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Scheme

S.No	Subject Code	Subject Title	Marks Allotted						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	BSB 111	Diversity of Microbes & Cryptogams	20	8	80	27	50	17	**150**
2	BSB 121	Cell Biology & Genetics	20	8	80	27	50	17	**150**
3	BSB 131	Diversity & systematics of seed plants	20	8	80	27	50	17	**150**
4	BSB 141	Sructure, development & reproduction in flowering plants	20	8	80	27	50	17	**150**
5	BSB 151	Plant physiology and biochemistry	20	8	80	27	50	17	**150**
6	BSB 161	Plant ecology, biodiversity and phytogeography	20	8	80	27	50	17	**150**

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First Semester Scheme & Syllabus

S.No	Subject Code	Subject Title	Marks Allotted						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	**BSB 111**	**Diversity of Microbes & Cryptogams**	**20**	**8**	**80**	**27**	**50**	**17**	**150**

Unit-1

Viruses- Mycoplasma and Bacteria : characteristics of viruses and mycoplasma, general account of TMV and T4 bacteriophage. Bacterial structure, nutrition, reproduction and economic importance; general account of Cynobacteria.

Unit-2

Algae - General characters, classification and economic importance; important features and life history of Chlorophyceae- Volvox, Oedogonium, Charophyceae-Chara Xanthophyceae - Vaucheria, Phaeophyceae - Ectocarpus, Sargassum, Rhodophyceae -Polysiphonia.

Unit-3

Fungi- general characters, classification and economic importance, important features and life history of Mastigomycotina- Phytophthora, Zygomycotiana-Mucor. Asco mycotina -Aspergillus, Peziza, Basidomycotina- Puccinia, Deurteromycotina- Cercospora, Colletotrichum, general account of Lichens.

Unit-4

Bryophyta - Classification, study of morphology, anatomy, reproduction of Hepaticopsida, Riccia, Marchantia, Anthrocerotopsida Anthoceros, Bryopsida- Polytrichum

Unit-5

Pteridophyta - Important characters and classification. Stelar organization. Morphology and anatomy of Rhynia. Structure, anatomy and reproduction in Lycopodium, Selaginella, Equisetum and Marsilea.

Suggested Books :

1.G.M. Smith 1971 Cryptogamic Botany. Vol - I Algae & Fungi Tata McGrraw Hill Pub. Co. New Delhi.
2.G.M. Smith 1971 Cryptogamic Botany. Vol -II Bryophytes & Pteridophytes. Tata McGrraw Hill Pub. Co. New Delhi.
3.O.P.Sharma,1992. Text book of Thallophyta McGrraw Hill Pub. Co.
4.O.P.Sharma,1990. Text book of Pteridophyta McMillan India Ltd .
5.P.D.Sharma 1991. The Fungi. rastogi & Co. Meerut.
6.H.C. Dubey.1990. an introduction of Fungi.Vikas Pub. house pvt.ltd.
7.P.Puri 1980. Bryophyta Atma Ram & Sons, Delhi.
8.A.Clifton.1958. Introduction to the Bacteria. Mcgrew Hillpub. Co.New delhi.

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Practical Work : Semester-I

Scheme of practical examination Marks:

Algae / Fungi	05	Brophyta	10	Pteridophyta	10
Plant disease	05	Spoting	10	Sessional	10
Total	50				

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Second Semester, Scheme & Syllabus

S.No	Subject Code	Subject Title	Marks Allotted						
			Assignment Marks		Theory Marks		Practical Marks		Total Marks
			Max	Min	Max	Min	Max	Min	
1	**BSB 121**	**Cell Biology & Genetics**	**20**	**8**	**80**	**27**	**50**	**17**	**150**

Unit-1

The cell envelope: plasma membrane, bilayer lipid structure,function of the cell wall. Structure and function of cell organells: Golgibodies,ER, Peroxisome, Vacuole, Chloroplast and Mitochondrion.

