

**Jankidevi Bajaj College of Science, Wardha**  
**Semester Pattern Syllabus**  
**FOR B Sc. BOTANY**  
**Session 2017-18**

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**SEMESTER – I**  
**Plant Diversity & Applications of Microbes**  
**(60 Hours)**

**Unit I: Viruses and Bacteria** **(10)**

- 1.1 Virus: General Account of Viruses and structure of TMV and HIV
- 1.2 Mycoplasma : - Structure, Reproduction.
- 1.3 Bacteria:- Cell structure, Reproduction: (Binary fission, Conjugation)
- 1.4 Cyanobacteria: -General account, Ultra cell structure, reproduction (eg. *Nostoc*).
- 1.5 Role of microbes in Agriculture, Medicine and Industries.

**Unit II: Algae** **(10)**

- 2.1. Classification of Algae F. E. Fritsch
- 2.2 General characters of algae with reference to Habitat, Thallus Organization, Pigmentation, Reserve food and Reproduction
- 2.3 Life history of: - *Oedogonium*, *Vaucheria*, *Chara*, *Ectocarpus*.
- 2.4 Economic Importance of Algae with special reference to Food, Industries, Agriculture and Harmful aspects

**Unit III : Fungi and Lichens** **(10)**

- 3.1 General characteristics of Fungi,
- 3.2 Classification of Fungi( Alexopoulos 1996),
- 3.2 Life history of: - *Albugo*, *Puccinia* *Cercospora*,
- 3.4 Economic importance (Industries, Medicine, Food & Agriculture)
- 3.5 Lichens: - Types, Reproduction & Economic importance

**Unit IV: Plant pathology** **(10)**

- 4.1 Host, pathogen, symptoms
- 4.2 Viral diseases-TMV
- 4.3. Bacteria – Black arm of cotton
- 4.4 Causes and Control of: Leaf curl of Papaya, Citrus canker and Red rot of Sugarcane

**Unit V: Bryophyta****(10)**

5.1 Classification (Proskauer 1957)

5.2 General characters (Hepaticopsida, Anthocerotopsida and Bryopsida),

5.3 Alteration of generation in life cycles of *Marchantia* & *Funaria*

5.4 Economic importance

**Unit VI: Applications of Microbes****(10)****(a) Biofertilizers**

6.1 Concept, importance and types, Vermicomposting

6.2 Nitrogen fixing biofertilizers: Azotobacter, Rhizobium, Nostoc, Anabena

6.3 Phosphorus degrading &amp; Potash mobilizing bacteria, VAM

**(b) Mushroom Cultivation**

6.4 Introduction of nutritional &amp; medicinal value of edible mushrooms

6.5 Economic importance of mushrooms.

6.6 Cultivation practices of *Agaricus* (button), *Pleurostus* (Dhingari oyster mushroom) and *Volcariella* (Paddy straw mushroom)**List of Practicals :**

Study of Bacterial forms from permanent micropreparation.

Gram staining of Bacteria, Ultrasturcture of Bacteriophage from TEM photographs

Study of Cyanobacteria: *Nostoc*.Study of Algal genera: *Oedogonium*, *Chara*, *Vaucheria*, *Ectocarpus*.Study of Fungal genera:- *Albugo*, *Mucor*, *Puccinia*, *Cercospora*

Study of Lichen: - Thallus structure, Types

Plant pathology: – Leaf curl of Papaya, Red rot of Sugarcane, Citrus canker

Study of Bryophytes :- *Marchantia* & *Funaria*

\*To study the bacteria present in root nodules of leguminous plant.

To study the liquid culture/broth culture of *Rhizobium*.To prepare the biofertilizers from broth culture of bacteria (*Rhizobium* / Cyanobacteria)

Identification of different types of mushroom.

Materials required for Cultivation of Mushrooms.

Demonstration of cultivation of Mushroom.

Botanical Excursions (One short/Long excursion is compulsory)

