 4.1 Introduction | |
| | 4.2 Concept and types | |
| | 4.3 Components and Organization | |
| | 4.4 Biogeochemical cycles – Nitrogen, Oxygen, Carbon, Hydrologic, Sulphur & Phosphorus | |
| | 4.5 Trophic organizations – ecological pyramids, food chains, Different types of food chains. | |
| | 4.6 Trophic organizations<br>Autotrophy, Heterotrophy, Decomposers.<br>Ecosystem productivity – Primary, Secondary, Gross, Net<br>Energy flow in ecosystem, | |
| **5** | **Ecological adaptations** | **06** |
| | 5.1 Concept | |
| | 5.2 Xeric, Hydric and Mesic adaptations | |
| | 5.3 Adaptations in relation to soil | |
| | 5.4 Ecads, Ecotypes and Ecoclines | |
| | 5.5 Adaptive significance of photosynthetic pathways | |
| **6** | **Ecological Succession** | **05** |
| | 6.1 Concept and process | |
| | 6.2 Primary and Secondary succession | |
| | 6.3 Hydrosere and xerosere | |
| **7** | **Plant indicators** | **03** |
| | 7.1 Plants as indicators | |
| | 7.2 Role of indicators in environmental monitoring | |
| **8** | **Phytogeography** | **05** |
| | 8.1 General principles | |
| | 8.2 Phytogeographical regions of India<br>(As per Chatterjee and Mani) | |

## SEMESTER IV
## Paper -VII
## PLANT PHYSIOLOGY

**1. Mineral nutrition** **05**

1.1 Role of Minerals:

Criteria of essentiality of elements,

Role of macro (P, K, Ca) and micro (Fe, Mn) elements,

1.2 Mineral – nutrient uptake

A) Passive uptake – Diffusion, Cation exchange, Donon equilibrium

B) Active uptake – Role of cell membranes, Carrier mediated uptake, Phospholipids hypothesis

**2 Photosynthesis:** **10**

2.1 Introduction and significance

2.2 Photosynthetic apparatus

2.3 Photosynthetic pigments, accessory pigments

Photosystems – reaction center complexes

Photochemical reactions

Emerson enhancement effect.

Electron transport pathway in chloroplast membrane.

Photophosphorylation

2.4 Dark reactions

Calvin cycle

$C_4$ cycle

CAM

**3 Transport of organic substances (Phloem Transport)** **04**

3.1 Definition of Symplastic transport

3.2 Phloem loading and unloading

3.3 Mechanism of translocation in phloem (in brief),

Mass flow hypothesis,

3.4 Source sink relationship:

Assimilate partitioning –

a. During vegetative phase
b. During reproductive phase

**4 Respiration: 06**

4.1 Introduction

4.2 Structure of Mitochondrion

4.3 Glycolysis

4.4 Decarboxylation – Conversion of pyruvate to Acetyl Co-A

4.5 TCA cycle

4.6 ETS in mitochondria

4.7 Oxidative phosphorylation

**5 Nitrogen metabolism 05**

5.1 Introduction

5.2 Nitrogen cycle

5.3 Biological $N_2$ fixation – Definition, types & organisms involved

5.4 Mechanism of Biological Nitrogen fixation

5.5 Significance of Biological Nitrogen fixation.

**6 Growth. 10**

6.1 Introduction

6.2 Phases of growth

6.3 Grand period of Growth

6.4 Reproductive growth

a. Photoperiodism – physiology of flowering

b. Florigen concept

c. Vernalization

6.5 Phytohormones.

Discovery, chemical nature & practical applications –

i) Auxins (IAA) ii) Gibberellins

Iii) Cytokinins IV) Ethylene V) Abscissic acid

# Paper – VIII

## UTILIZATION OF PLANTS

**1 Domestication of Plants** **02**

1.1 Plant introduction

1.2 Primary and secondary centers of diversity.

**2 Legumes** **04**

2.1 General account

2.2 Botanical name, source and economic importance of chickpea (Bengal gram) red gram and fodder legumes – Lucerne and ***Sesbania***.