Unit-2

Ultrastructure and function of nucleus: Nuclear membrane, Nucleolus, Extranuclear genome, Presence and functions of mitochondrial and plastid-DNA,Plasmids. chromosomal organization; morphology ,centromere and telomere, special types of chromosome, Mitosis and Meiosis

Unit-3

Variations in chromosomes structure : Deletions, duplications translocations. inversions; variation in chromosome number, aneuploidy, polyploidy, DNA the genetic material, DNA structure and replication, the nucleosome model, satellite and repetitive DNA.

Unit-4

Structure of gene: genetic code, transfer of genetic information; trascription, translation, protein syntesis, tRNA, and ribosomes. Regulation of gene expression in prokaryotes and eukaryotes.

Unit-5

Genetic inheritance: Mendelism; laws of segregation and independent assortment; linkage analysis; interactions of genes. Genetic variations; mutations, spontaneous and induced; transposable elements; DNA damage and repair.

Suggested Books :

1. Alberts B.D. Lewis, J.Raff, M.Rubers, K. and Watson I.D. 1999 molecular Biology of cell Garland Pub. Co. Inc. New York, U.S.A.
2. P.K. Gupta 1999 A text Book of cell and Molecular Biology, Rastogi Pub. Meerut India.
3. Kleinsmith L.J. and Molecular Biology (2nd edition) Harper Collins College pub. New York USA.
4. P.K. Gupta Genetic's Rastogi Pub. Meerut.
5. Sinha & Sinha cytogenetics & plant Breeding Vikas Pub.

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Practical Work : Semester-II

Scheme of practical examination

Marks:	
Mitosis/Meiosis	10
Genetic problem	10
Cell and Cell inclusions	10
Spotting	10
Sessional	10
Total	50

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Second Semester, Scheme & Syllabus

Subject Code	Subject Title	Marks Allotted						
		Assignment Marks		Theory Marks		Practical Marks		Total Marks
		Max	Min	Max	Min	Max	Min	
BSB 131	Diversity & systematics of seed plants	20	8	80	27	50	17	150

UNIT – 1

Characteristics and Classification of Gymnosperms, Heterospory and Origin of Seed Habit, Evolution and Diversity of Gymnosperms, Geological Time Scale, and Fossilization.Fossil Gymnosperms: Lyginopteris and Lagenostoma.

UNIT – 2

Morphology, Anatomy Reproduction and life cycle of Cycas, Pinus and Ephedra.

UNIT – 3

Origin and Evolution of Angiosperms, Fundamental components of α, β, γ taxonomy, Plant Identification, Principles and rules of Botanical Nomenclature, Herbarium and Botanical gardens; Classification of Angiosperms: Bentham and Hooker, and Hutchinson, Modern trends in Taxonomy.

UNIT –4

Diagnostic characteristics and Economic Importance of Families –Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Fabaceae, and Apiaceae.

UNIT – 5

Diagnostic characteristics & Economic Importance of Families –Asteraceae, Asclepiadaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Liliaceae and Poaceae.

Practical Exercises + Scheme (Marks- 50)

Gymnosperms- 10

-Morphological and anatomical study of Cycas, Pinus, and Ephedra (all parts).

- Study of permanent slides of Cycus, Pinus and Ephedra.

Angiosperms- 15

-Study of types of inflorescence and flowers with labelled sketches.

- Technical description of common flowering plants belonging to families mentioned in theory syllabus.