## **Suggested Readings:**

- Tortora, G. E. B. R. Funke, C. L Case U (1997): Microbiology, An Introduction, 6<sup>th</sup> Ed (Addison NesleyLogman ,Inc.)
- Smith, K. M. : Plant Viruses [1992] 6th Ed luniversity Book Stall ,New Delhi) Dubey, RC. DK Maheshwari [1999] : Text Book of Microbiology (S. Chand & Co) Sharma, P.D. [1993] : Microbiology and plant pathology ( Rastogi& Co) Sullia, S. B. [1998] : General Microbiology (Oxford &IBH) Prescott et al [1999]: Microbiology 3<sup>rd</sup>ed (Wm C Brown Pub)
- Bold, H.C. C. J Alexopoulos and T Delevoryas [1980] : Morphology of Plants and Fungi (Harper and Row Publishers, N.Y.)
- Ganguly, Kar [] : College Botany, Vol II (New Central Book Agency, Calcutta) Bierhorst, D. W. (1971) : Morphology of Vascular Plants (Macmillon& Co. N.Y.)
- Bold, H. C. and M. J. Wynne [1978] :Introduction of Algae: Structure and Reproduction (Prentice Hall Of India, Pvt. Ltd)
- Kumar, H. D. and HN Singh (1982) : A text Book of Algae (AffiliateEast - West Press, Pvt. Ltd, New Delhi)
- Sharma, O.P.1992): Text . Book OfThallophytes (McGraw Hill Publishing Co.) Smith, G. M. [1971] :Cryptogamic Botany, Vol. I Atgae and Fungi(TMh) Vasishtha, B. R. [1990] : Algae (S. Chand & Co. New Delhi)
- Alexopoulos, C. J. and G. W. Min & M. Blackwell, Indroductory Mycology, CBS distributors & publishers, Delhi.
- Dube, H. C. [1990] introduction to Fungi (Vikas Publishing House Pvt. Ltd, Delhi)
- Sharma, P. D. [1991] : The Fungi (Rastogi&Co.Meerut)
- Vasishtha, B. R.[1990] : Fungi (S. Chand and Co. New Delhi)
- Mehrotra, R. S. and Aneja, K. R. 1990 An Introduction to mycology (Wiley Estern Ltd.) Prempuri [1980] :Bryophyta (Atma Ram & Sons Delhi)
- Ram Udar [1970] : An Introduction to Bryophyta (ShashidharMalviyaPrakashan, Lucknow) Smith, G. M. [1971] :Cryptogamic Botany, vol. I I, Bryophytes and Pteridiphytes (THM)
- Chopra, G. Land D I Yadav [1980] : A text Book of Bryophyta (Arihant Press)
- Vashishtha, B. R. [1992] :Bryophyta (S. Chand & Co. New Delhi)

Dubey, R.C., 2005 A Text book of Biotechnology S.Chand & Co, New Delhi.  
 Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.  
 John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay Publication, New Delhi.  
 4. Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.  
 Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New Delhi.  
 Vayas,S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic Farming Akta Prakashan, Nadiad  
 Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.  
 Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.  
 Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

**Semester - I**  
**Botany Practical Examination**  
**Question Paper**

**Time: 5 hrs**

**Marks: 30**

- Q. 1) Gram Stain given Bacterial strain / Stain the **Cyanobacterial** material [A], & Identify **04**
- Q. 2) Identify & give characters of the given **Algal** material [B]and make a temporary Mount **04**
- Q. 3) Identify & give characters of the given **Fungal** material[C] and make a temporary Mount **04**
- Q. 4) Identify & give characters of the given **Bryophytic** material[D] and make a temporary Mount **04**
- Q. 5) Spotting : **08**
- |                                |                       |                    |           |
|--------------------------------|-----------------------|--------------------|-----------|
| E-Virus/Bacteria/Cyanobacteria | F- Algae              |                    |           |
| G- Fungi                       | H-Bryophyte           | I- Plant pathology | J- Lichen |
| K- Biofertilizer               | L-MushroomCultivation |                    |           |
- Q. 9) Viva-voce **03**

Q.10) Practical Record & Excursion Report 03

**Semester – II**

**Pteridophyta, Paleobotany, Gymnosperms, Morphology of Angiosperms &  
Scientific Report writing  
(60 Hours)**

**Unit I Pteridophyta (10)**

1.1 Classification (Smith, 1952)

1.2 General characters (Psilopsida, Lycopsidea, Sphenopsida and Pteropsida),

1.3 **Life history of** *Selaginella* (Heterospory and seed Habit), *Equisetum*

1.4 Apogamy, Apospory and Stellar system in Pteridophytes

**Unit II Palaeobotany (10)**

2.1 Introduction to Paleobotany, Geological time scale

2.2 Fossilization: Replacement theory, Infiltration theory

2.3 Types of fossils: Impression, Compression, Petrification

2.4 Fossil plants: Gymnosperms: *Glossopteris* (Leaf, Scutum), *Cycadeoidea*  
(morphology, anatomy of Stem and flower)

**UNIT III: Gymnosperms (10)**

3.1 Classification (Stewart 1982)

3.2 General characters

3.3 Life cycles of *Pinus* and *Gnetum*

3.4 Affinities of gymnosperms with Pteridophytes and Angiosperms

3.5 Economic importance

**Unit IV: Morphology of Angiosperms I**

4.1 Diversity in Plants habits – Annual, biannual, perennials

4.2 Root: Tap, Adventitious & Modifications (Storage, Respiration & Reproduction.

4.3 Stem: Shape, surface, texture, nature, Branching (Monopodial, Sympodial),  
modifications (Runner, Rhizome, Tuber, Bulb, cladode).

