Government PG College for Women Rohtak

Department Of Botany

Syllabi & Field Work Report (2023-24)

1. Copy of syllabi of B.Sc. I, II, III Botany. (Annex. 1,2,3)
2. Programme Name and code (Annex. 4)
3. Practicals in BSc I (Sem1,2), BSc II (Sem3,4) and BSc III (Sem5,6) include field work and project report (Annex. 5)
4. Course Codes (Annex. 4)
5. No of students year wise undertaking field work and project report (Annex. 6)
6. Field Work Report (Annex. 6)
7. Sample Pictures (Annex.7)

Dr Veena Sachdeva
Associate Professor in Botanty

SCHEME OF EXAMINATION FOR B.Sc. (BOTANY) SEMESTER SYSTEM

w.e.f. Session 2023-24

Scheme of B.Sc. 1st Year

Semester I					
Sr. No.	**Paper code**	**Nomenclature**	**Marks+IA**	**Periods / week**	**Exam. Duration**
1.	BOT.1.1	Diversity of Microbes	40+10	4	3 hrs.
2.	BOT 1.2	Cell Biology	40+10	4	3 hrs.
3.	P-101	Practical (1.1& 1.2)	50	8	3hrs
Semester II					
4.	BOT 2.1	Diversity of Archegoniates	40+10	4	3 hrs.
5.	BOT 2.2	Genetics	40+10	4	3 hrs.
6.	P-102	Practical (2.1& 2.2)	50	8	3 hrs
Total Semester I & II			**300**		

Scheme of B.Sc. II (2023-24)

Semester III					
Sr. No.	**Paper code**	**Nomenclature**	**Marks+IA**	**Periods / week**	**Exam. Duration**
1.	BOT 3.1	Biology and Diversity of Seed Plants-I	40+10	4	3 hrs.
2.	BOT 3.2	Plant Anatomy	40+10	4	3 hrs.
3.	P-201	Practical (3.1& 3.2)	50	8	3 hrs
Semester IV					
4.	BOT 4.1	Biology and Diversity of Seed Plants II	40+10	4	3 hrs.
5.	BOT 4.2	Plant Embryology	40+10	4	3 hrs.
6.	P-202	Practical (4.1& 4.2)	50	8	3hrs
Total Semester III & IV			**300**		

Scheme of B.Sc. III (2023-24)

Semester V					
Sr. No.	**Paper code**	**Nomenclature**	**Marks+IA**	**Periods / week**	**Exam. Duration**
1.	BOT 5.1	Plant Physiology	40+10	4	3 hrs.
2.	BOT 5.2	Ecology	40+10	4	3 hrs.
3.	P-301	Practical (5.1& 5.2)	50	8	3hrs
Semester VI					
4.	BOT 6.1	Biochemistry & Plant Biotechnology	40+10	4	3 hrs.
5.	BOT 6.2	Economic Botany	40+10	4	3 hrs.
6.	P-302	Practical (6.1& 6.2)	50	8	3hrs
Total Semester V & VI			**300**		
Grand Total Semester I – VI			**900**		

Note: -

- There will be an internal assessment of 20%, in each theory paper.
- I Period =45 minutes
- Practical examination will be held conducted at the end of each semester.

B.Sc. Botany SEMESTER-I

PAPER CODE: BOT. 1.1 PAPER –I

DIVERSITY OF MICROBES

Internal Assessment-10 Max. Marks – 40

Time- 3 Hours

Note: Attempt five questions in all, selecting one question from each unit.

Question No. 1 is compulsory (short answer type).

Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

Bacteria: Structure, nutrition, reproduction and economic importance **Cyanobacteria**: General characters; life-history of *Nostoc*

Algae: General characters, classification (upto classes) and economic importance; General account of algal blooms

UNIT II

Important features and life-history (excluding development) of *Volvox*, *Oedogonium* (Chlorophyceae), *Vaucheria* (Xanthophyceae), *Ectocarpus* (Phaeophyceae) and *Polysiphonia* (Rhodophyceae)

UNIT-III

Viruses: General account of Viruses including structure of TMV and Bacteriophages

Fungi: General characters, classification (upto classes) and economic importance; General account of Lichens

UNIT- IV

Important features and life-history of *Phytophthora* (Mastigomycotina), *Mucor* (Zygomycotina), *Penicillium* (Ascomycotina), *Puccinia*, *Agaricus* (Basidiomycotina), *Colletotrichum* (Deuteromycotina)

B.Sc. Botany SEMESTER-I

PAPER CODE: BOT. 1.2 PAPER –II CELL

BIOLOGY

Internal Assessment-10 Max. Marks - 40

Time- 3 Hours

Note: Attempt five questions in all, selecting one question from each unit.

Question no. 1 is compulsory (short answer type).

Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

The Cell Envelopes: Structure and functions of Cell Wall, Plasma Membrane, Golgi Apparatus, Endoplasmic Reticulum, Lysosomes, Peroxisomes and Vacuoles

UNIT II

Ultra-structure and function: Chloroplast, Mitochondria, Nucleus and Nucleolus

Chromosome: Morphology, ultra-structure - kinetochore, centromere and telomere

UNIT-III

Cell Cycle: General account

Cell Division: Mitosis and Meiosis - Stages and Significance

UNIT - IV

Chromosomal aberrations: Structural and Numerical - deletions, duplications, translocations, inversions, aneuploidy, polyploidy

Sex chromosomes and Sex determination in Plants

PRACTICALS

B.Sc. 1st Botany (First Semester)

Diversity of Microbes and Cell Biology (Code: P 101)

Max. Marks: 50 Time allotted: 3 Hours

1. Identify, classify and write short morphological notes giving well labelled relevant diagrams on the given two specimens A, B & C (15)

2 Prepare smear/squash and find out two different stages of mitosis/meiosis. Identify and show it to the examiners and also give characters of identification. (12)

3 Identify giving two important characters of identification of the given spots 1, 2, 3,4
(one slide/ material from virus, bacteria, fungi, lichen). (8)

4. Field visit and collection records (5)

5. Practical records (5)

6. Viva-voce (5)

SUGGESTED READINGS

Smith, G.M. 1971. Cryptogamic Botany. Vol.I. Algae & Fungi. Tata McGraw Hill Publishing Co., New Delhi.

