JSS MAHAVIDYAPEETA

JSS COLLEGE FOR WOMEN (Autonomous)

Saraswathipuram, Mysuru - 9

(Autonomous College under University of Mysore: Reaccredited by NAAC with A Grade)

FOR UNDER GRADUATE PROGRAM

BOTANY

SYLLABUS AND SCHEME OF EXAMINATION

2024-25

ALLOCATION OF CREDITS (2024-25 onwards**)**

Sem	Course code	Practical/ Theory	TITLE OF THE COURSE DISCIPLINE CORE COURSE (COMPULSORY)	Hrs/ Week L:T:P	Credits	Max marks
I	DSCB* - 1.1	Theory	**Diversity of Microbes, Algae, Fungi & Phytopathology**	3 Hrs.	3	80+20
		Practical	”	4 Hrs.	2	40+10
II	DSCB* - 1.2	Theory	**Bryophytes, Pteridophytes, Gymnosperms, Palaeobotany & Anatomy of Angiosperms**	3 Hrs.	3	80+20
		Practical	”	4 Hrs.	2	40+10
III	DSCB* – 1.3	Theory	**Reproductive Biology, Plant Ecology, Biodiversity & Conservation**	3 Hrs.	3	80+20
		Practical	”	4 Hrs.	2	40+10
	DSEB1.1	Elective	**Nursery, Gardening & Floriculture**	2 Hrs.	2	40+10
IV	DSCB* – 1.4	Theory	**Plant Physiology & Metabolism, Cell Biology & Molecular Biology**	3 Hrs.	3	80+20
		Practical	”	4 Hrs.	2	40+10
	DCB**- 1.1	Compulsory	**Mushroom culture technology**	2 Hrs.	2	40+10
	DSEB - 1.2	Elective	**Medicinal plants**	2 Hrs.	2	40+10
V	DSEB - 1.2	Theory	**Morphology of Angiosperms, Taxonomy, Economic Botany & Ethnobotany**	3 Hrs.	3	80+20
		Practical	”	4 Hrs.	2	40+10
	DCB**- 1.2	Theory	**Floriculture**	2 Hrs.	2	40+10
VI	DSEB - 1.3	Theory	**Genetics, Genetic Engineering, Plant Biotechnology & Evolution**	3 Hrs.	3	80+20
		Practical	**”**	4 Hrs.	2	40+10
	DCB** - 1.4	Theory	**Botanical products**	2 Hrs.	2	40+10

Botany – First semester

DSCB 1.1: Diversity of Microbes, Algae, Fungi and Phytopathology

Code: HMA250 - 48 Hrs (3 Hrs of instruction/ week: 3 Credits)

Course outcome

1. Students will be in position to understand the general characters, classification and economic importance of Mollicutes, Viruses, Bacteria, Cyanobacteria, Algae, Fungi and Lichens
2. They know the structure and reproduction of various forms included in the syllabus
3. They will acquire the basic knowledge of various plant diseases mentioned in the syllabus and their management

Unit I: Microbial diversity - 16 Hrs.

A brief account of microbes in soil, air, food and water.

Brief account of five kingdom (Whittaker) and three domain (Carl Woese) system of classification.

Virology: History, general characters, classification, ultrastructure and multiplication of TMV and Bacteriophage (T4); Transmission of Viruses.

Viroids: General characters and fine structure of PSTVd.

Prions: General characters and diseases [Creutzfeldt-Jakob disease (CJD), Bovine spongiform encephalopathy (BSE)].

Mycoplasma: History and general characters.

Phytoplasma: Introduction, classification and diseases (Sandal spike disease).

Bacteriology: Introduction, classification (based on nutrition); Ultrastructure and Reproduction (Budding, fission and endospore formation); Genetic recombination (Conjugation, transduction and transformation) and economic importance.

Unit II: Algae and Lichens - 16 Hrs.

Cyanobacteria: General characters and economic importance of Cyanobacteria.

Type study: Spirulina and *Nostoc*

General characters, classification and economic importance of algae.

Type study: *Chlorella*, *Oedogonium*, *Caulerpa*, *Diatom* (Pennales), *Sargassum* and *Polysiphonia*.