**3 Vegetable oil sources** **05**

3.1 General account

3.2 Botanical name, source and economic importance of – Groundnut, Soybean.

3.3 Brief account of cultural practices of Groundnut & Soybean.

**4 Plant Fibers** **04**

4.1 General account

4.2 Botanical name, source, nature and economic importance of – Cotton, ***Agave*** and Coir

**5 Plant perfumes and cosmetics** **04**

5.1 A general account

5.2 Botanical name, source and economic importance of – ***Citronella***, ***Jasmine***, ***Rose*** and ***Lawsonia***.

**6 Medicinal plants** **10**

A brief account of plant drugs and their chief constituents used in Indigenous and allopathic systems in –

A) Rhizome – ***Zingiber officinale*** *and* ***Glycirrhiza glabra***

**B)** Root – ***Rauwolfia serpentina, Withania somnifera***

***C)*** Stem – ***Tinospora cordifolia***

D) *Leaf* – ***Aloe vera, Adhatoda zeylanica***

E) Floral bud – ***Syzigium aromaticum***

F) Fruit – ***Emblica officinalis*** and ***Terminalia chebula***

**7 Natural Products** **05**

7.1 Rubber – Plant source and economic importance

7.2 General account of plant insecticides

7.3 Concise account of dyes and pigments

**8 Ornamental Plants –** Botanical name and ornamental value of following plants **06**

8.1 Seasonals – ***Aster, Celosia, Chrysanthemum***

8.2 Perennials – ***Acalypha, Adenium, Crossandra, Dieffenbackia.***

8.3 Cacti and succulents – ***Opuntia and Bryophyllum***

8.4 Climbers – ***Bougainvillea, Quisqualis***

# Solapur University, Solapur

## PRACTICALS IN BOTANY AT B.Sc. Part – II

**(To be implemented from June 2011)**

**Botanical excursions** – One teacher along with a batch not more than sixteen students be taken for Botanical excursions to places of botanical interest, one in each term. If there are female students in a batch of sixteen, one additional lady teacher is permissible for excursion. Each excursion will not be more than 3 days during college working days. T.A. and D.A. for teachers and non teaching staff participating in the excursions should be paid as per the rules. The tour report duly certified by the concerned teacher and the head of the department should be submitted at the time of practical examination.

Practical – I and II are to be covered in 25 practicals each. These practicals are to be performed by the students. Each practical is to be supplemented by permanent slides, preserved / fresh specimens / materials, charts, herbarium sheets, wherever necessary.

Every candidate must produce a certificate from Head of the Department in his / her college stating that he / she has completed practical course in a satisfactory manner as per the lines laid down by academic council on the recommendations of Board of Studies in Botany. The student should record his / her observations and report of each experiment should be written in the Journal.

The Journal is to be signed periodically by teacher in charge and certified by Head of the Department at the end of the year. Candidates have to produce their certified journal and tour reports at the time of practical examination. A candidate will not be allowed to appear for the practical examination without a certified journal, otherwise a candidate must produce a separate certificate of his / her regular attendance for practical course and completion of the same signed by the concerned teacher and Head of the Department.

**Distribution of Marks:**

Practical I - 50 Marks

Practical II - 50 Marks

**Practical – I** **50 Marks**

| Sr. No. | Particulars | Marks |
|---|---|---|
| 1. | Plant Anatomy | 20 |
| 2. | Plant Ecology | 20 |
| 3. | Journal | 05 |
| 4. | Tour report | 05 |

**Practical – II** **50 Marks**

| | | |
|---|---|---|
| 1. | Plant Physiology | 20 |
| 2. | Economic Botany | 20 |
| 3. | Journal | 05 |
| 4. | Horticultural Term Paper | 05 |

Each practical examination (Practical I and II) should be of maximum. 5 hours duration and shall test a candidate in respect of following –

i. Identification and preparation of temporary and permanent slides.
ii. Practical study of external and internal structures of different plants as per the syllabus.
iii. Understanding of principles of the experiments.
iv. Identification and setting of ecological experiments.
v. Identification and setting of Physiological experiments.
vi. Recording of observations and conclusions.
vii. Identification and understanding of the practicals conducted with respect to development of plants and their utilization.
viii. Spotting of the specimens as per the syllabus.
ix. Submission of the tour report and Horticultural term paper.

