EKLAVYA UNIVERSITY, DAMOH (M.P.)

Scheme of Examination B.Sc I Year

/For batch admitted in Academic Session 2020-21/

Subject wise distribution of marks and corresponding credits

S. No.	Subject Name	Subject Code	Paper Name	Maximum Marks Allotted											Total Marks	Contact Periods Per week			Total Credits
				Theory Slot									Practical Slot						
				Final Yearly				Half Yearly				Quiz/ Assignment/ Attendence	End Sem	Lab Work/ Sessional		L	T	P	
				P1	P2	P3	P4	P1	P2	P3	P4								
1	Common	BAECC20Y101	Environmental and Disaster Management (University Core Under Ability Enhancement Course (AEC-1)	60				30				10			100	2	0	0	2
		BAECC20Y102	Communication Theory (University Core under Ability Enhancement Course (AEC-2)	60				30				10			100	4	0	0	4
		BYOGA20Y101	Yoga- 1 (University Core)	–	–	–		–	–	–		–	60	40	100	2	0	0	2
2	Botany	BBOTY20Y101	Diversity of Lower Plants (Paper - I) (Core Course - 1A)	30				15				5			50	3	1	0	4
		BBOTY20Y102	Diversity of Higher Plants (Paper- II) (Core Course - 1B)		30				15			5			50	3	1	0	4
		BBOTY20Y103	Paper- I and Paper- II, Practical (Practical 1A & 1B, Core Course 1C)										30	20	50	0	0	2	2
		BBOTY20Y104	Fundamentals of Industrial Microbiology & Techniques(Paper-III) (Core Course - 1D, for Honors)			30				15		5			50	3	1	0	4
		BBOTY20Y105	Paper- III, Practical (Practical 1D for Honours, Core Course 1E)										30	20	50	0	0	1	1
3	Common	BASPR20Y101	Assingment Presentation for 3 Core Courses											50	50	0	3	0	3

Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiencey Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.

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ज्ञान प्राप्तये लक्ष्य संधानम्
Estd. by Madhya Pradesh Niji Vishwavidyalaya (Sthapna Avam Sanchalanat Adhyadesh) 2020

School of Basic and Applied Sciences

UG Botany

Class		**B.Sc. Botany**
Semester/Year		**I Year.**
Subject & Subject code		**Botany, BBOTY20Y101**
Paper	**(English)**	**Diversity of Lower Plants (Paper - I)**
	हिन्दी	**निम्न श्रेणी के पादपों की विविधता**
Max. Marks		**30 (ETE) + 20 (IA) = 50**

Credits			**Total Credits**
L	**T**	**P**	4
3	1	0	

Course Objectives:

Candidate will learn about:

1. Microscopic observation and identification of Fungi, Bryophytes, Pteridophytes and also about.
2. Crop plants infected by the pathogens included in the syllabus and study of symptoms, causative agents and etiology.
3. Pupil will gain knowledge about mineral nutrition in plants.
4. Growth and developmental processes in plants.
5. Useful and harmful activities of Algae.

Course Outcome:

At the end of the course, learners will be able to:

1. Understand the diversity among Bacteria, Viruses and Algae.
2. Know the systematic, morphology and structure, of Bacteria, Viruses and Algae.
3. Understand the life cycle pattern of Bacteria, Viruses and Algae.
4. Understand the morphological diversity of Bryophytes and Pteridophytes.

Student Learning Outcomes (SLO):

Student will develop:

1. Understanding on the concept of microbial nutrition.
2. Classify viruses based on their characteristics and structures.
3. Critical knowledge of plant diseases and their remediation.
4. Get acquitted general characteristics of Bacteria and their cell reproduction/recombination.
5. earn to conduct experiments using skills appropriate to subdivisions.