Lichens: General characters, classification (based on morphology and fungal component), structure, reproduction and Economic importance.

Unit III: Fungi and Phytopathology - 16Hrs

Fungi: General characters, classification (Ainsworth's) and economic importance.

Type study: *Rhizopus*, *Albugo*, *Penicillium*, *Puccinia* and *Fusarium*.

Phytopathology: Introduction, classification (based on causal organism) and disease triangle.

Plant diseases: Host, causal organism, symptoms and management of: Little leaf of brinjal, Tobacco mosaic disease, Citrus canker, Tikka disease of groundnut, Late blight of potato, Coffee rust and Algal rust; Biopesticides (Neem, *Bacillus subtilis*, *Trichoderma*, NPV).

Suggested readings

1. Alexopolous, J. and Charles, W. M. 1988. Introduction to Mycology. Wiley Eastern, New Delhi.
2. Chopra, G. L. 1973. Text Book of Algae. S. Nagin and Co. Jalandhar.
3. Dube, H. C. 1983. An Introduction of Fungi. Vikas Publication House, New Delhi.
4. Dutta, A. C. 1998. Botany for Degree Students. Oxford University Press.
5. Ganguli, H. C., Das, K. S. and Datta C. 1935. College Botany. (Vol. II). New Central Book Agency (P) Ltd.
6. Mehrotra, R. S. and Aneja, K. R. 1990. An Introduction of Mycology. Wiley Eastern Ltd.
7. Pandey, B. P. 2001. College Botany Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S. Chand and Company Ltd, New Delhi.
8. Pandey**,** B. P. 2007. Botany for Degree students: Diversity of Microbes, Cryptograms, Cell Biology and Genetics. S. Chand and Company Ltd, New Delhi.
9. Pelczar, M. J. 2001. Microbiology. 5th edition, Tata Mc Graw-Hill Co, New Delhi.
10. Presscott, L., Harley, J. and Klein, D. 2005. Microbiology. 6th edition, Tata McGraw- Hill Co. New Delhi.
11. Sambamurthy, A. V. S. S. 2006. A text book of Plant Pathology. I. K. International Pvt. Ltd., New Delhi.
12. Sambamurthy, A.V.S. S. 2006. A Textbook of Algae. I.K. International Pvt. Ltd., New Delhi.
13. Sharma, O. P. 2006. A Text Book of Thallophyta. McGraw Hill Publishing. Co. New Delhi.
14. Singh, R. S.1984. Introduction to Principles of Plant Pathology. Oxford and IBH Publication Co. Pvt. Ltd, New Delhi.
15. Singh, V., Pande, P. C. and Jain, D. K. 2006. A Textbook of Botany. Rastogi Publications, Meerut.
16. Smith G. M., 1955. Cryptogamic Botany- Algae, Fungi and Lichens. Vol. I. McGraw-Hill Book Co., New York.
17. Srivastava, H. N. 1998. Algae. Pradeep Publications, Jalandar.
18. Srivastava, H. N. 1993. Fungi. Pradeep Publications, Allahabad.
19. Sundarajan, S. 1998. College Microbiology. Vol 1. Vardhana Publications, Bangalore.
20. Sundararajan, S. 1993. College Botany. Vol I and II. Himalaya Publishing Company, Bangalore.
21. Vashishta, B. R., Sinha A. K. and Singh, V. P. 2008. Botany for Degree Students: Algae. S. Chand and Company Ltd, New Delhi.

Scheme of question paper
(Theory)

B.Sc., Degree I Semester Examination
Diversity of Microbes, Algae, Fungi and Phytopathology

Code: HMA250
Time: 3 Hrs **Max Marks: 80**

I. Define/ Explain any EIGHT the following **8 X 1 = 08**
5 from Unit I
3 from Unit II
2 from Unit III

II. Write short notes on any FIVE of the following **5 X 3 = 15**
2 from Unit I
3 from Unit II
2from Unit III

III. Answer any FIVE of the following **5 X 5 = 25**
2 from Unit I
2 from Unit II
3 from Unit III

IV. Describe any FOUR of the following in detail **4 X 8 = 32**
2 from Unit I
2 from Unit II
2from Unit III

Unit	1 Mark	3 Marks	5 Marks	8 Marks	Total
I	1 X 5 = 5	3 X 2 = 6	5 X 2 = 10	8 X 2 = 16	**37**
II	1 X 3 = 3	3 X 3 = 9	5 X 2 = 10	8 X 2 = 16	**38**
III	1 X 2 = 2	3 X 2 = 6	5 X 3 = 15	8 X 2 = 16	**39**

