**MANONMANIAM SUNDARANAR UNIVERSITY**
**TIRUNELVELI**

**UG COURSES – AFFILIATED COLLEGES**

**B.Sc. Plant Biology and Plant Biology**

**(Choice Based Credit System)**

**(with effect from the academic year 2016-2017 onwards)**

**(44th SCAA meeting held on 30.05.2016)**

| Sem. | Pt. I/II/ III/ IV/ V | Sub No. | Subject status | Subject Title | Hrs./ week | Cre-dits | Marks | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Maximum | | | Passing minimum | |
| | | | | | | | Int. | Ext. | Tot. | Ext. | Tot. |
| III | I | 17 | Language | Tamil/Other Language | 6 | 3 | 25 | 75 | 100 | 30 | 40 |
| | II | 18 | Language | English | 6 | 3 | 25 | 75 | 100 | 30 | 40 |
| | III | 19 | Core - 5 | PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY | 4 | 4 | 25 | 75 | 100 | 30 | 40 |
| | | 20 | Practical – Core Paper V | PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY | 2 | - | 50 | 50 | 100 | 20 | 40 |
| | | 21 | Allied -III | PLANT DIVERSITY AND MEDICINAL BOTANY | 4 | 4 | 25 | 75 | 100 | 30 | 40 |
| | | 22 | Allied Practical-III | PRACTICAL ( List enclosed) | 2 | - | 50 | 50 | 100 | 20 | 40 |
| | IV | 23 | Skilled Based subject-I | (A)MUSHROOM CULTIVATION (OR) (B)ORGANIC FARMING | 4 | 4 | 25 | 75 | 100 | 30 | 40 |
| | IV | 24 | Non-Major Elective-I | (A)GARDENING AND GARDEN MANAGEMENT (OR) HERBAL MEDICINE | 2 | 2 | 25 | 75 | 100 | 30 | 40 |
| Subtotal | | | | | 30 | 20 | | | | | |

| Sem. | Pt. I/II/ III/ IV/V | Sub. No. | Subject status | Subject Title | Hrs. / week | Cre-dits | Marks | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Maximum | | | Passing minimum | |
| | | | | | | | Int. | Ext. | Tot. | Ext. | Tot. |
| IV | I | 25 | Language | Tamil/Other Language | 6 | 3 | 25 | 75 | 100 | 30 | 40 |
| | II | 26 | Language | English | 6 | 3 | 25 | 75 | 100 | 30 | 40 |
| | III | 27 | Core - 6 | MICROBIOLOGY & TECHNIQUES IN BIOLOGY | 4 | 4 | 25 | 75 | 100 | 30 | 40 |
| | | 28 | Major Practical-IV | MICROBIOLOGY & TECHNIQUES IN BIOLOGY | 2 | 2 | 50 | 50 | 100 | 20 | 40 |
| | | 29 | Allied -IV | PLANT BIOLOGY AND PLANT BIOTECHNOLOGY | 4 | 4 | 25 | 75 | 100 | 30 | 40 |
| | | 30 | Allied Practical-IV | PRACTICAL (list enclosed) | 2 | 2 | 50 | 50 | 100 | 20 | 40 |
| | IV | 31 | Skill Based Subject -II | (A)FLORICULTURE (OR) (B) PRESERVATION OF FRUITS AND VEGETABLES | 4 | 4 | 25 | 75 | 100 | 30 | 40 |
| | IV | 32 | Non-Major Elective-II | (A)FOOD & NUTRITION (OR) (B) BOTANY FOR COMPETITIVE EXAMINATIONS | 2 | 2 | 25 | 75 | 100 | 30 | 40 |
| | V | | Extension Activity | NCC,NSS, YRC, YWF | | 1 | | | | | |
| Subtotal | | | | | 30 | 25 | | | | | |

**MSU/2016-17/UG –Colleges / Part III (B. Sc Plant Biology & Plant Biotech)/ Semester -III/ Ppr.no.19/Core-5**

## PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY

**UNIIT I**

General Characteristics and Classification of Pteridophytes (Smith, 1951); Distribution, Systematic Position, Structure, Reproduction and Life History (need not study the development of gametophyte, sex organs and sporophyte) of *Psilotum* and *Lycopodium*.