Spotting- 10

Viva- voce- 5

Practical record - 10

SUGGESTED READINGS:--

1. Agarwal, S.B. 2007. Unified Botany, Shivlal Agarwal & Company Indore.
2. Bhatnagar, S. P. and Moitra 1996. Gymnosperms. New Age International Limited, New Delhi.
3. Davis, P.H. and Heywood, V.H. 1963, Principles of Angiosperm taxonomy. Oliver and Boyd, London.
4. Gangulee, H. C. & Kar, A. K. 2006. College Botany Voll.III, New Central Book Agency (P) Ltd. Kolkata, 700009.
5. Heywood, V.H. and Moore, D.M. (eds) 1984. Current concepts in plant taxonomy. Academic press London.
6. Jeffery, C. 1982. An Introduction of plant taxonomy. Cambridge University Press Cambridge, London.
7. Jones, S.B. Jr. and Luchsinger, A.E. 1986. Plant Systematic. Mc Graw Hill Book Co. New York.
8. Kaushik, M.P. 2003. Modern Textbook of Botany, Prakash Publication Muzaffar Nagar U.P.
9. Mukherjee, S.K. 2006. College Botany Voll.II, New Central Book Agency (P) Ltd. Kolkata, 700009.
10. Pandey, B. P. 2010. A Text book of Botany- Angiosperms, S. Chand & Company Ltd. Ramnagar, New Delhi- 110055.
11. Radford, A.E. 1986. Fundamentals of Plant Systmatics, Happer and Raw, New York.
12. Saxena and Sarabhai. 1989. Text book of Botany. Rastogi Publication Meerut.
13. Singh, G. 1999. Plant Systematics : Theory and Practice. Oxford and IBH Pvt. Ltd. New Delhi.
14. Vasishta, P.C. 2005. Botany for degree students Voll. V, Gymnosperms. S. Chand & Company Ltd. Ramnagar, New Delhi- 110055.

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Second Semester, Scheme & Syllabus

Subject Code	Subject Title	Marks Allotted						
		Assignment Marks		Theory Marks		Practical Marks		Total Marks
		Max	Min	Max	Min	Max	Min	
BSB 141	Structure, development & reproduction in flowering plants	20	8	80	27	50	17	150

UNIT –1

The Root system: Root apical meristems, Differentiation of primary and secondary tissues and their roles, Anatomy of Monocot and Dicot roots, Morphological modification of root for storage, respiration, reproduction and interaction with microbes.

UNIT – 2

The Shoot system: Shoot apical meristem and histological organization, Anatomy of primary stem in Monocotyledons and Dicotyledons, Secondary growth in stem and root – Vascular cambium and its functions, Characteristics of growth rings, Sapwood and Heart wood, Secondary Phloem, Cork Cambium and Periderm.

UNIT –3

The Leaf system: Origin, Development, Diversity in size, shape and arrangement, Internal structure of Dicot and Monocot leaf in relation to photosynthesis and water loss, Adaptations to water stress, senescence and abscission.

UNIT – 4

The Flower system: Concept of flower as a modified shoot, Structure of Anther, Microsporogenesis and Male Gametophyte, Structure of Pistil, Ovules, Megasporogenesis and Development of Female Gametophyte (Embryo Sac) and its types, Pollination – Mechanism and Agencies of Pollination, Pollen Pistil interactions and Self incompatibility.

UNIT – 5

Double Fertilization, Development and types of Endosperm and its morphological nature, Development of Embryo in Monocots and Dicots, Fruit development and maturation. Seed structure and dispersal, Vegetative Propagation.

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Practical Exercises + Scheme
(Marks- 50)

1- Cutting, staining and mounting of cross section of two materials of monocotyledons/dicotyledons root and stem and leaf like Sunflower and Maize or other available material. 15

2- Organisation of shoot Apex and Root Apex. 5

3- Study of Ovules and Anthers and their types 5

- Structure of stigma and style (Hibiscus, Maize, Ocimum, Citrus and Clitoria

(Aprajita) or plant studied by you.

4-Spotting- 10

5-Viva- voce- 5

6-Practical Record- 10

SUGGESTED READINGS:--

1•Gangulee, H.C., Das, K. S. And Dutta, C. 2007. College Botany Voll.I, New Central Book Agency (P) Ltd. Kolkata, 700009.