Assessment method

Assessment		Marks
C_1	Assignment	10
C_2	Test	10
C_3	Semester end exam	80

Practical Syllabus
I Semester - Paper I

(DSCB 1.1) Diversity of Microbes, Algae, Fungi and Phytopathology

Code: **HMA250P** **- 64 Hrs (1 Practical of 4 Hrs / week: 2 Credits)**

Equipments used in Microbiology lab: Inoculation loop & needle, Hot air oven, Incubator, Autoclave, Pressure cooker, Laminar air flow chamber, Hemocytometer, Colony counter.
Photographs /Charts of Microbiologists and their contribution
Staining of bacteria: Simple (positive and negative) and Gram staining.
Structure and reproduction of *Spirulina*, *Nostoc* and *Chlorella*
Structure and reproduction of *Oedogonium*
Structure and reproduction of *Caulerpa* and *Sargassum*
Structure and reproduction of *Polysiphonia* and Pennate Diatom
Structure and reproduction of *Rhizopus*, *Albugo*
Structure and reproduction of *Penicillium* and *Puccinia*,
Structure and reproduction of *Fusarium* and Lichens
Host, causal organism, symptoms and management of Sandal spike, TMV, Citrus canker, Algal rust (Avocado)
Tikka disease of Groundnut, Late blight of Potato and Coffee rust
Biopesticides (Neem, *Trichoderma*, *Bacillus subtilis*, NPV)

Assessment method

Assessment		**Marks**
C_1	Continuous assessment (CA)	05
C_2	Submission	05
C_3	Semester end exam	40

Practical Question Paper Scheme
I Semester - Practical I
(DSCB 1.1) Diversity of Microbes, Algae, Fungi, and Phytopathology

Code: HMA250P
Time: 3 Hrs **Max. Marks: 40**

I. Perform the experiment A and leave for evaluation - 07
II. Prepare a temporary stained slide of the materials B & C sketch, label and identify with reasons. Leave the preparation for evaluation - 10
III. Write critical comment on the materials D, E & F - 12
IV. Identify the slides G, H & I with reason -06
V. Record - 05

Practical Question Paper Scheme
I Semester - Practical I
(DSCB 1.1) Diversity of Microbes, Algae, Fungi, and Phytopathology

Code:
Time: 3 Hrs **Max. Marks: 40**

I. Perform the experiment A and leave for evaluation - 07
[Simple staining (positive and negative) / differential staining]
(Principle- 1; Procedure- 2; Performance with result- 4)

II. Prepare a temporary stained slide of the materials B & C sketch, label, and identify with reasons. Leave the preparation for evaluation - 10
(1 from Cyanobacteria/ Algae, 1 from Fungi)
(Identification- 1; Preparation- 2; Reasons with labeled diagram- 2)

III. Write critical comment on the materials D, E & F - 12
(1 each from Fungi, Virus / Bacteria/ Mycoplasma disease and Algae/Lichen)
(Identification- 1, Causal organism- 1, Symptoms and Management- 2)

IV. Identify the slides G, H & I with reason -06
(1 each from Algae/ Cyanobacteria, Fungi and Lichen)
(Identification- 1; Reasons with labeled diagram-1)

V. Record - 05

Note: Each student shall bring the practical record to the practical examination for evaluation without which he / she shall not be allowed to appear for the practical examination.