**UNIT II**

Occurrence, Systematic Position, Structure, Reproduction and Life Cycle of *Gleichenia*, *Marsilea*; (need not study the development of gametophytes, sex organ and sporophyte) ; Stelar Evolution in Pteridophytes.

**UNIT III**

General Characteristics and Classification of Gymnosperms (Chamberlain, 1934); Distribution, Systematic Position, Structure, Reproduction and Life History of *Pinus*.

**UNIT IV**

Occurrence, Systematic Position, Structure, Reproduction and Life Cycle of *Gnetum* (need not study the Development of Sex Organs and Sporophyte). Economic Importance of Gymnosperms.

**UNIT V**

Paleobotany: Geological Time Scale, Methods of Fossilization; Brief Study of *Rhynia*, *Lepidodendron* and *Lyginopteris*.

## MSU/2016-17/UG-Colleges/ Part III (B. Sc Plant Biology & Plant Biotech)/ Semester -III/ Ppr.no.20/ Core- Practical – III

1. To make suitable micro preparations of the following:

   *Lycopodium* stem,

   *Gleichenia* Stem,

   *Marsilea* Petiole, Rhizome and Sporocarp.

   *Pinus* Stem and Needle

   *Gnetum* Stem and Leaf.

2. To observe and identify Specimens and Microslides.

**Pteridophytes:** *Psilotum* Habit,

*Psilotum* - Stem T.S;

*Psilotum* Synangium L.S and C.S;

*Lycopodium* cone L.S,

*Gleichenia* habit,

**Gymnosperms:** *Pinus* -Male and Female Cone (Specimen),

*Pinus* -L.S of Male and Female Cone (Slide)

*Gnetum* – Male and Female Cone (Specimen)

L.S. of Male and Female Cone (Slide),

*Gnetum*- L.S of Ovule.

**Paleobotany** (Slide)

*Rhynia* stem

*Lepidodendron* stem

*Lyginopteris* stem.

3. Maintain a Record Notebook for External and Internal Evaluation.

### References :


1. Arnold, C.A. 1947. An introduction to Palaeobotany. McGraw Hill Co. Ltd., New Delhi.
2. Chamberlain, C.A. 1986. Gymnosperms-Structure and Evolution, Publishers & Distributors.
3. Pandey, S.N. 1995. A Textbook of Pteridophyta. Vikas Publishing House, Ghasiabad.
4. Shukhla, A.C. and Misra, P. 1982. Essentials of Paleobotany, Vikas Publishing House Pvt. Ltd., Ghasiabad.
5. Smith, G.M. 1955.Cryptogamic Botany. Vol. III. McGraw Hill Co.
6. Sporne, K.R. 1976. Morphology of Pteridophytes. B.I. Publishers, New Delhi.
7. Vashista, P.C. 1971. Botany for Degree students: Pteridophyta. S. Chand& Co., New Delhi.
8. Vashista, P.C. 1978. Botany for degree students: Gymnosperms. S. Chand & Co., New Delhi

## PLANT DIVERSITY AND MEDICINAL BOTANY

**UNIT I**

General Characteristics of Algae – Distribution, Structure and Life History of Volvox. General Characteristics of Fungi – Distribution, Structure and Life History of Polyporus - Economic Importance of Algae and Fungi.

**UNIT II**

General Characteristics of Lichens; Structure and Reproduction of Usnea. General Characteristics of Bryophytes; Structure and Reproduction of *Funaria*.

**UNIT III**

General Characters of Pteridophytes - Structure and Reproduction of *Lycopodium*; General Characters of Gymnosperms – Structure and Reproduction of Pinus; Economic Importance of Pteridophytes and Gymnosperms.