Sharma, P.D. 1991. The Fungi. Rastogi & Co., Meerut.

Dube, H.C. 1990. An Introduction to Fungi, Vikas Publishing House Pvt.Ltd., Delhi.

Clifton, A. 1958. Introduction to the Bacteria: McGraw Hill & Co., New York.

Alberts, B.Bray, D.Lewis, J., Raff, M.., Roberts, K. and Watson. I.D. 1999. Molecular Biology of Cell. Garland Publishing Co., Inc., New York, USA.

Atherly, A.G. Girton, J.R. and McDonald, J.F. 1999. The Science of Genetics, Saunders College Publising , Fort Worth, USA.

Gupta, P.K. 1999. A text book of Cell and Molelcular Biology. Rastogi Publications, Meerut, India.

B.Sc. Botany Semester-II

PAPER CODE: BOT. 2.1

PAPER –I DIVERSITY OF ARCHEGONIATES

Internal Assessment-10
Max. Marks – 40
Time- 3 Hours

Note: Attempt five questions in all, selecting one question from each unit. Question No. 1 is compulsory (short answer type).Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

Bryophyta- General characters, classification (upto classes), alternation of generations, evolution of sporophytes and economic importance

UNIT -II

Bryophyta: Structure and reproduction (excluding development) of *Marchantia* (Hepaticopsida), *Anthoceros* (Anthocerotopsida) and *Funaria* (Bryopsida)

UNIT-III

Pteridophyta- General characters, classification (upto classes), alternation of generations, heterospory, apospory, apogamy and economic importance;
General account of stellar evolution

UNIT IV

Pteridophyta: Structure and reproduction (excluding development) of *Rhynia* (Psilopsida), *Selaginella* (Lycopsida), *Equisetum* (Sphenopsida) and *Pteris* (Pteropsida)

B.Sc. Botany SEMESTER-II

PAPER CODE: BOT. 2.2

PAPER –II GENETICS

Internal Assessment-10
Max. Marks – 40
Time- 3 Hours

Note: Attempt five questions in all, selecting one question from each unit.

Question no. 1 is compulsory (short answer type).

Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

Genetic Material: DNA - the genetic material, DNA structure and replication, DNA-Protein interaction, The Nucleosome Model, Genetic Code, Satellite and Repetitive DNA.

UNIT - II

Genetic Inheritance: Mendelism: Laws of Segregation and Independent Assortment; Linkage Analysis; Allelic and non-allelic interactions.

UNIT-III

Extra-nuclear Inheritance: Presence and function of Mitochondrial and Plastid DNA; Plasmids.

Genetic Variations: Mutations - spontaneous and induced; transposable genetic elements; DNA damage and repair.

UNIT - IV

Gene Expression: Modern concept of gene; RNA; Ribosomes; Transfer of genetic information - transcription and translation; Structure of proteins; Regulation of gene expression in prokaryotes and eukaryotes

PRACTICALS

B.Sc. 1st Botany (Second Semester)

Diversity of Archegoniates and Genetics

(Code: P-201)

Max Marks: 50 **Time: 3hrs**

1. Identify, classify and write short morphological notes giving well labelled diagrams on the given two specimens from Bryophytes and Pteridophytes. (12)

2. One numerical regarding genetics (Mendelian inheritance or gene interaction) as per syllabus. (12)

3. Identify giving two important characters of identification of the given spots 1, 2, 3,4 (8)

4. Field Visit and collection records (8)

5. Practical records (5)

6. Viva-voce (5)

SUGGESTED READINGS:

Atherly, A.g. Girton, J.R. and McDonald, J.F. 1999. The Science of Genetics, Saunders College Publishing, Fort Worth, USA.

Gupta, P.K. 1999. A text book of Cell and Molecular Biology. Rastogi Publications, Meerut, India

Kleinsmith, L.J. and Kish, V.M. 1995. Principles of Cell and Molelcular Biology (2nd edition). Harper Collins College Publishers, New York, USA.

Lodish, H., Berk, A., Zipursky, S.L., Matudaria, P., Baltimoe, D. and Darnell, J. 2000. Molecular, Cell Biology, W.H. Freeman and Co., New York, USA.

Russel, P.J. 1998. Genetics, The Benjamin/Cummings Publishing Co. Inc., USA.

Snustad, D.P. and Simmons, M.J. 2000. Principles of Genetics. John Wiley and Sons, Inc. USA.

Smith, G.M. 1971. Cryptogamic Botany, Vol.II, Bryophytes & Pteridophytes. Tata McGraw Hill Publishing Co., New Delhi.

Sharma, O.P. 1992. Text Book of Thallophytes, McGraw Hill Publishing Co.

Sharma, O.P. 1990. Text Book of Pteridophyta, Mc Millan India Ltd.

Puri, P., 1980, Bryophyta, Atma Ram & Sons, Delhi.

Russel, P.J. 1998. Genetics, The Benjamin/Cummings Publishing Co. Inc., USA.

Snustad, D.P. and Simmons, M.J. 2000. Principles of Genetics. John Wiley and Sons, Inc. USA.

B.Sc. Botany
SEMESTER-
III

PAPER CODE: BOT. 3.1

Paper -I BIOLOGY AND DIVERSITY OF SEED PLANTS –I

Internal Assessment-10
Max. Marks - 40
Time – 3 hrs.

Note : Attempt five questions in all, selecting one question from each unit.

Question No.1 is compulsory (short answer type).

Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

General characters, origin and evolution ofGymnosperms
Geological Time Table; Evolution of Seed Habit.
Pilger and Melchior's (1954) system of classification of Gymnosperms.

UNIT-II

Palaeobotany- Fossils and Fossilization (Process involved, types of fossils and importance of fossils);
Reconstruction of the following fossil plants:

Lyginopteris Williamsonia

Cycadeoidea (= ennettites)

UNIT-III

Morphology and anatomy of root, stem, leaf/leaflet and reproductive parts including mode of reproduction, life-cycle and economic importance of following plants:

Cycas

Pinus

UNIT-IV

Morphology and anatomy of root, stem, leaf/leaflet and reproductive parts including mode of reproduction, life-cycle and economic importance of *Ephedra*
Economic importance of Gymnosperms
General characters, origin and evolution of Angiosperms

B.Sc. Botany
SEMESTER-III

PAPER CODE: BOT. 3.2 PAPER-II
PLANT ANATOMY

Internal Assessment-10
Max. Marks - 40
Time – 3 hrs.