Theory Syllabus
II Semester - Paper II

(DSCB 1.2) Bryophytes, Pteridophytes, Gymnosperms, Paleobotany and Anatomy of Angiosperms

Code: HMB250 - 48 Hrs (3 Hrs of instruction/ week: 3 Credits)

Course outcome

1. Students will be able to understand the salient features, classification and economic importance of Bryophytes, Pteridophytes and Gymnosperms
2. They will know the Morphology, Anatomy and Reproduction of Bryophytes, Pteridophytes, Gymnosperms and fossil plants included in the syllabus
3. They will acquire the knowledge of geological time scale, fossils and fossilization
4. Students are able to understand various types of tissues and their functions
5. They will understand the anatomical structures of root, stem and leaf of dicots and monocots

Unit I - 15 Hrs

Bryophytes: General characters, classification and economic importance of Bryophytes
Type Study - *Riccia*, *Marchantia*, *Anthoceros* and *Funaria* (Developmental details not required).
Paleobotany: Geological time scale, fossils and fossilization; Types of fossils.
Type study: *Rhynia* and *Cycadeoidea*

Unit II - 15 Hrs

Pteridophytes: General characters classification and economic importance.
Stelar Evolution.
Type study: *Psilotum*, *Selaginella*, *Equisetum*, *Pteris* and *Marsilea* (Developmental details not required); Heterospory and seed habit (Brief account).

Unit III - 15 Hrs

Gymnosperms: General characters, classification and economic importance of Gymnosperms.
Type study: Morphology, Anatomy and Reproduction: *Cycas*, *Pinus* and *Gnetum.*
Anatomy of Angiosperms: Epidermal tissue system (Epidermis, trichomes, stomata and hydathodes) and Secretory tissue (Laticiferous tissues). **- 1 Hrs**
Vascular bundles, types of vascular bundles. **– 1 Hrs**
Anatomy of monocot and dicot root, stem and leaf.
Secondary growth in dicot stem and Anomalous secondary growth in *Dracaena* stem **– 1 Hrs**

Suggested readings

1. Andrews, H. N. 1961. Studies in Paleobotany. John Wiley, New York.
2. Bhatnagar, S. P. and Mitra, A. 1966 Gymnosperms. New age International (P) Ltd. Publishers.
3. Bierhorst, D. W. 1971. Morphology of Vascular Plants. The MacMillan Co., N.Y. and Collier- MacMillan Ltd., London.
4. Chamberlain, C. J. 1935. Gymnosperms- Structure and Evolution. Chicago Press.
5. Chestor, A. A. 1947. Introduction to Palaeobotany. McGraw Hill, London.
6. Coulter, J. M. and Chamberlain, C. J. 1964. Morphology of Gymnosperms. Central Book Depot, Allahabad.
7. Dutta, A. C. 1998. Botany for Degree Students. Oxford University Press.
8. Dutta, S. C. 1966. An Introduction to Gymnosperms. Asia Publications House, Mumbai.
9. Eames, A. J. 1936. Morphology of Vascular Plants (Lower Groups). McGraw Hill, N.Y.
10. Easu, K. 1979. Anatomy of seed plants. Wiley Eastern Ltd. New Delhi
11. Fahn, A. 1969. Plant Anatomy. 2nd Edition, Wiley, New York.
12. Frank, C. 1990. The inter-relationships of the Bryophytes. New Phytologist. Today and Tomorrow's Printers and Publishers.
13. Gangulee, H. C., Kar and Kumar, A. 1982. College Botany- Vol. II. Central Book Agency, Calcutta.
14. Pandey, S. N. and Chadha, A. 2009. Plant Anatomy and Embryology. Vikas Publishing House Pvt Limited.
15. Pandey, S. N., Mishra, S. P. and Trivedi, P. S. 2007. A Textbook of Botany- Vol. II. Rastogi Publications, Meerut.
16. Rashid, A. 1999. An Introduction to Pteridophyta. MKM Publisher Pvt Ltd.
17. Shripad, N. A. 1995. Paleobotany. Oxford and I.B.H. New Delhi.
18. Singh, V., Pande, P. C. and Jain, D. K. 2005. Diversity and Systematics of Seed plants. Rastogi Publications, Meerut.
19. Singh, V., Pande, P. C. and Jain, D. K. 2006. A Textbook of Botany. Rastogi Publications, Meerut.
20. Sporne, K. R. 1971. The Morphology of Gymnosperms: The Structure and Evolution of Primitive seed Plants. Hutchinson University Library, London.
21. Sporne, K. R. 1974. Morphology of Pteridophytes. Hutchinson and Co., London.
22. Tayal M. S. 2004. Plant Anatomy. Rastogi Publications.
23. Vashishta, P. C. 1982. Peridophyta. S. Chand and Co. Ltd., New Delhi.