4.4 Leaf: Typical Leaf, Types (Simple, Compound), Phyllotaxy, Venation, Stipule  
and modifications of leaf (Tendrils, Phyllode)

**Unit V: Morphology of Angiosperms II (10)**

5.1 Inflorescence -Simple (Racemose, Cymose and special types).

5.2 Flower: Flower as modified shoot, Insertion of floral whorls,

5.3 Structure of Calyx, Corolla, Androecium and Gynoecium.

5.4 Placentation; Seed structure; Types of seeds

5.5 Fruit: Classification of fruits, Simple, Aggregate, Composite fruit.

## Unit VI Scientific Report writing

10

### (a) Data collection, Documentation and Photography

6.1 Maintaining a laboratory record; Tabulation and generation of graphs.

6.2 Imaging of tissue specimens and application of scale bars.

6.3 The art of field photography.

### (b) The art of scientific writing and its presentation

6.4 Numbers, units, abbreviations and nomenclature used in scientific writing.

6.5 Writing references. Power Point presentation. Poster presentation.

6.6 Scientific writing and ethics, Introduction to copyright-academic misconduct/plagiarism.

### List of Practicals

Study of Pteridophytes : *Rhynia*, *Selaginella*, *Equisetum*.

Study of Gymnosperm: *Pinus*, *Gnetum*, *Cycadeoidea*, *Glossopteris*.

Study of Root: Types, Modifications.

Study of Stem: shape, surface, texture, nature Branching, Modifications (Ex. *Hibiscus*, *Ocimum*, any grass).

Study of Leaf: Stipules, base, kind, shape, surface, margin, Apex, texture, Phyllotaxy, Venation & Modifications.

Inflorescence: Types.

Flower: Parts, Thalamus, Calyx, Corolla, Androecium, Gynoecium.

Fruits: Types.

\* To understand and prepare reference list (e.g. Research papers, Reference books, websites, Ph.D./M. Sc. Thesis & research reports)

To write and understand units, abbreviations and nomenclature used in scientific writing and prepare presentations in poster and power point template.

To prepare scientific paper.

### Suggested Readings:

Rashid, A. [1989] : An Introduction to Pteridophyta Vikas Publishing House, Pvt. Ltd. New Delhi

Sharma, O. P. [1990] : Text Book of Pteridophyta (McMillan India Ltd.)

Bhatnagar, S. P. and Moitra A. 1996 Gymnosperms. New Age International Limited , New Delhi Davis, P. H. and Heywood V. H. 1963. Principals of Angiosperm Taxonomy.

Oliver and Boyd London.

Sporne, K. R. 1965. The Morphology of Gymnosperms. Hutchinson University Library Press, London.

Stewart, W. N. and G. W. Rothwell 1993 : Paleobotany and the Evolution of Plants, 2<sup>nd</sup> Edn. Cambridge University Press.

Bierhorst, D. W. [1971] : Morphology of Vascular Plants. Macmillon & Co. N.

R. Vashishtha, B. R. [1992] : Gymnosperm (S. Chand & Co. New Delhi)

Dawson, C. (2002). Practical research methods. UBS Publishers, New Delhi.

Stapleton, P., Yondeowei, A., Mukanyange, J., Houten, H. (1995). Scientific writing for agricultural research scientists – a training reference manual. West Africa Rice Development Association, Hong Kong.

**Semester II  
Practical Examination  
Question Paper**

**Time: 5 hrs**

**Marks : 30**

Q.1) Identify & give characters of the given **Pteridophytic** material **[A]** and make temporary Mount. 04

Q.2) Identify & give characters of the given **Gymnospermic** **[B]** material and make temporary mount. 04

Q.3) Describe the given **leaf** material **[C]** 04

Q.4) Describe (Calyx, Corolla, Androecium & Gynoecium) of given **Flower** **[D]**. 04

Q. 5) Spotting : 08

E. Pteridophyte                      F. Fossil      G. Gymnosperm      H. Vegetative morphology  
I. Inflorescence/flower      J. Fruit      K. Data collection      L. Scientific writing

Q.6) Viva-voce 03

Q.7) Practical Record & Excursion Report 03