Note : Attempt five questions in all, selecting one question from each unit.

Question No.1 is compulsory (short answer type).

Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

Tissues - meristematic and permanent (simple, complex and secretory) Tissue systems (Epidermal, ground and vascular)
The Shoot system - shoot apical meristem and its histological organizations.

UNIT-II

Cambium - structure and functions.
Secondary growth in dicot stem; characteristics of growth rings; sap wood and heart wood, periderm;
Anomalous secondary growth (*Dracaena, Boerhaavia* and *Achyranthes*)

UNIT-III

Leaf: Types of leaves (simple and compound); phyllotaxy. Epidermis-uniseriate and ultiseriate, epidermal appendages and their morphological types.
Anatomy of typical Monocot and Dicot leaf and cell inclusions in leaves, leaf abscission, Stomatal apparatus and their morphological types

UNIT-IV

Root system: Root apical meristem; histological organization
Secondary growth in dicot root.
Structural modifications in roots: Storage (*Beta*), Respiratory (*Rhizophora*), Epiphytic (*Vanda*).

PRACTICALS

B.Sc. IInd Botany (Third Semester)

Biology & Diversity of Seed Plants-I and Plant Anatomy(Code: P 301)

Max. Marks: 50 **Time : 3Hours**

1. Cut the section of given material A and prepare a double-stained permanent mount of the given material. Identify giving reasons and show it to the examiner. (10)

2 Identify, classify and write morphological notes on the given material/specimens B & C from Gymnosperms. (10)

3 Identify, giving the important characters of identification of the spots/specimen 1 and 2 from Gymnosperms and 3 and 4 from angiosperms (10)

4 Filed visit and collection records. (10)

5 Note-book (5)

6 Viva-voce (5)

Suggested Readings

Bhatnagar, S. and Moitra, A. 1996. Gymnosperms. New Age International Limited, New Delhi.

Davis, P.H. and Heywood, V.H. 1963. Principles of Angiosperms Taxonomy, Oliver and Boyd. London.

Gifford, E.M. and Foster, A.S. 1988. Morphology and Evolution of Vascular Plants, W.H. Freeman & Company, New York.

Heywood, V.H. and Moore, D.M. (eds) 1984. Current concepts in Plant Taxonomy. Academic Press, London.

Jeffrey, C. 1982. An introduction to Plant Taxonomy. Cambridge University Press, Cambridge, London.

Jones, S.B. , Jr. Luchsinger, A.E. 1986. Plants Systematics 2nd edition). McGraw Hill Book Co. New York.

Maheshwari, J.K. 1963. Flora of Delhi, CSIR, New Delhi.

Radford, A.E. 1986. Fundamentals of Plant Systamtics. Harper and Row, New York.

Singh, G. 1999. Plant Systematics: Theory and Practical. Oxford and IBH Pvt. Ltd., New Delhi.

Sporn, K.R. 1965. The Morphology of Gymnsperms. Hutchinson & Co. Ltd., London.

Stace, C.A. 1989. Plant Taxonomy and Biosystematics (2nd edition). Edward Arnold, London.

Steward, W.M. Paleobotany and the Evolution of Plants. Cambridge University Press, Cambridge.

B.Sc. Botany SEMESTER- IV

PAPER CODE: BOT. 4.1

PAPER-I BIOLOGY AND DIVERSITY OF SEED PLANTS-II

Internal Assessment-10 Max. Marks – 40
Time – 3 hrs

Note: Attempt five questions in all, selecting one question from each unit. Question No.1 is compulsory (short answer type).Nine questions are to be set spread over the entire syllabus. All questions carry equal marks

UNIT-I

Taxonomy and Systematics, fundamental components of taxonomy (identification, classification, description, nomenclature and phylogeny), Role of chemotaxonomy, cytotaxonomy and taximetrics in relation to taxonomy, Botanical Nomenclature, principles and rules, principle of priority, Keys to identification of plants.

UNIT-II

Type concept, taxonomic ranks, Salient features of the systems of classification of angiosperms proposed by Bentham & Hooker and Engler & Prantl, Floral Terms and Types of Inflorescence

UNIT-III

Diversity of Flowering Plants: Diagnostic features and economic importance of the following families: Ranunculaceae, Brassicaceae, Malvaceae, Euphorbiaceae, Rutaceae, Fabaceae, Cucurbitaceae

UNIT-IV

Diversity of Flowering Plants: Diagnostic features and economic importance of the families: Apiaceae, Asclepiadaceae, Lamiaceae, Solanaceae, Asteraceae, Liliaceae and Poaceae

B.Sc. Botany SEMESTER- IV

PAPER CODE: BOT. 4.2 PAPER-II

PLANT EMBRYOLOGY

Internal Assessment- 10 Max. Marks - 40

Time – 3 hrs.

Note : Attempt five questions in all, selecting two questions from each unit. Question No.1 is compulsory (short answer type). Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

Flower-a modified shoot, Microsporangium, its wall and dehiscence mechanism.

Microsporogenesis, pollen grains and its structure (pollen wall).

UNIT -II

Pollen germination (microgametogenesis), Male gametophyte, Pollen-pistil interaction; self incompatibility, Pollination: types and agencies

UNIT-III

Structure of Megasporangium (ovule), its curvatures; Megasporogenesis and Megagametogenesis,Female gametophyte (mono, bi and tetrasporic), Double fertilization,Endosperm types and its biological importance.

UNIT-IV

Embryogenesis in Dicot and Monocot; Polyembryony, Structure of Dicot and Monocot seed, Fruit types; Dispersal mechanisms in fruits and seeds.