**UNIT IV**

Plant Nomenclature – Bentham and Hooker's System of Classification, Merits and Demerits of Bentham Hooker's system; Critical study of the following Families and their Economic importance - Rutaceae, Asclepiadaceae, Euphorbiaceae and Poaceae.

**UNIT – V**

Study of the Following Plants with Reference to the Morphology, Useful Parts and their Medicinal Importance. *Aloe vera, Piper nigrum, Phyllanthus niruri, Coleus amboinicus, Catharanthus roseus, Gymnema sylvestre.*

## MSU/2016-17/UG-Colleges / Part III (B. Sc Plant Biology & Plant Biotech)/

## Semester -III/ Ppr.no.22/ Allied Practical - III

1. Technical description of Plant parts with reference to the families prescribed in the syllabus.
2. Dissection of floral parts of plants belong to the families prescribed in the syllabus.
3. Make suitable Micro preparations of
   a. Dicot stem,
   b. Monocot stem,
   c. Dicot root,
   d. monocot root,
   e. Lycopodium stem,
   f. Pinus needle.
4. To identify and to record the medicinal values and morphology of the useful parts of the plants prescribed in the syllabus.
5. To identify the slides showing
   a. Mature anther,
   b. Ovule,
   c. Dicot embryo,
   d. Volvox,
   e. Nostoc,
   f. Yeast,
   g. *Lycopodium* cone L.S and
   h. *Funaria* capsule L.S.
6. To identify the following specimens
   a. *Polyporus*,
   b. *Funaria*,
   c. *Lycopodium* and
   d. *Pinus* –male and female cone.
7. Demonstration experiment
   a. Ganong's light screen,
   b. Bell jar experiment and
   c. Suction due to Transpiration.
8. Photograph – Callus culture, Meristem culture.
9. To maintain a record note book for external and internal evaluation.

## MUSHROOM CULTIVATION

**UNIT I**

Introduction – Morphology, Identification of Edible and Poisonous Mushroom,Medicinal Mushrooms – Structure and Life cycle of Edible Mushroom-Oyster Mushroom (*Pleurotus* species), Prospects of Mushroom Cultivation in Small Scale Industry.

**Unit – II**

Pure culture – Preparation of Medium (PDA and Oatmeal Agar Medium) Sterilization – Preparation of Test Tube Slants to Store Mother Culture – Culturing of *Pleurotus* mycelium on Petri Plates, Preparation of Mother Spawn in Saline Bottle and Polypropylene Bag and their Multiplication.

**Unit - III**

Cultivation of Mushrooms -Infrastructure- substrates (locally available)Polythene bag, Mushroom bed preparation - Factors affecting the Mushroom Bed Preparation, Spawn Running and Harvesting of Mushrooms - Button mushroom (*Agaricus bisporus*), Oyster Mushroom(*Pleurotus sp*.) and Paddy Straw Mushroom(*Volvariell a*sp.)

**Unit IV**

Post Harvesting Technology of Mushrooms, Farm Design and Protection of Mushrooms from Pests and Diseases.Nutritional Value – Proteins, Amino Acids, Mineral Elements, Carbohydrates,Fibre content, Vitamins;Significance of Mushrooms.

**Unit - V**

Storage and Value Added Products : Short-Term Storage (Refrigeration – upto 24 hours) Long Term Storage (Canning, Pickles, Papads), Drying, Storage in Salt Solutions, Value Added Food Preparation – Types of Food Prepared from Mushroom; Soup, Cutlet, Omelette, Samosa, Pickles, Curry.