Unit	Syllabus	Periods
UNIT - I	**Viruses and Prokaryotes :** Viruses, Viroids and Prion. Characteristics of Viruses, general account of TMV and T4 Bacteriophage. Bacterial structure, nutrition, reproduction and economic importance; General account of Mycoplasma, Cyanobacteria and Actinomycetes. Application of Microbiology, Important crop disease, their prevention and control measures.	15

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UNIT - I	**वायरस एवं प्रोकेरियोट** : विषाणु ,वायराइडस. एवं प्रियॉन। विषाणुओ के सामान्य लक्षण, टी.एम.वी. , एवं टी फोर बेक्टीरियोफेज का सामान्य विवरण। जीवाणु की संरचना, पोषण, प्रजनन एवं आर्थिक महत्व. माइकोप्लाज्मा, सायनोबेक्टीरिया एवं एक्टीनोमाइसिटीज का सामान्य विवरण।सूक्ष्म जैविको के अनुप्रयोग। महत्वपूर्ण फसलो के रोग, निवारण एंव रोकथाम।	15
UNIT - II	**Algae :** General characters, classification and economic importance. Important features and life history of Chlorophyceae- Volvox, Oedogonium, Charophyceae - Chara. Xanthophyceae- Vaucheria, Phaeophyceae- Ectocarpus, Rhodophyceae- Polysiphonia. **शैवाल** – शैवालों के सामान्य लक्षण, वर्गीकरण एवं आर्थिक महत्व, मुख्य लक्षण एवं जीवन चक्र, क्लोरोफाइसी–वॉल्वॉक्स, ऊडोगोनियम, कैरोफाइसी– कारा, जैन्थोफाइसी – वाउचेरिया, फियोफाइसी– एक्टोकार्पस, रोडोफाइसी– पोलीसाइफोनिया।	15
UNIT - III	**Fungi :** General characters, classification and economic importance, Important features and life history of Oomycetes - Albugo, Zygomycetes: Mucor, Ascomycetes: yeast, Peziza, Basidiomycetes: Puccinia, Deuteromycetes: Alternaria. General account of Lichens. **कवक** : कवकों के सामान्य लक्षण, वर्गीकरण एवं आर्थिक महत्व। प्रमुख लक्षणों एवं जीवन इतिहास का अध्ययन. उमाइसिटीज–एल्ब्यूगो, जायगोमायसिटीज –म्यूकर, एस्कोमायसिटीज–यीस्ट, पेजाइजा, बेसिडियोमासिटीज–पक्सीनिया, ड्यूटेरोमायसिटीज– आल्टरनेरिया, लाइकेन्स का सामान्य विवरण।	15
UNIT - IV	**Bryophyta :** General Characters and Classification, study of morphology, anatomy, reproduction of Hepaticopsida: Riccia, Marchantia. Anthocerotopsida: Anthoceros, Bryopsida: Polytrichum. **ब्रायोफाइटा** : सामान्य लक्षण एंव वर्गीकरण ,बाह्य आकारिकी, आंतरिक संरचना एवं प्रजनन, हेपेटीकोप्सिडा – रिक्सिया, मारकेन्शिया, एन्थोसिरोटोप्सिडा – एन्थोसिरोस, ब्रायोप्सिडा – पॉलीट्राइकम.	15
UNIT - V	**Pteridophyta:** Important characters and classification. Stelar organization. Morphology and anatomy of Rhynia. Structure. Anatomy and Reproduction in Lycopodium, Selaginella, Equisetum and Marsilea. **टेरिडोफाइटा** : प्रमुख लक्षण एवं वर्गीकरण। स्टीलर संगठन, राहिनिया की बाह्य एवं आंतरिक संरचना। लाइकोपोडियम, सिलेजिनेला, इक्वीसिटम एवं मारसीलिया की बाह्य तथा आंतरिक संरचना एवं प्रजनन।	15

Text Books-

1 Botany by Dr. S.B. Agrawal, Dr.V.K. Agrawal, Dr.Amit Agrawal - Edition 2019.

2 Botany by Dr. Amita Arjaria, Edition 2019.

Reference Books-

1 "Pteridophyta" Edition-2010 by N.S. Parihar,

2 An Introduction to Pteridophyta by Rashid A

3 "Bryophyta" Edition-2011 by Puri Prem.