PRACTICALS

B.Sc. IInd Botany (Fourth Semester)

Max. Marks: 50 Time: 3Hours

1 Describe/compare the given flowers A and B in semi-technical language giving V.S. of flowers, T.S. of ovaries, floral diagrams and Floral Formulae. Identify and assign them to their respective families giving reasons. (12)

2 Dissect out the globular/heart-shaped embryo from the given material. (10)

3 Identify, giving the important characters of identification of the spots 1, 2 and 3 from embryology (9)

4 Field visit and collection records. (9)

5 Practical records (5)

6 Viva-voce (5)

7 Suggested Readings

Bhojwani, S.S. and Bhatnagar, S.P. 2000. The Embryology of Angiosperms. 4th revised and enlarge edition. Vikas Publishing House, Delhi.

Cutter, E.G. 1969. Plant Anatomy Part-I, Cells and Tissues, Edward Arnold, London.

Cutter, E.G. 1971. Plant Anatomy: Experiment and Interpretation. Part-II Organs, Edward Arnold London.

Esau, K. 1977. Anatomy of Seed Plants, 2nd edition. John Wiley & Sons, New York.

Fageri, K and Van der Pijl 1979. The Principles of Pollination Ecology. Pergamon Press, Oxford.

Fahn, A. 1974. Plant Anatomy, 2nd Edition. Pergamon Press, Oxford.

Hartmann, H.T. and Kestler, D.E. 1976. Plant Propagation; Principles and Practices. 3rd edition. Prentice Hall of India Pvt. Ltd. New Delhi

King. J. 1997. Reaching for the Sun: How Plants Works. Cambridge University Press, Cambridge, U.K.

Mauseth, J.D. 1988. Plant Anatomy. The Benjamin/Cummings Publishing Company Inc. Menlo Park, California, USA.

Proctor, M and Yeo, P. 1973. The Pollination of Flowers. William Collins Sons, London.

Raven, P.H. Evert, R.F. and Eichhorn, S.E. 1999. Biology of Plants. 5th edition. W.R. Freeman and Co., Worth Publishers, New York.

Thomas, P. 2000. Trees: Their Natural History. Cambridge University Press, Cambridge.

B. Sc. III (Botany)

Syllabus PAPER CODE:

BOT. 5.1

SEMESTER-V

Paper – I Plant Physiology

Internal Assessment-10 Max. Marks – 40
Time – 3 hrs.

Note: Five questions to be attempted in all, selecting one question from each unit. Question No. 1 will be compulsory (short answer type). Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

Plant-water relations: Importance of water to plant life; physical properties of water; imbibition, diffusion and osmosis; absorption and transport of water; transpiration; physiology of stomata.

Mineral nutrition: Essential macro and micro elements and their role; mineral uptake; deficiency symptoms.

UNIT -II

Transport of organic substances: Mechanism of phloem transport; source-sink relationship; factors affecting translocation.

Photosynthesis : significance; historical aspects; photosynthetic pigments; action spectra and enhancement effects; concept of two photosystems; Z-scheme; photo-phosphorylation; Calvin cycle; C4 pathway; CAM plants; photorespiration.

UNIT-III

Growth and development : Definitions; phases of growth and development; seed dormancy; plant movements; the concept of photoperiodism; physiology of flowering; florigen concept; physiology of senescence; fruit ripening;

UNIT -IV

Plant hormones- auxins, gibberellins, cytokinins, abscissic acid and ethylene, history of their discovery, mechanism of action; photo-morphogenesis;

Phytochromes and their discovery, physiological role and mechanism of action.

Suggseted Readings:

1. Dennis,D.T., Turpin, D.H., Lefebvre,D.D. and Layzell (eds.). 1997: Plant Metabolism (2nd Edition), Longman, Essex, England.
2. Galston, A.W. 1989: Life Processes in Plants, Scientific American Library, Springer-Verlag, New York, USA.
3. Hopkins, W.G., 1995: Introduction to Plant Physiology, John Wiley & Sons, Inc., New York, USA.
4. Mohr, H. and Schopfer, P. 1995: Plant Physiology. Springer-Verlag, Berlin Germany.

B. Sc. III (Botany) Syllabus SEMESTER-V

PAPER CODE: BOT. 5.2

Paper - II Ecology

Internal Assessment-10
Max. Marks – 40
Time – 3 hrs.

Note: Five questions to be attempted in all, selecting two questions from each unit. Question No. 1 will be compulsory (short answer type). Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

Introduction to Ecology: Definition; scope and importance; levels of organization . Environment: Introduction; environmental factors- climatic (water, humidity, wind, light, temperature), edaphic (soil profile, physico-chemical properties), topographic and biotic factors (species interaction).

UNIT-II

Adaptations of plants to water stress and salinity (morphological and anatomical features of hydrophytes, xerophytes and halophytes).

Population ecology: Basic concept; characteristics; biotic potential, growth curves; ecotypes and ecads.

UNIT-II

Community ecology: Concepts; characteristics (qualitative and quantitative analytical and synthetic); methods of analysis; ecological succession.

Ecosystem: Structure (components) and functions (trophic levels, food chains, food webs, ecological pyramids and energy flow)

Biogeochemical cycles: Carbon, nitrogen, phosphorus and hydrological cycle.

UNIT-IV

Phyto-geography: Phyto- geographical regions of India; vegetation types of India (forests). Environmental pollution: Sources, types and control of air and water pollution.

Global change: Greenhouse effect and greenhouse gases; impacts of global warming; carbon trading; Ozone layer depletion; Biomagnification

Suggested Readings:

1. Odum, E.P. 1983: Basic Ecology, Saunders, Philadelphia.
2. Kormondy, E.J. 1996: Concepts of Ecology, Prantice-Hall of India Pvt. Ltd., New Delhi.
3. Mackenzie, A. et al. 1999: Instant Notes in Ecology, Viva Books Pvt. Ltd., New Delhi.

Semester V Practical

Plant Physiology and Ecology (P-501)

Max. Marks: 50 **Time: 3hrs.**

1. Devise an experiment to demonstrate the physiological process (As per list).Perform it and show it to the examiner.	12
2. Comment on physiological experiment (Specimen set up/ model/chart).	10
3. Ecological experiment/ecological specimen (As per list)	12
4. Note Book, Collection and field report	10
5. Viva-voce	6

B.Sc. Botany SEMESTER-VI

PAPER CODE: BOT. 6.1

Paper – I Biochemistry and PlantBiotechnology

Internal Assessment-10 Max.

Marks –40 Time – 3 hrs

Note: Five questions to be attempted in all, selecting two questions from each unit.