**Demonstration**:

1. Identification of edible mushrooms.
2. Cultivation of Paddy Straw Mushroom.
3. Preparation of recipes.
4. Maintain an Observation Notebook

**References**


1. Chang, S. T. and W. A. Hayes (1978) The Biology and Cultivation of Edible Mushrooms, Academic Press. New York
2. Chang S.T. and P.G. Miles 2004. Mushrooms: Cultivation, Nutritional Value, Medicinal effect and Environmental Impact (II Edition). CRC Press.
3. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R. 1991. Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
4. Nita Bahl. 2002. Handbook of Mushrooms. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
5. Phillips, Roger (2006) *Mushrooms*. Pub. McMillan, Publications
6. Savoie JM, Callac P, Foulongne-Oriol M (2012) *Mushroom Biotechnology and Bioengineering*, CD Press Publishing House. Bucharest, Romania, Eds: M. Petre& M. Berovic,
7. Sohl, H.S. 1988. Mushroom – Exciting Commercial Prospects. The Hindu Survey of Indian Agriculture.
8. Suman, B.C., V.P. Sharma 2007. Mushroom Cultivation in India :Daya Publication House.
9. Swaminathan, M. 1990. Food and Nutrition. Bappco, The Bangalore, Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore.
10. Tewari, Pankaj Kapoor, S.C., 1988. Mushroom Cultivation Mittal Publications, Delhi.

## MSU/2016-17/B. Sc Plant Biology & Plant Biotech/ Semester -III/Ppr.no.23(B) / Skill Based Subject – I (B)

### ORGANIC FARMING

**Unit I**

Soil Science, Brief Account of Soil Profile; Fertility of Soil – Importance of Organic Matter – Water Retentivity and Aeration of Soil.

**Unit II**

Organic Manure, Types, Animal Wastes – Cattle Dung, Urine, Poultry Wastes, Slaughter Wastes, Piggery and Fishery Wastes.

**Unit III**

Plant wastes – Fallen leaves and Twigs – Humus Formation, Green Manuring – Mulching – Leaves of Trees like *Pongamia, Gliricidia ,Azadirachta, Calotropis* – Compost making.

**Unit IV**

Biofertilizers: Rhizobium-Importance, Mass Production and Application, VAM Fungi - Mass production and Applications.

**Unit – V**

Vermicomposting – Importance, Application and Production of Vermicompost; Preparation and importance of Panchagavya foliar spray.

Demonstration:

1. Soil Profile
2. Capillarity of Different kinds of Soil.
3. Vermicomposting
4. Preparation of Organic Manure
5. Identification of the following plants:
    a. *Pongamia,*
    b. *Gliricidia*
    c. *Azadirachta and*
    d. *Calotropis.*
1. Maintain an Observation Notebook.

References:


1. Dubey, R.C. 2006, A Text Book of Biotechnology, S. Chand and Company Ltd. New Delhi.
2. ICAR, 1980. Hand Book of Agriculture, Indian Council of Agricultural Research, New Delhi.
3. John Jothi Prakash, E. 2006. Outlines of Biotechnology. Emkay Publications, New Delhi.
4. Mark Coyne, 2004. Soil Microbiology- An Exploratory Approach. Delmar Publishers, Singapore.
5. Miller, C.E. and Turk, L.M. 2002. Fundamentals of Soil Science. Biotech Books, New Delhi.

## MSU/2016-17/B. Sc Plant Biology & Plant Biotech/ Semester -III/Ppr.no.24 (A)/ Non-Major Elective I - (A)

### GARDENING AND GARDEN MANAGEMENT

**Unit I**

Principles of Ornamental Gardening – Types – Formal & informal Gardens – English Gardens, Mughal Gardens, Japanese Gardens.

**Unit II**

Propagation Techniques – Soft Wood Cutting, Simple and Air Layering, 'T' Budding, Approach Grafting, Pruning, Garden Implements – Digger, Pruning Shears, Garden Rake.

**Unit III**

Components of Ornamental Gardens – Hedges, Edges, Flower Beds, Arches, Rockery, Lawn and Topiary.

**Unit IV**

Vegetable Gardening – Types, Establishment of Kitchen Garden, Components of Kitchen Garden – Perennials, Pandals, Fence, Seasonal Vegetable Crops in bunds, Compost Pits.