Theory Question Paper Scheme
II Semester - Paper II

(DSCB 1.2) Bryophytes, Pteridophytes, Gymnosperms, Palaeobotany and Anatomy of Angiosperms

Code: HMB250
Time: 3 Hrs **Max Marks: 80**

Instruction: Draw neat labeled diagrams wherever necessary

I. Define/ Explain any EIGHT of the following **8 X 1 = 08**

2from Unit I
3 from Unit II
2 from Unit III
3 from Anatomy

II. Write short notes on any FIVE of the following **5 X 3 = 15**

2 from Unit I
2 from Unit II
2from Unit III
1 from Anatomy

III. Answer any FIVE of the following **5 X 5 = 25**

2 from Unit I
2 from Unit II
2 from Unit III
1 from Anatomy

IV. Describe any FOUR of the following in detail **4 X 8 = 32**

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Assessment method

Assessment		Marks
C_1	Assignment	10
C_2	Test	10
C_3	Semester end exam	80

Practical Syllabus
II Semester - Practical II
(DSCB 1.2) Pteridophytes, Gymnosperms, Paleobotany and Anatomy of Angiosperms

Code: **HMB250P** **- 64 Hrs. (1 practical of 4 Hrs / week: 2 Credits)**

Meristems, simple and complex tissues
Anatomy of monocot and dicot root
Anatomy of monocot and dicot stem
Anatomy of monocot and dicot leaf
Morphology, anatomy and reproduction of *Marchantia*
Morphology, anatomy and reproduction of *Anthoceros* and *Funaria*
Morphology, anatomy and reproduction of *Psilotum* and *Rhynia*
Morphology, anatomy and reproduction of *Selaginella* and *Equisetum*
Morphology, anatomy and reproduction of *Pteris* and *Marsilea*
Morphology, anatomy and reproduction of *Cycas and Cycadeoidea*
Morphology, anatomy and reproduction of *Pinus*
Morphology, anatomy and reproduction of *Gnetum*
Visit to Geology Museum / Fernarium

Assesment method

Assesment		**Marks**
C_1	Continuous assessment (CA)	05
C_2	Submission / Assignment	05
C_3	Semester end exam	40

Practical Question Paper
II Semester - Practical II
(DSCB 1.2) Pteridophytes, Gymnosperms, Paleobotany, Anatomy of Angiosperms

Code: **HMB250P**
Time: 3 Hrs **Max. Marks: 40**

I. Identify the specimens A, B and C with reasons -09
II. Prepare a temporary stained slide of the material D sketch, label and identify with reasons. Leave the preparation for evaluation. - 05
III. Comment on the materials E, F and G -09
IV. Identify the slides / Chart H, I, J and K with reasons - 12
VI. Record - 05

Practical Question Paper Scheme (2024-25 onwards)
II Semester - Practical II (DSCB 1.2)

Pteridophytes, Gymnosperms, Palaeobotany and Anatomy of Angiosperms

Code: HMB250P
Time: 3 Hrs **Max. Marks: 40**

I. Identify the specimens A, B and C with reasons - 09
(1each from Bryophytes, Pteridophytes and Gymnosperms)
(Identification -1; Reasons with labeled diagram- 2)
II. Prepare a temporary stained slide of the material D sketch, label and identify with reasons. Leave the preparation for evaluation. - 05
(from Anatomy)
(Mounting- 3; Identification- 1; Reasons with labeled diagram- 1)
III. Comment on the materials E, F and G - 09
(1 each from Bryophytes, Pteridophytes and Gymnosperms/Paleobotany)
(Identification- 1; Reasons with labeled diagram- 2)
IV. Identify the slides / Chart H, I, J and K with reasons - 12
(1 each from Bryophytes, Pteridophytes, Gymnosperms and Anatomy of Angiosperms)
(Identification- 1; Reasons with labeled diagram- 2)
VI. Record - 05

Note: Each student shall bring the practical record to the practical examination without which he / she shall not be allowed to appear for the practical examination.