2•Hywood, V.H. & Moore, D.M. (eds) 1984. Current concepts in plant taxonomy. Acedemic press London.

3•Jones, S.B. Jr. and Luchsinger, A.E. 1986, Plant taxonomy (III edition) Mc Graw Hill Book Co. New York.

4•Maheshwari, P.1978. Plant Embryology.

5• Pandey, B. P. 2010. A Text book of Botany- Angiosperms, S. Chand & Company Ltd. Ramnagar, New Delhi- 110055.

6• Radford, A.E. 1986. Fundamentals of Plant Systematics, Harper and Row, New York.

7• Shrivastava and Das. Modern text book of Botany Vol-III & IV.

8• Singh, V., Pande P.C. and Jain , D. K. Structure & Development in Angiosperms. Rastogi Publication, Meerut.

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Second Semester, Scheme & Syllabus

Subject Code	Subject Title	Marks Allotted						
		Assignment Marks		Theory Marks		Practical Marks		Total Marks
		Max	Min	Max	Min	Max	Min	
BSB 151	Plant physiology and biochemistry	20	8	80	27	50	17	150

UNIT –1

Plant Water Relations: Properties of water, Importance of water in plant life, Diffusion, Osmosis & Osmotic relation to plant cell, Water Absorption, Ascent of Sap, Essential macro & micronutrients and their role. Transpiration: Structure & Physiology of Stomata, Mechanism of Transpiration, Factors affecting the rate of transpiration.

UNIT –2

Photosynthesis: Chloroplast, Photosynthetic pigments, Red drop, Emerson's effect, Concept of two Photosystems, Light reaction, Dark reaction - Calvin cycle, Hatch-Slack cycle, CAM cycle, Factors affecting rate of photosynthesis & Photorespiration.

UNIT –3

Respiration: Mitochondria, aerobic and anaerobic respiration, Respiratory coefficient, mechanism of respiration - Glycolysis, Kreb's cycle, Pentose phosphate pathway, Electron transport system, Factors affecting rate of respiration, Redox potential and theories of ATP synthesis.

UNIT – 4

Definition, classification and chemical structure: Monosaccharide, disaccharide, oligosaccharide and polysaccharides; Amino acids, essential and non essential amino acids; Lipids, saturated and non saturated fatty acids.

Classification, nomenclature and characteristics of Enzymes, Concept of holoenzyme, apoenzyme, co-enzyme and co-factors, mode & mechanism of enzyme action, Factors affecting enzyme activity. Plant Harmones, mode of action of Auxins, Gibberellins, Cytokinin and Abscissic acid.

UNIT – 5

Genetic Engineering: Tools and techniques of recombinant DNA technology; cloning vectors; genomic and cDNA library; transposable elements; gene mapping and chromosome walking. Biotechnology: Functional definition; basic aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis biology of Agrobacterium; vectors for gene delivery and marker genes; salient achievements in crop biotechnology.

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Practical Exercises + Scheme (Marks- 50)

Question 1- 20

1- Preparation of solution of specific Normality, Molal and Molar solutions.
2- Exercises related to osmosis and osmotic relation.
3- Exercises related to Transpiration.
4- To separate Plastidial pigments by Paper Chromatography.
5- To perform the exercise of Photosynthesis & Respiration.
6- To perform biochemical test for Carbohydrate, Lipid and Protien.
7- To extract Enzyme for any plant part and demonstrate its activity.