**Unit V**

Indoor Gardening – Principles and Maintenance. Hanging baskets, Terrarium, Bottle Garden and Bonsai.

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## MSU/2016-17/B. Sc Plant Biology & Plant Biotech/ Semester -III/ Ppr.no.24(B)/ Non- Major Elective – I (B)

### HERBAL MEDICINE

**UNIT: I**

Indian systems of medicine – Ayurveda, Siddha, Unani and Homeopathy. TBK (Tribal Botanical knowledge): Folk medicines, including Home remedies. Ethno medicines of Tamil Nadu.

**UNIT: II**

Herbal remedies for common ailments like cold, fever, diabetes, cuts, diarrhoea.

**UNIT: III**

Study on the morphology, useful parts, uses and method of use for specific ailments: rhizome (*Acorus*, Ginger), Bulb (Garlic, Onion), Root (*Hemidesmus, Vinca*), Bark (*Saracaindica, Cinnamomum*), Leaf (*Adhatoda, Vitex*), Flower (Cassia, Clove), Whole plant (*Phyllanthus,*Neem)).

**UNIT: IV**

Skin and hair care using herbals. Herbal preparation: decoction, extract, infusions, oils, shampoos, powders.

**UNIT: V**

Cultivation, harvest and post-harvest technology of some medicinal plants –*Catharanthusroseus, Adhatodavasica, Acoruscalamus.*

**REFERENCES:**


1. Aruna Devaraj, 2002. Herbal cosmetology.
2. Gala, D.R. Dhiren Gala & Sanjay Gala. 2000. Nature cure for common diseases, Navneet Publications Ltd., Mumbai.
3. Kirtikar K.R. and Basu, B.D. 1991. Indian Medicinal Plants Vol.1-4, Periodical Experts, New Delhi.
4. Saha, M.N. 1997. Fruit and Vegetable juice therapy, Jain Publishers-New Delhi.
5. Vaidya Bhagwan Dush, B. 1999. Herbal cure, Jain Publishers-New Delhi.

# MICROBIOLOGY AND TECHNIQUES IN BIOLOGY

**UNIIT I**

Brief History and Development of Microbiology, Classification of Microorganisms (Whittaker's Five Kingdom Concept), Bacteria - Outline of Bacterial Classification (Bergey'smanual); Ultra Structure, Nutritional Types and Reproduction of Bacteria, Media Preparation and Pure Culture Techniques of Bacteria; Staining Technique – Gram – Staining.

**UNIT II**

Viruses: General Characteristics, Structure and Reproduction of HIV, $T_4$ Bacteriophages, Viroids, Virions and Mycoplasma; Transmission of Viruses and Purification of Viruses.

**UNIT III**

Microbes in Food Production, Spoilage, Poisoning and Preservation. Bacteria Flora in Milk, Pasteurization of Milk and Milk Products; Bacterial Pathogens and Water Pollution; Drinking Water as a Vehicle of Diseases; Purification of water.

**UNIT IV**

Methods of Direct Gene Transfer – Ultrasonication, Electroporation, Liposome Mediated Gene Transfer.Microscopy - Principles and Applications of Light and Dark field; Electron Microscope (Scanning and Transmission Electron Microscopy; Phase contrast, Fluorescence, Polarization;Camera Lucida.

**UNIT V**

Identification of Recombinants – Insertional inactivation, Immunochemical Method and Colony Hybridization Technique, Selection of Recombinant using Selective Medium and reporter genes. Blotting Techniques – Southern, Northern and Western Blotting.