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School of Basic and Applied Sciences

Class		**B.Sc. Botany**
Semester / year		**I Year**
Subject & Subject Code		**Botany, BBOTY20Y102**
Paper	**(English)**	**Diversity of Higher Plants (Paper- II)**
	हिन्दी	**उच्च श्रेणी के पादपों की विविधता**
Max. Marks		30 (ETE) + 20 (IA) = 50

Credits			**Total Credits**
L	**T**	**P**	4
3	1	0	

Course Objectives:

Candidate will learn about:

1. Mineral nutrition in plants.
2. Growth and developmental processes in plants.
3. Photosynthesis and Respiration in plants.
4. Training students to prepare micro preparation and showing the stages of mitosis (Onion root tips) and showing permanent slides/photographs of mitosis and meiosis.
5. Micro preparation of stems, roots and leaf of dicot and monocot.

Course Outcome:

At the end of the course, learners will be able to:

1. Understand the diversity of angiosperms.
2. Understand the comparative account among the families of angiosperms.
3. Know the economic importance of the angiosperm plants.
4. Understand the status of angiosperms in plant kingdom.
5. Know the Pre-Darwinian and Post- Darwinian systems of Classification.
6. Know the role of cytology and Phytochemistry in Taxonomy.

Student Learning Outcomes (SLO):

Students will inculcate the knowledge about:

1. The structure, life history and Economic importance of Gymnosperms.
2. Methods of fossilization and fossil plants.
3. Concepts and fundamentals of plant anatomy examine the internal anatomy of plant systems and organs
4. Evolution of concept of organization of shoot and root apex.
5. Composition of different parts of plants and their relationships.
6. Adaptive and protective systems of plants.

Unit	**Syllabus**	**Periods**
UNIT - I	**Gymnosperm :** General characters and Classification of Gymnosperms in India. Heterospory and Origin of Seed Habit. Diversity of Gymnosperms. Geological Time Scale and Fossilization, types of Fossil, tools and techniques. Fossil Gymnosperms: Lyginopteris and Williamsonia.	15