# B.Sc. Part – II (Botany)

## Practicals (Laboratory Exercise)

### Practical No. I (Based on Paper – V &VI )

| | |
|---|---|
| 1 and 2 | Study of organization in a following plant.<br>Using w.m. of shoot tips of ***Hydrilla*** / V. S. of ***Coleus*** or<br>***Bryophyllum*** and w.m. of root tips of ***Pistia*** or V.S. of root tips of<br>Onion / Maize / Aerial roots of ***Ficus*** / ***Tinospora***. |
| 3, 4 | Anatomy of root, stem and leaf using hand sections<br>or permanent slides (Sunflower & Maize) |
| 5 6 | Anomalous secondary growth in ***Bignonia*** and ***Dracaena*** stem by using<br>permanent double staining technique. |
| 7 | Secondary growth in dicot stem and root. |
| 8 | Maceration technique. |
| 9 ,10 | Study of Epidermal, Mechanical and Secretory tissue systems. |
| 11 | Study of anatomy of porous (ring porous & diffused porous) and non porous wood.<br>Understanding of wood anatomy by using T.S. / TLS / RLS in ***Eucalyptus*** and<br>***Pinus*** stem.. |
| 12, 13 | Field study of Hydrophytes, Mesophytes, Xerophytes, Parasites and Trees with<br>varied canopy architecture.Field diary to be prepaired. |
| 14 | To study the working and use of meteorological instruments. |
| 15 & 16 | To study texture, pH and water holding capacity of soil (Two soils) |
| 17 & 18 | Determination of density & frequency of different plant species by quadrat method. |
| 19 | To prepare a report on any ecosystem from near by locality. |
| 20, 21 & 22 | To study maps of India with respect to major climatic zones,<br>forest types and biogeographical regions. |
| 23 | Ecological adaptations in morphology and anatomy of hydrophytes –<br>1) Submerged, 2) Floating, 3) Amphibious (One plant from each group) |
| 24 | Ecological adaptation of xerophytes (***Nerium*** & ***Aloe***). |
| 25 | Ecological adaptations of Epiphyte (Aerides) and parasite (***Cuscuta***) |

**Practical No. II (Based on Paper VII & VIII)**

1 To study permeability of plasma membrane using different concentrations of organic solvent.

2 To study structure of stomata and to determine the stomatal index.

3 Detection of essentiality of mineral elements by Hydroponics / Sand culture and with the help of chart

4 To demonstrate the presence of Calcium,Phospate, Potassium, Iron and Nitrogen in the plant tissue.

5 To extract and separate photosynthetic pigments by ascending paper chromatography.

6 To study the effect of $CO_2$ concentration on the rate of photosynthesis

7 To study $C_3$ and $C_4$ plants by Kranz anatomy.

8 Estimation of TAN.

9 To study respiration in germinating seeds.

10 Analysis of vegetative growth.

11 &12 To study the effect of growth regulators (IAA,GA,CCC &ABA) on seed germination and seedlings growth.

13 Study of maps showing the centres of primary diversity of important economic plants that originated in India

14 Study of map showing the plants of economic importance introduced in India from other Countries.

15 Study of Vegetative, Floral morphology and pod in Chickpea, Red gram and fodder legumes as per theory.

16 Study of structure of oil storing tissues in sectioned seeds of Mustard, Groundnut, Soybean and Coconut endosperm using micro chemical tests.

17,18 Study of vegetative, Floral and Fruit morphology of Cotton.
Microscopic structure Cotton fiber, Preparation of absorbent Cotton by alkali treatment, Staining of Cotton with and without mordating.