(Any two experiments from above mentioned list)

Question 2: Comment on any technique related to Biotechnology- 05

Spotting- 10

Viva- voce- 5

Practical Record- 10

SUGGESTED READINGS:--

1• David, L. N. and Michael, M. C. 2000. Lehninger principle of Biochemistry, Macmillan worth Pub. New York, USA.
2• Gangulee, H.C.,Das, K.S., Datta, C. and Sen, S. 2007. College Botany Voll.I, New Central Book Agency (P) Ltd. Kolkata, 700009.
3• Hopkins, W.G. 1995. Introduction of Plant physiology Pub. John wiley and sons New York.
4• Jain, V.K. 1974. Fundamentals of Plant Physiology, S. Chand & Compnay.
5• Pandey, B. P. 2010. A Text book of Botany- Angiosperms, S. Chand & Company Ltd. Ramnagar, New Delhi- 110055.
6• Taiz & Zeiger, E. 1998. Plant Physiology. Sinauer associates, Inc. Pub. Massachusetts U.S.A.
7• Verma, S.K. & Verma, M.A. 1995. Text book of Plant Physiology & Biotechnology. S. Chand & Company.
8• Verma, V. 1995. Plant Physiology, Emkey Pub.

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Second Semester, Scheme & Syllabus

Subject Code	Subject Title	Marks Allotted						
		Assignment Marks		Theory Marks		Practical Marks		Total Marks
		Max	Min	Max	Min	Max	Min	
BSB 161	Plant ecology, biodiversity and phytogeography	20	8	80	27	50	17	150

UNIT – 1

Ecosystems: Structure and types, Biotic and Abiotic components, Trophic levels, Food chains, Food webs, Ecological pyramids, Energy flow; Biogeochemical cycles: Concept, Gaseous and Sedimentary cycles, Carbon, Nitrogen, Phosphorus and Sulphur cycle.

UNIT – 2

Ecological adaptations: Morphological, Anatomical and Physiological responses, Water adaptation (Hydrophytes, Xerophytes and Mesophytes), Temperature adaptation (Thermoperiodism and Vernalization),Light adaptation (Heliophytes and Sciophytes), Plant Succession: Causes, trends and processes, types of succession - Lithosere, Hydrosere and Xerosere.

UNIT – 3

Population Ecology: Distribution patterns, Density, Natality, Mortality, Growth curves, Ecotypes and Ecads; Community Ecology: Characteristics, Classification, Life forms.
Biodiversity: Basic concept, definition, Importance, Biodiversity of India, Hotspots, In situ and ex situ conservation, Endangered and threatened species, Red data book.

UNIT – 4

Soil: Physico-chemical properties, Soil formation, Development of Soil Profile, Soil classification, Soil composition, Soil factors; Pollution: Definition, Types & Causes; Global warming, Climate change and Ozone holes.

UNIT – 5

Phytogeography: Phytogeographical regions of India, Vegetation -types of Madhya Pradesh, Biosphere reserves, Sancturies and National parks of Madhya Pradesh, Natural resources – definition and classification of natural resources, Conservation and management of natural resources, Land resources management,Water resources management, Wet land resource management.

Practical Exercises + Scheme
(Marks- 50)

1-To determine the minimum size of Quadrat by species area curve method. 05
- To conduct exercise on Frequency, Density and Abundance.
2- Study of soil with reference to soil texture, water holding capacity, pH and test for Carbonate and Nitrate. 05
3-Preparation of slides of Xerophytic, Hydrophytic and Mesophytic plants. 10

4-To comment upon Phytogeographic region (model/ charts) and National Parks (Photographs). 05
5-Spotting- 10
6-Viva- voce- 5
7-Practical Record- 10

SUGGESTED READINGS:--

1• Banerjee, S.1998. Bio diversity conservation- Agrobotamica, Bikaner.
2• Kumar, U.K 2006. Bio diversity principles and conservation, Agrobios, Jodhpur.
3• Odum, E.P. 5Th ed. 2004 .Fundamentals of Ecology. Natraj Publisher, Dehradun.
4• Puri, G.S. 1960. Indian Forest Ecology.
5• Sharma, P.D. 7th ed. 1998.Ecology and Environment, Rastogi Publication, Shivaji Road. Meerut, 250002. India.
6• Shukla, R. S. & Chandel, P.S. 2006. A Text book of Plant Ecology.