Question No. 1 will be compulsory (short answer type). Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

Basics of Enzymology: Discovery and nomenclature; characteristics of enzymes; concept of holoenzyme, apoenzyme, coenzyme and co-factors; regulation of enzyme activity; mechanism of action.

UNIT-II

Respiration: ATP – the biological energy currency; aerobic and anaerobic respiration; Krebs cycle; electron transport mechanism (chemiosmotic theory); redox -potential; oxidative phosphorylation; pentose phosphate pathway.

UNIT-III

Lipid metabolism: Structure and functions of lipids; fatty acid biosynthesis; β-oxidation; saturated and unsaturated fatty acids; storage and mobilization of fatty acids.

Nitrogen metabolism: Biology of nitrogen fixation; importance of nitrate reductase and its regulation; ammonium assimilation.

UNIT-IV

Genetic engineering and Biotechnology: Tools and techniques of recombinant DNA technology; cloning vectors; genomic and cDNA library; transposable elements; aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis; biology of *Agrobacterium*; vectors for gene delivery and marker genes.

Suggested Readings:

1. Bhojwani, S.S. 1990: Plant Tissue Culture Applications and Limitations. Elsevier Science Publishers, New York, USA.
2. Lea, P.J. and Leegood, R.C. 1999:Plant Biochemistry and Molecular Biology, John Wiley & Sons, Chichester, England.
3. Old, R.W. and Primrose, S.B. 1989: Principles of Gene Manipulation, Blackwell Scientific Publications, Oxford, UK.
4. Raghavan, V. 1986: Embryogenesis in Angiosperms: A Developmental and Experimental Study, Cambridge University Press, New York, USA.

SEMESTER-VI PAPER CODE: BOT. 6.2

Paper – II Economic Botany

Internal Assessment-10

Max. Marks – 40 **Time – 3 hrs.**

Note: Five questions to be attempted in all, selecting two questions from each unit.

Question No. 1 will be compulsory (short answer type). Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

UNIT-I

Vavilov's centres of origin of crop plants, Origin, distribution, botanical description, brief idea of cultivation and economic uses of the following:

Food plants - cereals (rice, wheat and maize), pulses (gram, arhar and pea), vegetables (potato, tomatoand onion).

UNIT-II

Origin, distribution, botanical description, brief idea of cultivation and economic uses of the following:

Fibers- cotton, jute and flax.

Oils- groundnut, mustard, sunflower and coconut.

UNIT-III

Morphological description, brief idea of cultivation and economic uses of the following:

Spices- coriander, ferula, ginger, turmeric, cloves.

Medicinal plants- *Cinchona, Rauwolfia, Atropa, Opium, Cannabis, Azadirachta, Withania*.

UNIT-IV

Botanical description, processing and uses of:

Beverages- tea and coffee;

Rubber - *Hevea*;

Sugar- sugarcane

General account and sources of timber; energy plantations and bio-fuels.

Semester VI

Practical

Semester V Practical

Plant Physiology and Ecology (P-501)

Max. Marks: 50 **Time: 3hrs.**

1. Devise an experiment to demonstrate the physiological process (As per list).Perform it and show it to the examiner.	12
2. Comment on physiological experiment (Specimen set up/ model/chart).	10
3. Ecological experiment/ecological specimen (As per list)	12
4. Note Book, Collection and field report	10
5. Viva-voce	6

Suggested Readings:

1. Kocchar, S.L. 1998: Economic Botany in Tropics, 2nd edition, MacMillan India Ltd., New Delhi.
2. Sambammurthy, A.V.S.S. And Subramanyam, N.S. 1989: A Textbook of Economic Botany, Wiley Eastern Ltd., New Delhi.
3. Sharma, O.P. 1996: Hills Economic Botany (Late Dr. A.F. Hill adapted by O.P. Sharma), Tata McGraw Hill Co. Ltd., New Delhi.
4. Simpson, B.B. and Conner-Ogorzaly, M. 1986: Economic Botany- Plants in Our World, McGraw Hill, New York

SCHEME OF EXAMINATION FOR B.Sc. (BOTANY) SEMESTER SYSTEM

w.e.f. Session 2023-24 Scheme of B.Sc. 1st Year

Semester I					
Sr. No.	**Paper code**	**Nomenclature**	**Marks+IA**	**Periods / week**	**Exam. Duration**
1.	BOT.1.1	Diversity of Microbes	40+10	4	3 hrs.
2.	BOT 1.2	Cell Biology	40+10	4	3 hrs.
3.	P-101	Practical (1.1& 1.2)	50	8	3hrs
Semester II					
4.	BOT 2.1	Diversity of Archegoniates	40+10	4	3 hrs.
5.	BOT 2.2	Genetics	40+10	4	3 hrs.
6.	P-102	Practical (2.1& 2.2)	50	8	3 hrs
Total Semester I & II			**300**		

Scheme of B.Sc. II 2023-24

Semester III					
Sr. No.	**Paper code**	**Nomenclature**	**Marks+IA**	**Periods / week**	**Exam. Duration**
1.	BOT 3.1	Biology and Diversity of Seed Plants-I	40+10	4	3 hrs.
2.	BOT 3.2	Plant Anatomy	40+10	4	3 hrs.
3.	P-201	Practical (3.1& 3.2)	50	8	3 hrs
Semester IV					
4.	BOT 4.1	Biology and Diversity of Seed Plants II	40+10	4	3 hrs.
5.	BOT 4.2	Plant Embryology	40+10	4	3 hrs.
6.	P-202	Practical (4.1& 4.2)	50	8	3hrs
Total Semester III & IV			**300**		

Scheme of B.Sc. III 2023-24

Semester V					
Sr. No.	**Paper code**	**Nomenclature**	**Marks+IA**	**Periods / week**	**Exam. Duration**
1.	BOT 5.1	Plant Physiology	40+10	4	3 hrs.
2.	BOT 5.2	Ecology	40+10	4	3 hrs.
3.	P-301	Practical (5.1& 5.2)	50	8	3hrs
Semester VI					
4.	BOT 6.1	Biochemistry & Plant Biotechnology	40+10	4	3 hrs.
5.	BOT 6.2	Economic Botany	40+10	4	3 hrs.
6.	P-302	Practical (6.1& 6.2)	50	8	3hrs
Total Semester V & VI			**300**		
Grand Total Semester I – VI			**900**		

Note: -

There will be an internal assessment of 20%, in each theory paper. I Period =45 minutes

Practical examination will be held conducted at the end of each semester.