19 Study of plants (live or herbarium) used as resource of drugs as per theory.

20 Study of plant insecticides sources –*Azadirachta indica, Artemisia annua, Chrysanthemum cinerarifolium and Nicotiana tabaccum.*

22 Sources of dyes – *Curcuma longa, Bixa orellana, Crocus sativus, Butea monosperma, Indigofera (Indigo) Lawsonia inermis*

22 Study of aromatic plants. (As per theory)

23 Extraction of aromatic oil by distillation method.

24 Study of ornamental plants ,as per theory, seasons of flowering plants And botanical names with description in brief.

25 Horticultural term Paper-ornamental plants – Seasonals ,perennials , climbers, cacti, succulents, bonsai, indoor plants, cut flowers etc.

# Solapur University, Solapur

## B.Sc. Part – II Practical Examination, March / April 2012

## BOTANY PRACTICAL – I

**Centre:** **Total Marks: 50**

**Date:** **Time: 11.00 am onwards**

**N.B. :** 1. Draw near labelled sketches whenever necessary.

2. Do not write about theoretical points, unless asked specifically.

3. Record your observations carefully and neatly wherever asked.

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Q. 1 Make a double stained permanent micro preparation of a T.S. of Specimen A. 09

Q. 2 Macerate the given material B and prepare the slide from it. Show the slide to the examiner. 05

Q. 3 a) Prepare the list quadrat of the marked area and find out the percentage Frequency / Density of different species there in. 09

b) Set up the ecological experiment assigned to you & show it to the examiner or Describe the ecological adaptation in the given specimen. 05

Q. 4 Identification

**(From 2010 to 2011 and onwards)**

a) Identify and describe (Anatomy) 02

b) Identify and describe (Anatomy) 02

c) Identify and describe (Anatomy) 02

d) Identify and comment – (Ecology) 02

e) Identify and comment – (Ecology) 02

f) Identify and comment – (Ecology) 02

Q. 5 a) Journal 05

b) Submission of Excursion report. 05

**TOTAL----50**

# Solapur University, Solapur

## B.Sc. Part – II Practical Examination, March / April 2012

## BOTANY PRACTICAL – II

**Centre:** **Total Marks: 50**

**Date:** **Time: 11.00 am onwards**

**N.B. :** 1. Draw near labeled sketches wherever necessary.

2. Do not write about theoretical points, unless asked specifically.

3. Record your observations carefully and neatly wherever asked.

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Q. 1 Set up the physiological experiment assigned to you and record your observation, submit the report to the examiner. 09

Q. 2 Arrange the physiological experiment given to you and show it to the examiner. 05

Q. 3 a) Identify, give the botanical name and uses of specimen A&B. 08

b) Identify, give the botanical name ,plant part/s used and uses of Specimen C 06

Q. 4 Identifications:

a) Identify and comment – (Physiology) 02

b) Identify and comment – (Physiology) 02

c) Identify and comment – (Physiology) 02

d) Identify and comment (Plant utilization) 02

e) Identify and comment (Plant utilization) 02

f) Identify and comment (Plant utilization) 02

Q. 5 a) Horticultural Term Paper. 05

b) Journal. 05

**TOTAL------ 50**

# Suggested Readings

## Development of Plant / Anatomy.


1. P.C. Vasista. Plant Anatomy. Pradip Publications, Opposite Sitla mandir, Jalandhar- 144008.
2. B.P.Pandey Plant Anatomy. S.Chand & Company,LTD. Ram Nagar, New Delhi.110055.
3. A.C.Datta. Botany For Deree students. Press-Delhi, Bombay, Madrass.S
4. Carlquist, S. 1998. Comparative Wood Anatomy: Systematic, Ecological and Evolutionary Aspects of dicotyledonous Wood. Springer – Verlag, Berlin.
5. Culter, E.G. 1969. Part I. Cells and Tissues. Edward Arnold, London.
6. Culter, E.G. 1971. Plant Anatomy: Experiment and Interpretation. Part II Organs. Edward Arnold, London.
7. Esau, K. 1977. Anatomy of Seed Plants, 2nd edition, John Wifey and Sons, New York.
8. Fahn, A. 1974. Plant Anatomy, 2nd edition. Pergamon Press, Oxford.
9. Lyndon, R.F. 1990. Plant Development: The Cellular Basis. Unwin Hyman, London.
10. Mauseth, J.D. 1988. Plant Anatomy. The Bonjamin/Cummings Publishing Company Inc., Metro Park, California, USA.
11. Nair, M.N.B. 1998. Wood Anatomy and Major Uses of Wood. Faculty of Forestry, Universiti Putra Malaysia, 43400 Serdang, Selangor D.E., Malaysia.
12. Rahvan, V. 2000. Developmental Biology of Flowering Plants. Springer-verlag, New York.
13. Raven, P.H., Evert, R.F. and Eichhorn, S.E. 1999. Biology of Plants. 5th edition. W.H., Freeman and Co., Worth Publishers, New York.
14. Steeves, T.A. and Sussex, I.M. 1989. Patterns in Plant Development, 2nd edition. Cambridge University, Press, Cambridge.
15. Thomas, P. 2000. Trees: Their Natural History. Cambridge University Press, Cambridge