UNIT - I	**अनावृत्तबीजी** : अनावृत्तबीजियों के सामान्य लक्षण , वर्गीकरण, एवं भारत में वितरण, विषमबीजाणुता एवं बीज स्वभाव का उद्गम। अनावृत्तबीजियों की विविधताएं। भू–वैज्ञानिक रागय सारणी, जीवाश्मीभवन, जीवाश्म के प्रकार, साधन एंव तकनीक । अनावृत्तबीजी जीवाश्म–लाइजीनोप्टेरिस विलियमसोनिया।	15
UNIT - II	**Gymnosperm :** General account of Cycadofilicales, Bennettitales and Gnetales. General account of ginkgoales, Morphology, Anatomy, Reproduction and life cycle of Cycas, Pinus and Ephedra.	15
	अनावृत्तबीजी : साइकाडोफिलीकेल्स, बेनिटाइटेल्स एव निटेल्स के सामान्य लक्षण। जिंगोएल्स के सामान्य लक्षण। साइकस, पाइनस एवं इफिड्रा की आकारिकी, आन्तरिक संरचना, प्रजनन तथा जीवन–चक्र।	
UNIT - III	Tissue System: Types of Vascular bundles, Apical meristem, Classification of Meristem.The Root system, Root apical meristem. Differentiation of primary and secondary tissues and their role. Anatomy of Monocot and Dicot root. Secondary growth in root. Modification of root for various functions, Interaction of root with microbes.	15
	उतक तंत्रः सवंहन पूल के प्रकार,शीर्षस्थ प्रविभाजी उतक, प्रविभाजी उतक का वर्गीकरण। जड़ तंत्रः जड़ का शीर्ष विभाज्योतक, प्राथमिक एवं द्वितीयक ऊतकों का विभेदन एवं उनके कार्य, एकबीजपत्री एवं द्विबीजपत्री जड़ की आन्तरिक सरंचना, जड़ में द्वितीयक वृद्धि। विभिन्न कार्यो हेतु जड़ के रूपांतरण। सूक्ष्मजीवो के साथ जड़ की पारस्परिक क्रिया।	
UNIT - IV	**The Shoot system:** Shoot apical meristem and histological organization, Anatomy of Monocot and Dicot Stem: Vascular cambium and its function, Secondary growth in stem: Characteristics of growth rings: Sapwood and Heart wood, Secondary Phloem, Cork Cambium. and Periderm. Anatomy of C_3 and C_4 Plants. Anomalous Secondary Growth in Nyctanthus, Boerhhavia, Achyranthus, Leptadenia, Salvadora, Bignonia and Dracaena.	15
	प्ररोह तंत्र : प्ररोह शीर्षस्थ विभज्योतक एवं ऊतकीय संगठन, एकबीजपत्री एवं द्विबीजपत्री तने की आंतरिक संरचना – संवहन एधा एवं उसके कार्य, तने में द्वितीयक वृद्धि वलय की विशेषताएं,रस दारू, एवं कठोरदारू। द्वितीयक फ्लोएम, कार्क कैम्बियम एवं परिचर्म, C_3 एवं C_4 पौधो की आंतरिक संरचना। तने में असामान्य वृद्धि–निक्टेन्थस, बोरहाविया, एकाइरेन्थस, लेप्टाडीनिया, साल्वाडोरा, बिग्नोनिया, ड्रेसीना.	
UNIT - V	**The Leaf system :** Origin and Development of leaf. Diversity in size, shape and arrangement. Internal structure of Dicot and Monocot leaf. Adaptations to photosynthesis and water stress, Senescence and Abscission.	15
	पर्ण तंत्र : पर्ण की उत्पत्ति एवं विकास, प्रमाप, आकार एवं विन्यास में विविधताएं, एकबीजपत्री एवं द्विबीजपत्री पर्ण की आंतरिक संरचना, प्रकाश संश्लेषण एवं जलीय प्रतिबल का अनुकुलन, जीर्णता एवं विलगन।	

Text Books-

1 Botany by Dr. S.B. Agrawal, Dr.V.K. Agrawal, Dr.Amit Agrawal - Edition 2019.

2 Botany by Dr. Amita Arjaria, Edition 2019

Reference Books-

3 "Gymnosperm" by S.P. Bhatnagar,

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School of Basic and Applied Sciences

Class	**B.Sc. Botany**
Semester / year	**I Year**
Subject & Subject Code	**Practical Botany, BBOTY20Y103**
Paper	**Paper- I and Paper- II, Practical**
Max. Marks	**50= (30+20) (ETE + IA)**

L	T	P	
0	0	2	2

PRACTICALS

1 Microscopic Study of Algae –Volvox, Oedogonium, Chara, Vaucheria, Ectocarpus, Polysiphonia.

2 Pathological Study of Fungi - Albugo, Mucor, Yeast, Peziza, Puccina.

3 Morphological and Anatomical Study of Bryophyta – Riccia, Marchantia Anthoceros, Polytrichum.

4 Morphological and Anatomical Study of Pteridophyta- Lycopodium, Selaginella, Equisetum and Marsilea.

5 Morphological and Anatomical Study of Gymnosperm- Cycas, Pinus and Ephedra.

6 Anatomical Study of Root and Stem.

7 Anatomical Study of Nyctanthus, Boerhhavia, Achyranthus, Leptadenia , Salvadora , Bignonia and Dracaena.

8 Anatomical Study of Monocot & Dicot leaf.

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School of Basic and Applied Sciences