PRACTICALS

B.Sc. 1st Botany (First Semester)

Diversity of Microbes and Cell Biology (Code: P 101)

Max. Marks: 50 Time allotted: 3 Hours

2. Identify, classify and write short morphological notes giving well labelled relevant diagrams on the given two specimens A, B & C (15)

4 Prepare smear/squash and find out two different stages of mitosis/meiosis. Identify and show it to the examiners and also give characters of identification. (12)

5 Identify giving two important characters of identification of the given spots 1, 2, 3,4
(one slide/ material from virus, bacteria, fungi, lichen). (8)

4. Field visit and collection records (5)

5. Practical records (5)

6. Viva-voce (5)

PRACTICALS

B.Sc. 1st Botany (Second Semester)

Diversity of Archegoniates and Genetics

(Code: P-201)

Max Marks: 50 **Time: 3hrs**

1. Identify, classify and write short morphological notes giving well labelled diagrams on the given two specimens from Bryophytes and Pteridophytes. (12)

2. One numerical regarding genetics (Mendelian inheritance or gene interaction) as per syllabus. (12)

3. Identify giving two important characters of identification of the given spots 1, 2, 3,4 (8)

4. Field Visit and collection records (8)

5. Practical records (5)

6. Viva-voce (5)

PRACTICALS

B.Sc. IInd Botany (Third Semester)

Biology & Diversity of Seed Plants-I and Plant Anatomy(Code: P 301)

Max. Marks: 50 **Time : 3Hours**

2. Cut the section of given material A and prepare a double-stained permanent mount of the given material. Identify giving reasons and show it to the examiner. (10)

2 Identify, classify and write morphological notes on the given material/specimens B & C from Gymnosperms. (10)

3 Identify, giving the important characters of identification of the spots/specimen 1 and 2 from Gymnosperms and 3 and 4 from angiosperms (10)

4 Filed visit and collection records. (10)

5 Note-book (5)

6 Viva-voce (5)

PRACTICALS

B.Sc. IInd Botany (Fourth Semester)

Max. Marks: 50 Time: 3Hours

8 Describe/compare the given flowers A and B in semi-technical language giving V.S. of flowers, T.S. of ovaries, floral diagrams and Floral Formulae. Identify and assign them to their respective families giving reasons. (12)

9 Dissect out the globular/heart-shaped embryo from the given material. (10)

10 Identify, giving the important characters of identification of the spots 1, 2 and 3 from embryology (9)

11 Field visit and collection records. (9)

12 Practical records (5)

13 Viva-voce (5)

Semester V Practical

Plant Physiology and Ecology (P-501)

Max. Marks: 50 **Time: 3hrs.**

1. Devise an experiment to demonstrate the physiological process (As per list).Perform it and show it to the examiner.	12
2. Comment on physiological experiment (Specimen set up/ model/chart).	10
3. Ecological experiment/ecological specimen (As per list)	12
4. Note Book, Collection and field report	10
5. Viva-voce	6

Semester VI

Practical

Semester V Practical

Plant Physiology and Ecology (P-501)

Max. Marks: 50 **Time: 3hrs.**

1. Devise an experiment to demonstrate the physiological process (As per list).Perform it and show it to the examiner.	12
2. Comment on physiological experiment (Specimen set up/ model/chart).	10
3. Ecological experiment/ecological specimen (As per list)	12
4. Note Book, Collection and field report	10
5. Viva-voce	6

Government PG College for Women Rohtak

Department Of Botany

Student Strength and details of Field Work/Project Report

(2023-24)

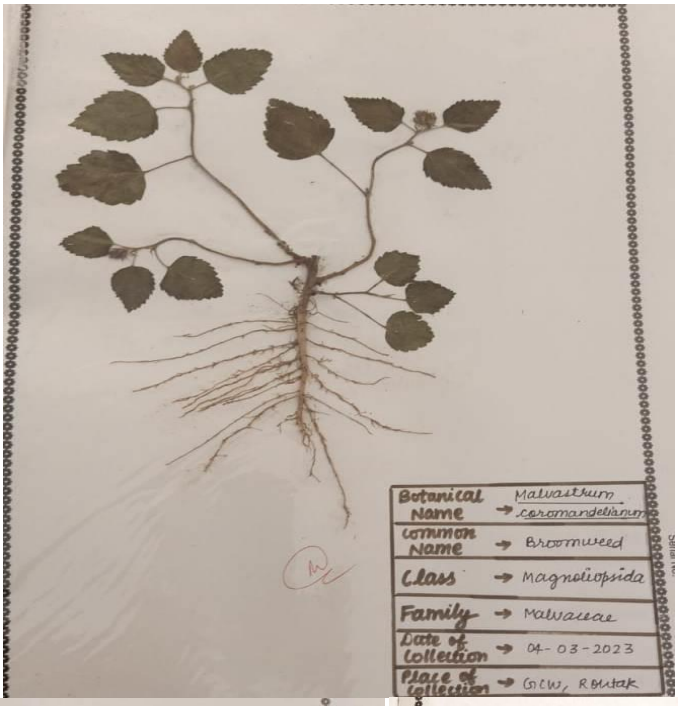
S.No	Session	Class/Sem.	Total no. of students	Field Work/Project Report: Place of Work
B.Sc 1st (Med. Botany)				
1.	2023-24	1st Sem.	213	Collection and identification of Algal and fungal (diseased plant) samples from college campus, water bodies around the campus and native places of students
		2nd Sem.	205	Collection and identification of Bryophyte and Pteridophyte samples from college campus, near water bodies/moist areas, around the campus and native places of students
S.No	**Session**	**Class/Sem.**	**Total no. of students**	**Field Work/Project Report: Place of Work**
B.Sc2nd (Med. Botany)				
2.	2023-24	3rd Sem.	162	Collection and identification of Herbarium specimen from Gymnosperms, Types/Modifications of Stems and leaves from college campus, around the campus and native places of students
		4th Sem.	161	Collection and identification of Herbarium specimen from angiosperm families from college campus, around the campus and native places of students