## Plant Ecology


1. Odum, E.P. Ecology. Oxford & F.B.h.Publishing Co.pvt.LTD-New Delhi..
2. Barbour, M.G., Burk, J.H. and Pitts, W.D. 1987. Terrestrial Plant Ecology. Benjamin / Cummings Publication Co., California.
3. Kormondy, E.J. 1996. Concepts of Ecology, Prentice-Hall of India Pvt. Ltd., New Delhi.
4. Hill, M.K. 1997. Understanding Environmental Pollution. Cambridge University Press.

5. Mackenzie, A. et al. 1999. Instant Notes in Ecology. Viva Books Pvt. Ltd., New Delhi.
6. Ashok Bendre / Ashok Kumar Economic Botany Rastogi Publications Shivaji Road, Meerut – 250002 India.
7. Prof. M.A. Khan – Environment, Biodiversity and Couservation S-B Nangia, A.P.H. Publishing Corporation, 5, Ansari Road, Daryaganj New Delhi – 110002.
8. B.P. Pandey – Modern Practical Botany Vol – I / II Chand & Company Ltd. Ramnagar New Delhi – 110055.
9. B.P. Pandey – Economic Botany Vol – I / II Chand & Company Ltd. Ramnagar New Delhi – 110055.
10. Pavas Divan – Environ Protection – Deep & Deep Publications D-I 124, Rajouri Garden, New Delhi – 110027.
11. P.S. Verma / V.K. Agrawal – Concept of Ecology, S. Chand & Lonpan Ltd. Ramnagar, New Delhi – 110055.
12. Eug Warming – Ecology of Plants, Ambey Publications Delhi (India)
13. Evgene P Odum – Ecology Oxford & IBH Publishing Co. Pvt. Ltd. Culcutta, New Delhi.
14. Ishwar Prakash. Desert Ecology. Scientific Publications, Ratandas Road,Jodhpur.-342001-India.
15. T.W. Woodhead. Plant Ecology. Sonali Publications.New Delhi.110002.
16. Eug. Warming. Ecology Of Plant. Ambey Publications Delhi.
17. Jonathan Silvertown. Introduction To Population Plant Ecology. Longman Singapure .Publisher, LTD.
18. R.S. Shukla & P.S. Chandel. Plant Ecology. S.Chand & Company LTD. Ram Nagar, New Delhi.110055.

## Plant Physiology

1. Hopkins, W. G. 1995. Introduction to Plant Physiology. John Wiley & Sons, Inc., New York, USA.
2. Moore, T. C. 1989. Biochemistry and Physiology of Plant Hormones ($2^{nd}$ edition). Springer – Verlag, New York, USA.
3. Salisburry, F.B. and Ross, C.W. 1992. Plant Physiology ($4^{th}$ edition). Wadsworth Publishing Co., California, USA.