**PRACTICALS**

1. Preparation of Culture Media for Bacteria.
2. Demonstration of Preparation of Serial Dilution and Isolation of Pure Culture from Soil.
3. Procedure for Gram Staining and identify the type of Bacteria.
4. Demonstration of Analysis of Milk – Methylene Blue Dye Reduction Test.
5. **Spotters:**
    i. Ultra Structure of Bacterial Cell,
    ii. $T_4$ Phage and
    iii. HIV Virus,
    iv. Autoclave,
    v. Laminar Air Flow Chamber,
    vi. Hot Air Oven,
    vii. Inoculation Needle,
    viii. Agar Medium,
    ix. Streak Plate Method,
    x. Spoiled Food.
    xi. Liposome Mediated Gene Transfer in Plants,
    xii. Colony Hybridization Technique,
    xiii. Blotting Techniques – Southern, Northern and Western.Blotting.
6. Maintain a Record Notebook for External and Internal Evaluation.\

**References:**

1. Anantharayan, R. and C.K.J. Paniker, 2000. Text book of Microbiology, 6th Edition. Orient Longman.
2. Atlas, R.M. 1989. Microbiology-Fundamentals and applications.McMillan Publishing Company, New York.
3. Dubey, R.C.1993. A Text book of Bio-Technology. S. Chand & Co. Ltd. New Delhi.
4. Dwivedi, J. N. and Singh, R. B. (1985). Essential of Plant Technique Scientific Publications, Jodhpur.
5. Kumar, H.D.1993. A Text book of Bio-Technology. East West Affiliated Press Ltd., New Delhi.
6. Pelczar, Michel J. JR., E.C.S. Chan and Noel R. Krieg (Eds.) Textbook of Microbiology. Tata McGraw Hill. Co. New Delhi.
7. Rao, A.S. 2009. Introduction to Microbiology. PHI Learning Pvt. Ltd. New Delhi.
8. Skoog, A. and West, M. (1980). Principles of Instrumental Analysis – W. B. Saunders Co., Philadelphia, USA.
9. Srivastava ,H.S. An Introduction to Bio-Technology. Rastogi Publishing Company Meerut.

## EMBRYOLOGY, PLANT ANATOMY, PHYSIOLOGY AND BIOTECHNOLOGY

**UNIT – I**

Structure and Development of Microsporangium; Structure, Types and Development of Megasporangium; Development of Male and Female Gametophyte; Double Fertilization; Endosperm – Types; Structure of Dicot Embryo.

**UNIT – II**

Tissues – Simple Tissues, Complex Tissues; Primary Structure of Dicot and Monocot stem; Dicot and Monocot Root; Normal Secondary thickening in Dicot Stem.

**UNIT – III**

Absorption of Water – Diffusion, Osmosis, imbibition; Mechanism of Absorption of Water - Mechanism; Ascent of sap – Cohesion Theory; Transpiration – Types, structure of stomata, Mechanism of Stomatal Transpiration (Starch – Sugar Hypothesis); Photosynthesis – Structure of Chloroplast, Importance of Photosynthesis, Mechanism of Photosynthesis – Light and Dark Reaction (Calvin cycle).

**UNIT – IV**

Algal Biotechnology: Nostoc - Morphology, Use as Biofertilizer and Mass cultivation; Fungal Biotechnology :Structure and Multiplication (Budding and Fission) of Yeast, Mass Culture and Uses.

**UNIT – V**

Tissue Culture – Scope and Importance - Totipotency, Nutrient Medium (M.S medium) Callus Culture, Meristem Culture and their Applications.

## MSU/2016-17/UG-Colleges /Part III (B. Sc Plant Biology & Plant Biotech) /

## Semester -III/ Ppr.no.30/Allied Practical - IV

1. Technical description of Plant parts with reference to the families prescribed in the syllabus.
2. Dissection of floral parts of plants belong to the families prescribed in the syllabus.
3. Make suitable Micro preparations of
   a. Dicot stem,
   b. Monocot stem,
   c. Dicot root,
   d. monocot root,
   e. Lycopodium stem,
   f. Pinus needle.
4. To identify and to record the medicinal values and morphology of the useful parts of the plants prescribed in the syllabus.
5. To identify the slides showing
   i. Mature anther,
   j. Ovule,
   k. Dicot embryo,
   l. Volvox,
   m. Nostoc,
   n. Yeast,
   o. *Lycopodium* cone L.S and
   p. *Funaria* capsule L.S.
6. To identify the following specimens
   a. *Polyporus*,
   b. *Funaria*,
   c. *Lycopodium* and
   d. *Pinus* –male and female cone.
7. Demonstration experiment
   a. Ganong's light screen,
   b. Bell jar experiment and
   c. Suction due to Transpiration.
8. Photograph – Callus culture, Meristem culture.
9. To maintain a record note book for external and internal evaluation.