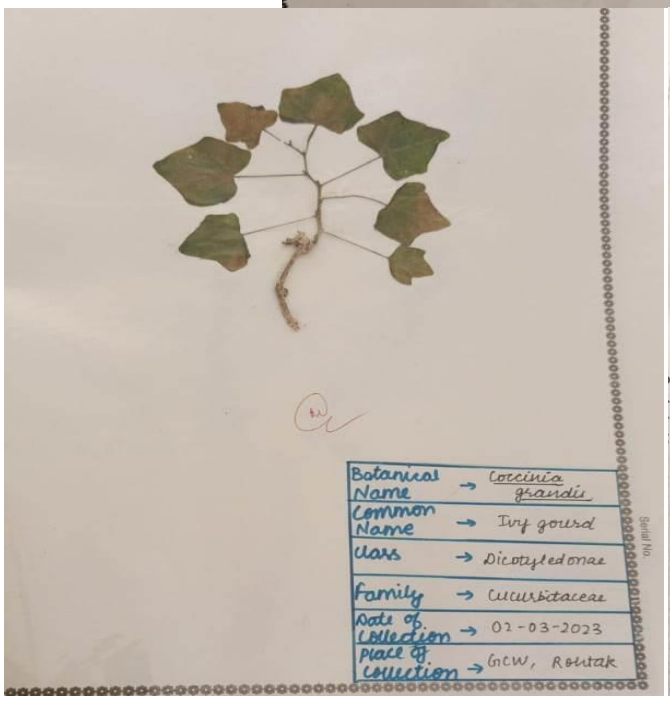
S.No	Session	Class/Sem.	Total no. of students	Field Work/Project Report: Place of Work
B.Sc3rd (Med. Botany)				
	2023-24	5th Sem.	131	Plant specimen showing Adaptations to water stress and salinity (morphological features of hydrophytes, xerophytes and halophytes).
		6th Sem.	131	Collection and identification of specimen (Botanical/Morphological description, brief idea of cultivation processing, sources and economic uses) of the Food plants ,Vegetables, Fibers plants, Spices, Medicinal plants, Beverages, Rubber, Sugar, Timber, Energy plantations and bio-fuels.

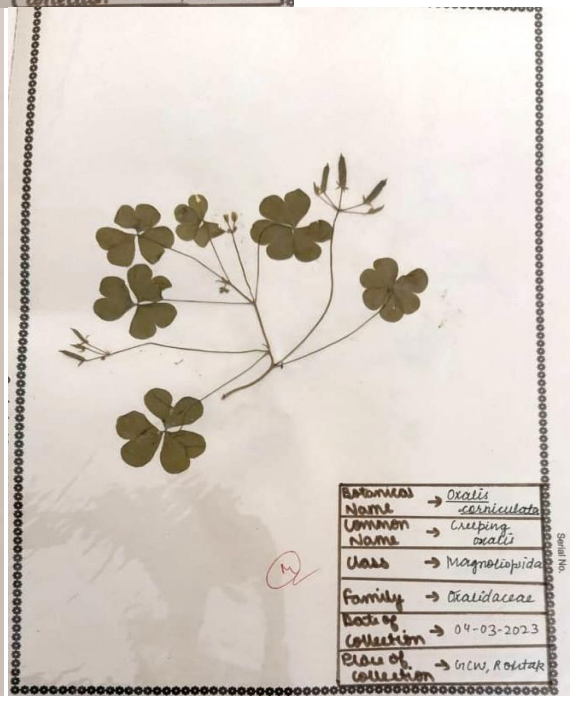
Dr Veena Sachdeva
Associate Professor in Botany

Collection: B.Sc1st (Med. Botany)

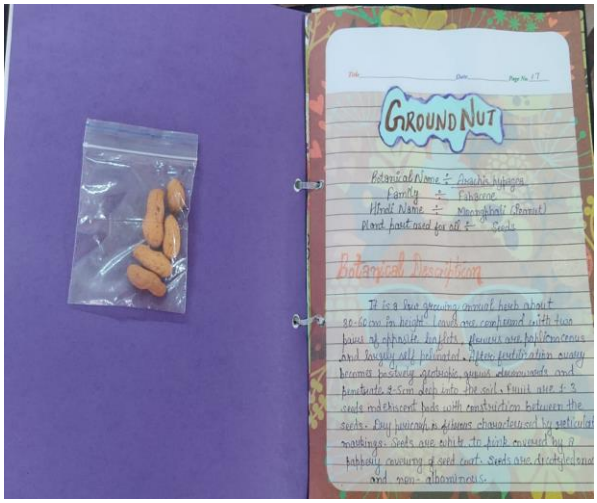
Collection: B.Sc2nd (Med. Botany)