4. Taiz, L. and Zeiger, E. 1998. Plant Physiology (2nd edition) Sinauer Associates, Inc., Publishers, Massachusetts, USA.
5. R.C. Grewal – Plant Physiology Campus Brokes International 483/24, Prahiad street Ansari Road, Darya ganj, New Delhi – 110002.
6. V.K. Jain – Fundamentals of Plant Physiology, S. Chand & Company Ltd. Ramnagar, New Delhi – 110055.
7. Salisbury Ross – Plant Physiology CBS, Publishers & Distributions 485/ Jain Bhawan, Bhole Nath Nagar, Shahdara, New Delhi – 110032.
8. Devlin & Witham – Plant Physiology CBS Publishers & Distributors 485, Jain Bhavan, Bhole Nath Nagar, Shahdara, New Delhi – 110032.
9. G. Ray Noggle / G. Fritz Introductory Plant Physiology Prentice Hall of India Ltd. New Delhi – 110001.
10. V.Verma. Text Book Of Plant Physiology. Emkay Publications.,B-19,East Krishna Nagar, Delhi-1100051.
11. V.I. Paladin. Plant Physiology. Arihant Publishers. Jaypur, (India)
12. Dr. S. Sundara rajan. Physiology Of Transport In Plants. Anmol Publications, Pvt. LTD. New Delhi.110002.
13. D.O.hall & K.K. Rao. Photosyntheis. Edward Arnold, East Street, Baltimore, Mary-land-21202,U.S.A.

## Plant Utilization.

1. R.C. Grewal – Medicinal plants, Campus Books International 4831/24, Prahiad street, Ansari Road, Darya Ganj, New Delhi – 110002. Fax : 91-011-3257835.
2. F.O. Bower – Plants and Man Ariana Publishing House, New Delhi – 110012.
3. Fuller, K.W. and Galon, J.r. 1985. Plant Products and New Technology. Calrendon Press, Oxford, New York.
4. Kocchar, S.L. 1998. Economic Botany in Tropics, 2nd edition. Macmillan India Ltd., New Delhi.
5. Sambamurthy, A.V.S.S. and Subramanyam, N.S. 1989. A Textbook of Economic Botany, Wiley Eastern Ltd., New Delhi.
6. Sharma, O.P. 1996. Hill's Economic Botany. Tata McGraw Hill Publishing Company Ltd., New Delhi.

7. Simpson, B.B. and conner-Ogorzaly, M. 1986. Economic Botany – Plants in Our World. McGraw Hill, New York.
8. Tippo, O. and Stern, W.L. 1977. Humanistic Botany. W.W. Norton, New York.
9. B.P.Pandey Economic Botany. S.Chand & Company pvt. LTD. Ram Nagar New Delhi. 110055.
10. Bentley & Trimen. Medicinal Plants. Asiatic Publishing house, 181 D.J. Extension, Laxmi Nagar. Delhi. 110092.
11. Robert Brentley & Henry Trimen. Medicinal Plants. Londan J & AChureldill.New Rulington Street.
12. He nery Kraemer Applied Economic Botany Ambey Publications, New Delhi.
13. A Textbook of economic Botany (EDN 1989)
    By SAMBA MURTY & N S Subramanyam. Publ.Wiley Estern LTD.New Delhi .
14. A Text book of Medicinal plants
    By.Prajkta, Purohit, Sharma, Kumar (2007)
    Publ. by Agro bios (India) Agrohouse Jodhpur 342002.

# SOLAPUR UNIVERSITY ,SOLAPUR

**Nature of Question Paper For Semester Pattern**

(For Paper V,VI,VII &VIII)

**Faculty Of Science**

( w .e .f. June 2011)

**Time: 2 hrs.** **Total Marks: 50**

Q.No.1) Multiple choice questions. (10)

1) ----------

a) b) c) d)

2)
3)
4)
5)
6)
7)
8)
9)
10)

Q.No.2) Answer any Five of the following (10)

i)
ii)
iii)
iv)
v)
vi)

Q.No.3) A) Answer any Two of the following (06)

i)
ii)
iii)

B) Write the Answer/Solve/Problem/Note (04)

Q.No.4) Answer any Two of the following (10)

i)
ii)
iii)

Q.No.5) Answer any Two of the following (10)

i)
ii)
iii)