Class				**B.Sc. Botany (Honours)**
Semester / Year				**I Year**
Subject & Subject code				**Botany Honours, BBOTY20Y104**
Paper				**Fundamentals of Industrial Microbiology & Techniques(Paper- III)**
Max. Marks				**30 (ETE) + 20 (IA) = 50**
Credits			**Total Credits**	
L	**T**	**P**		
3	1	0	4	

Course Objectives:

The candidate will gain knowledge about the structure of bacteria, fungi, algae, protozoa and viruses along with the basic principles of microscopy,Control of microbial growth by physical and chemical methods plus the use of antibiotics and their efficacy testing are emphasized. and Cultivation of microbes is discussed.

Course Outcome:

At the end of the course, learners will be able to:

1. Gain knowledge on various classes of microorganisms; their structure, extracellular and intracellular components, cultural characteristics and their growth conditions.
2. Know about the different parts and working mechanisms of basic light microscope up to electron microscopes with deep knowledge on the sample preparation and staining techniques.
3. Acquire knowledge on sterilization techniques with adequate information on sterile, aseptic conditions.
4. Know about different classes of antibiotics and their mode of actions, treatment strategies and detection of resistant forms of bacteria from clinical settings.
5. Microbial culture media and pure culture techniques for aerobic and anaerobic cultivation methods for bacteria.

Student Learning Outcomes (SLO):

Student will get aquainted with:

1. Nature of Science and Scientific Inquiry: Microbiology majors should be able to discuss science and scientific methodology as a way of knowing. Microbiology majors should make observations, develop hypotheses, and design and execute experiments using appropriate methods. They should be able to explain how the nature of science is applied to every day problems.
2. Communication Skills: Microbiology majors will demonstrate competence in written and oral communication.
3. Cooperation/Social Responsibility: Microbiology majors should understand and appreciate the value of cooperating and working effectively with peers and be able to demonstrate a commitment to the process of developing such skills.
4. Values: Microbiology majors should identify and discuss the ethical issues and responsibilities of doing science.

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Unit	Syllabus	Periods
UNIT - I	**HISTORY AND SCOPE :** History - Spontaneous generation and Biogenesis; Scope and application of Microbiology in human welfare; Development of Microbiology : Contribution of A.V. Leeuwenhock, Alexander Fleming, Louis Pasteur, Robert Koch and Edward Jenner.	15
UNIT - II	**DIVERSITY OF MICROBIAL WORLD- A:** Three kingdom and Whittaker's system of classification. General Characteristics and Structure of Eubacteria - Morphology, Structure of cell wall. Bacteria with unusual Properties : Archaeobacteria, Cyanobacteria, Mycoplasma and Actinomycetes.	15
UNIT - III	**DIVERSITY OF MICROBIAL WORLD- B:** Introduction to Fungi : Classification, general characteristics, reproduction and economic importance. Introduction to Virus, classification, general characteristics, structure and reproduction : T4, TMV. Pox Virus, Prions, Virions, Virusoid and Viriods.	15
UNIT - IV	**MICROBIAL TECHNIQUES :-** Microscopy : History, Principle, Construction and Application of Bright field microscopy. Dark field Microscopy, Phase contrast, Fluorescent Microscopy and electron Microscopy. Software in microscopy. Instrumentation : Principle, construction and application of Autoclave, Hot air oven, incubator, B.O.D. incubator, laminar Air Flow, Colorimeter, Spectrophotometer, pH meter, centrifugation and chromatography (TLC)	15
UNIT - V	**MICROBIOLOGICAL METHODS :-** Media Preparation, Concept of sterilization and disinfection; types of culture; Pure culture techniques; Nature of dyes, physical and chemical theories of staining, principle, procedure and application of simple staining negative staining, differential staining. Enrichment culture and micromanipulator; Maintenance and preservation of pure culture.	15

Text Books –

1 Microbiology by Pelczar ,Chan and Kreiz
2 General Microbiology by Stainier Ingharam, Wheelis and Painter.
3 Biology of microorganism by Brook and Madigan.
4 Fundamental Principles of Bacteriology by A.J.Salle.
5 Introduction of Microbiology by Ingraham and Ingraham.
6 Tools and techniques in Microbiology by Nath and Ingraham.