# FLORICULTURE

**UNIT I**

Importance of floriculture – Cut flowers – Chrysanthemum, Tulips, Lavendula, Gerbera, Gladiolus and Helichrysum.

**UNIT II**

CommercialFloriculture - Definition. – Cultivation of Calendula, Polyanthus and Marigold.

**UNIT III**

Cultivation of Anthurium, Orchids, Cut flower production, Package and export

**UNIT IV**

Importance of flowers in Perfumery - Extraction of Rose and Jasmine oil and their products.

**UNIT V**

Flower arrangement – General Principles of Flower Arrangement; Western and Japanese; Dry flower Decorations.

**References:**

1. Edmond, J.B.,Senn, T.L., Andrews, F.S. and Hal force, R.G. 1990. Fundamentals of Horticulture. Tata McGraw Hill Pvt. Co., London.
2. Kumar N. 2010. An introduction to Horticulture, Narosa Pub., New Delhi
3. Randhawa., G.S. 1973. Ornamental Horticulture in India. Today and Tomorrow Printers and Publishers, New Delhi.
4. Vishnu Swarap. 1997. Garden flowers. National Book Trust, India.

## PRESERVATION OF FRUITS AND VEGETABLES

**Unit-I :** Fruits and Vegetables- nutritive values, factors affecting storage, spoilage: microbial, enzymatic and insects.

**Unit-II :** Principles of Preservation; Importance and Methods of Preservation - Refrigeration, Freezing, Canning, Drying and Dehydration, Chemical preservatives.

**Unit- III:** Methods of preparation of the following: Fruit Juice- Grape; Squashes- Orange and Pine apple; Jam - Tomato and Mixed Fruit ; Jellies- Guava.

**Unit- IV:** Preparation of Chutney- Mango; Sauce - Tomato; Pickles- Lime, Mango and Garlic; Ketchup- Tomato. Drying of fruits: Banana, Mango, Grapes and Fig.

**Unit- V:** Canning of Fruits- Mango and Banana; Canning of Vegetables- Tomato, Carrot, Bean and Mushrooms.

**Demonstration:**

1. Preparation of Jams, Fruit juice, Squash, Sauces, Pickles and Ketchup.

2. Visit to stations doing these preparations/ fruit farms to learn the preservation of fruits and vegetables.

3.Maintain an Observation Notebook.

**References**

1. Alex V. Ramani, 2009. Food Chemistry, MPJ Publishers, Chennai
1. Cruess, W.V. 1948. Commercial Fruit and Vegetable products, McGraw Hill Book Company Inc., New York.
2. Kulshrestha, S.K. 1994. Food Preservation, Vikas Publishing House, New Delhi.
3. Swaminathan, M. 1992. Hand Book of Food Science and Experimental Foods, Bangalore printing and publishing Co. Ltd., Bangalore.
4. Siva Sankar, B. 2007. Food Process and Preservation, Prentice Hall of India Private Ltd.
5. Kumar N. 2010. An introduction to Horticulture, Narosa Pub. New Delhi.
6. Swamynathan, M. 2008. Advanced Text Book on Food and Nutrition Vol. 2, Bangalore Printing Publishing Co. Ltd. Bangalore.
7. GirdhariLal, G.S. Siddappaa and Tandon, G.L. 1986. Preservation of Fruits and Vegetables. Publications and Information Division, ICAR, New Delhi.
8. Usha Rani, C.K. and Mary Christi, R. 2010. Preservation of fruits and vegetables. Sheen Grafix, Nagercoil.