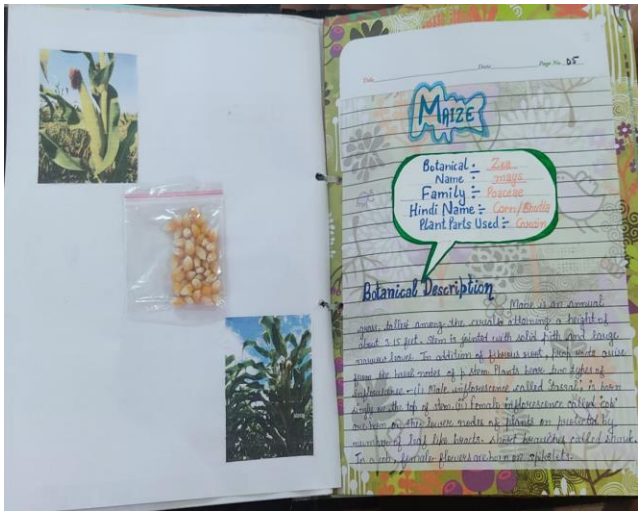


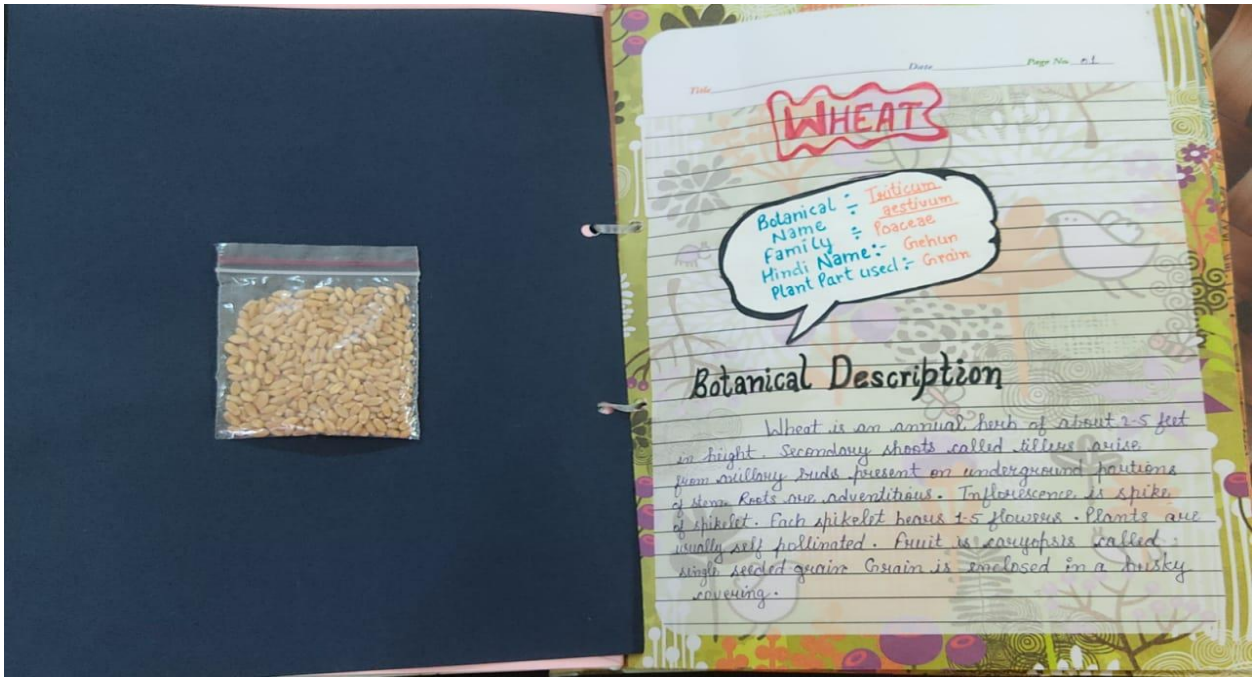




Collection: B.Sc3rd (Med. Botany)







1.3.3 Percentage of students undertaking project work/field work/internship (2022-23)

Programme name	Program Code	List of students undertaking project work/field work/internship	Link to the relevant document
B.Sc Medical Ist year Practicals: Collection	P-101(1.1&1.2) P-102 (2.1&2.2)	205 Students	Annex 1
B.Sc Medical 2nd year Practicals: Herbarium	P-201(3.1&3.2) P-202 (4.1&4.2)	161 Students	Annex 2
B.Sc Medical 3rd year Practicals: Project Report	P-301(5.1&5.2) P-302 (6.1&6.2)	131 Students	Annex 3

Annex 6 (I)

List of students undertaking Field work (Collection) Botany

B.Sc. 1 (P 101 and P102)

1	1230240002
2	1230240004
3	1230240005
4	1230240006
5	1230240008
6	1230240009
7	1230240010
8	1230240011
9	1230240012
10	1230240013
11	1230240014
12	1230240016
13	1230240017
14	1230240018
15	1230240019

16	1230240020
17	1230240022
18	1230240024
19	1230240025
20	1230240026
21	1230240027
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23	1230240029
24	1230240030
25	1230240031
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27	1230240034
28	1230240035
29	1230240037
30	1230240038
31	1230240039
32	1230240040
33	1230240041
34	1230240043
35	1230240044
36	1230240045
37	1230240046
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47	1230240059
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92	1230240111
93	1230240113
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95	1230240116
96	1230240119
97	1230240120
98	1230240121
99	1230240122
100	1230240123
101	1230240125

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186	1230240220
187	1230240221

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189	1230240223
190	1230240224
191	1230240225
192	1230240226
193	1230240227
194	1230240228
195	1230240229
196	1230240230
197	1230240231
198	1230240232
199	1230240233
200	1230240234
201	1230240235
202	1230240236
203	1230240237
204	1230240238
205	1230240239

Annex 6(II)

List of students undertaking Field work (Herbarium) Botany

B.Sc. II (P 201 and P202)

Sr.No	Class Roll No
1	11106
2	1211331030022
3	1211331030057
4	1211331030124
5	1221261030014
6	1221331030001
7	1221331030006
8	1221331030008
9	1221331030010
10	1221331030014
11	1221331030016
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14	1221331030021
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156	1221331030254
157	1221331030255
158	1221331030258
159	1221331030259
160	1221331030261
161	1221331049003

Annex 6(III)

List of students undertaking Field work (Project) Botany
B.Sc. III (P 301 and P302)

Sr.No	Roll no
1	1211331030002
2	1211331030003
3	1211331030004
4	1211331030005
5	1211331030006
6	1211331030007
7	1211331030008
8	1211331030010
9	1211331030011
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11	1211331030014
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104	1211331030176
105	1211331030180
106	1211331030181
107	1211331030182
108	1211331030183

109	SWIN KUMARI	120133030179
110	BHARTI	120133030180
111	SAKSHI	120133030182
112	NIDHI	120133030184
113	ANSHIKA	120133030187
114	TANNU	120133030191
115	EKTA	120133030192
116	ASHA	120133030193
117	MUSKAN	120133030194
118	POOJA	120133030195
119	REEMA	120133030196
120	DEEPANSHI	120133030197
121	ANSHU	120133030199
122	PRIYA	120133030202
123	TANNU	120133030203
124	ASHU	120133030205
125	SHEETAL	120133030206
126	TAMANNA	120133030208
127	BHUMIKA	120133030209
128	ANOOTHI YADAV	120133030210
129	RAKHI	120133030212
130	GARIMA	120133030213
131	MAHAK	120133030219

Dr Veena Sachdeva
Associate Professor in Botanty