Reference Books –

1 Prescot, M.J., Harley, J.P. and Klein, D.A. Microbiology. 5th Edition WCB Mc Graw Hill, New York, (2002).
2 Tortora, G.J., Funke, B.R. and Case, C.L. Microbiology: An Introduction. Pearson Education, Singapore, (2004).
3 Alcomo, I.E. Fundamentals of Microbiology. VI Edition, Jones and Bartlett Publishers. Sudbury. Massachusetts, (2001).
4 Black J. G. Microbiology- Principles and Explorations. John Wiley & SonsInc, NewYork, (2002).

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School of Basic and Applied Sciences

Class				**B.Sc. Botany (Honours)**
Semester / year				**I Year**
Subject & Subject Code				**Practical Botany Honours, BBOTY20Y105**
Paper				**Paper- III, Practical**
Max. Marks				**50= (30+20)** (ETE + IA)
L	**T**	**P**	1	
0	0	1		

PRACTICALS

1 To study Safety measure in Laboratory.

2 Study of compound microscope its construction,working, principle, care to be taken while using the microscope. use of oil immersion objective.

3 Study of instruments Autoclave, Hot air oven. Laminar air flow, Colony counter, Incubator, Centrifuge, pH Meter, Seitz Filter, Colorimeter and Spectrophotometer.

4 Illumination of Cleaning and sterilization of glassware's.

5 To perform Basic media preparation .

6 To perform Pure culture techniques- Pour Plate, Streak Plate ,Spread Plate and Serial Dilution methods.

7 To perform Staining of Bacteria.

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School of Basic and Applied Sciences

Class		**B.Sc. Botany**
Semester / year		**II Year**
Subject & Subject Code		**Botany, BBOTY20Y201**
Paper	**(English)**	**Taxonomy and Embryology of Angiosperms (Paper- I)**
	हिन्दी	आवृतबीजियो की वर्गीकी एंव भ्रूणिकी
Max. Marks		30 (ETE) + 20(IA) = 20

Credits			**Total Credits**
L	**T**	**P**	4
3	1	0	

Course Objectives:

1. Aware various plant families and its economic importance.
2. Get knowledge on structure and development of plant embryo.
3. To study about basics of embryology and reproduction in Angiosperm.

Course Outcome:

At the end of the course, learners will be able to:

1. Learn the types of classifications- artificial, Natural and phylogenetic.
2. Gain knowledge about Botanical Survey of India (BSI).
3. Briefly studied on herbarium techniques.
4. Learn the taxonomic evidences from molecular, numerical and chemicals.
5. Brief studied the economic products with special reference to the Botanical name, family, morphology of useful part and the uses
6. Know fertilization, endosperm and embryogeny

Student Learning Outcomes (SLO):

Students will learn:

1.complete details about the structures, development of embryo at different stages including gametogenesis, fertilization, and implantation.
2. correlate between the embryological structure and its significance.
3. Demonstrate activities on the gametogenesis, fertilization.
4. Understand the diversity of angiosperms.
5. Understand the comparative account among the families of angiosperms.
6. Know the economic importance of the angiosperm plants.