## MSU/2016-17/UG-Colleges / Part IV (B. Sc Plant Biology & Plant Biotech)/

## Semester -IV/Ppr.no.32(A)/Non-Major Elective –II (A)

### FOOD AND NUTRITION

**UNIT:I**

Energy Value of Food, Major Classes of Food- Carbohydrates, Proteins, Fats and Oils, Vitamins, Minerals – Sources and Requirements. Balanced Diet - Functions and Deficiency Symptoms – Causes and Prevention.

**UNIT: II**

Plants as Source of Food-Nutritive Value of Cereals and Millets (Rice, Wheat, Maize, Sorghum, and Ragi); Pulses (Bengal gram, Black gram, Green gram, Red gram and Peas); Nuts and Oil seeds (Ground nuts, Sesame, Coconut, Soyabeans, Sunflower); Fruits and Vegetables (Mango, Banana, Guava, Pomegranate, Grapes, Cucumber, Brinjal, Ladies finger, Tomato, Carrot).

**UNIT: III**

Food Preservation: Importance of Preservation. Methods of Preservation. Low and High Temperatures, Uses of Oil and Spices, Use of Salt and Sugar. Preparation of Jam, Jelly, Pickles and Squashes.

**UNIT: IV**

Food Additives: Definition and Types. Food Poisoning- Salmonellosis, Botulism. Food Adulteration- Harmful Effects, Simple Physical Tests for Detection of Food Adulterants.

**UNIT: V**

Food Borne Infection and their Prevention - Cholera, Typhoid.

**REFERENCES:**


1. Sumathi, Madamti R. & Rajagopal. M.V. 1984. Fundamentals of food and nutrition.
2. Swaminathan M. 1996. Food science,Chemistry& experimental food.
3. Shakunthal & M.Shaddaksharaswamy 1999. Food, Facts & Principles.
4. GirdhariLal, G.S. Siddappa & G.L.Tandon 1999. Preservation of fruits and vegetables.

## Botany for Competitive Examination

**Unit I**

Basics of the Plant Kingdom – Brief Classification of Plant Kingdom ; Diagnostic features of Algae, Fungi, Bryophyta, Pteridophyta, Gymnosperms, Bacteria, Viruses; Economic importance of these Groups.

**Unit II**

Basics of Angiosperm Taxonomy: A brief account of Natural System of Classification (Bentham and Hooker's System) and Phylogenetic System of Classification (Engler and Prantl's System). Binomial Nomenclature. A Brief account of the following Families and their Economic importance: Fabaceae, Cucurbitaceae, Poaceae.

**Unit III**

Medicinal Importance of the following Plants :*Zingiber officinale, Vetiveria zizanioides, Ocimum sanctum, Azadirachta indica, Solanum trilobatum, Phyllanthus emblica, Andrographis paniculata, Acalypha indica.*

**Unit IV**

Basics of Absorption of Water, Transpiration, Photosynthesis, Respiration, Protein Synthesis.

**Unit V**

Cell Organelles; Tissues and Tissue systems; An introduction to Genetics -Mendelism, Monohybrid cross and Dihybrid Cross; Genetic Engineering - Enzymes used in Gene Cloning experiments. An Introduction to Plant Tissue Culture; Biofertilizers.

**References**

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2. John Jothi Prakash, E. 2004. Medicinal Botany and Pharmacognosy, JPR Publications, Neyyoor-629 802.
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4. Singh V., Pande P.C., and Jain, D.K. 2002. A Text Book of Botany for Degree Students, Rastogi Publications, Meerut.
5. Vashista, P.C. 1985. Taxonomy of Angiosperms. Chand & Co. New Delhi.
6. Verma, V. 2005. A Text Book of Plant Physiology, Emkay Publications, New Delhi.