Unit	**Syllabus**	**Periods**
UNIT - I	**Taxonomy:** Origin and Evolution of Angiospertms: Principles and rules of Botanical Nomenclature, Museum, Herbarium and Botanical Gardens: Classification of Angiosprems: Bentham and Hooker,and Modern Trends in Taxonomy including Molecular taxonomy APG IV System. वर्गिकी: आवृतबीजियो का उद्गम् एवं विकास। वानस्पतिक नामकरण के सिद्धांत एंव नियम, संग्रहालय हरबेरियम एंव वानस्पतिक उघान, आव्तबीजियो का वर्गीकरण बेन्थम तथा हुकर की पद्धति। वर्गिकी में आधुनिक प्रवृत्तियॉ एंव आणविक वर्गीकी, एपीजी IV पद्धति।	15

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UNIT - II	Taxonomy: Terminology for plant description in semi - technical language% Diagnostic characteritics and Economic Importance of Families-Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Fabaceae, Apiaceae, Magnoliaceae, Rosaceae, Dipterocarpaceae, and Cucurbitaceae. वर्गिकीः पोधो के वानस्पतिक विवरण की अर्थ तकनिकी शब्दावली। रेननकुलेसी, ब्रेसीकेसी, मालवेसी, रूटेसी, फेबेसी, एपिएसी, मेग्नोलिएसी, रोजेसी, डिप्टेरोकारपेसी एंव कुकरबिटेसी कुलो के विशिष्ट लक्षण एंव आर्थिक महत्व ।	15
UNIT - III	Taxonomy : Diagnostic characteristics & Economic Importance to Families- Rubiaceae, Asteraceae, Apocynaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Liliaceae, Poaceae, Asclepiadaceae, Verbenaceae, Arecaceae, Musaceae and Orchidaceae. वर्गिकीः रूबिएसी, ऐस्टेरेसी, ऐपासाइनेसी, सोलेनेसी, लेमिएसी, यूफोरबिएसी, लिलिएसी, पोएसी, एस्क्लेपिडेसी, वर्बिनेसी, एरेकेसी, म्यूसेसी एंव आर्चिडेसी कुलो के विशिष्ट लक्षण एंव आर्थिक महत्व।	15
UNIT - IV	Embryology : 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 Sefl incompatibility. भ्रूणिकी : पुष्प एक रूपांतरित प्ररोह की अवधारणा। परागकोष की संरचना लघुबीजाणुजनन एवं नर युग्मकोद्भिद्। स्त्रीकेसर की संरचना, बीजुण्ड, गुरूबीजाणुजनन, मादा युग्मकोदभिद का विकास (भ्रूण कोष) एवं प्रकार। परागण– परागण की प्रक्रिया एव एजेंसी, पराग स्त्रीकेसर की पारस्परिक क्रिया एवं स्वअनिषेच्यता।	15
UNIT - V	Embryology : Double Fertilization and Triple Fusion. Development and Types of Endosperm and its Morphological Nature, Development of Embryo in Monocot and Dicot plants, Polyembryony and Apomixis, Application of palynology, Experimental Embrylogy including Pollen Storage and Test tube Ferilization Fruit development and Maturation, Seed Structure and dispersal.Mode of Vegetative Propagation. भ्रूणिकी : द्विनिषेचन एवं त्रिसंयोजन। भ्रूणपोष का विकास, प्रकार एवं इसकी आकारिकीय प्रकृति। एकबीजपत्रीय और द्विबीजपत्रीय भ्रूण का विकास। बहुभ्रूणता एंव असंगजनन परागाणु विज्ञान के अनुप्रयोग, प्रयोगात्मक भ्रौणिकी एंव पराग संघारण, परखनली (टेस्ट ट्यूब) निषेचन फल का विकास परिपक्वन एंव इसका आण्विक आधार फलो का परिवर्धन एंव परिपक्वताए, बीज की संरचना एंव प्रकीर्णन। कायिक प्रवर्धन के प्रकार।	15

Text Books-

1 A Text Book of Botany -Angiosperms By S.Chand & Company Ltd. Ramnager new Delhi-110055.

2 Modern Text Book of Botany Vol.III & IV By Shirivastava and Das

Reference Books-

1 Gangulee, H.C. ,Das K.S. and Dutta C.2007 College Botany Voll. I, New Central Book Agency (P) Ltd.Kolkata,700001

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

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

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