

**GOVT. BILASA GIRLS P.G.
COLLEGE**

BILASPUR



SYLLABUS

B.Sc.

Microbiology

Semester I & II

2022-2023

Govt. Bilasa Girls P.G.(Autonomous) College Bilaspur (C.G.)

DEPARTMENT OF MICROBIOLOGY

2022-2023

Description of Courses for Choice-Based Semester System

Course – 4 Credits

[Theory Paper –3 Credits (45 Periods) and Lab Work – 1 Credits (15 Periods)]

Section	Core Courses	Choice based courses
Sem. I	CCB – General Microbiology	XXXX
Sem. II	CCB – Microbial Diversity	XXXX
Sem. III	CCB - 03 Microbial Growth and Genetics	CBCB – 03(E1): <i>Ethno botany and Herbal medicine</i> CBCB – 03(E2): <i>Agro-services and Bio Farming</i> CBCB – 03(E3): <i>Computer basic and Bioinformatics</i>
Sem. IV	CCB - 04 Microbial metabolism and Genetic Engineering	XXXX
Sem. V	CCB - 05 Environmental Microbiology and agriculture	XXXX
Sem. VI	CCB - 06 Immunology and food microbiology	XXXX

Govt. Bilasa Girls P.G.(Autonomous) College Bilaspur (C.G.)

MICROBIOLOGY

B.Sc. I Semester

Part A: Introduction				
Program: Certificate course in Microbiology		Class: B.Sc.I Semester	Year: 2022	Session: 2022-2023
1.	Course Code	BMCT-101		
2.	Course Title	General Microbiology		
3.	Course Type	Theory		
4.	Pre-requisite (if any)	NO		
5.	Course Learning Outcomes (CLO)	<ul style="list-style-type: none">• To get introduced to the field of Microbiology and its historical development, basic and applied aspects of Microbiology, and scope of Microbiology.• To learn the basic microbiological techniques viz. microscopy, staining, and sterilization involved in the handling, control, and study of microorganisms.• To learn and understand the working principles of light microscopy and to understand their applications of the principles in the laboratory.		
6.	Credit Value	Theory: 3		
7.	Total Marks	Max. Marks: 75	Min Passing Marks: 28	

Part B: Content of the Course		
Total Periods: 45		
Unit	Topics	No. of Period
I	History of Microbiology: Milestones in the historical development of Microbiology. Discovery of microorganisms, contributions of Antony van Leeuwenhoek. Theory of spontaneous generation and biogenesis. Contributions of Edward Jenner, Louis Pasteur, Joseph Lister, Robert Koch, Metchnikoff, Beijerinck, Winogradsky, Ivanowsky, Alexander Fleming, Selman Waksman (in brief) to the development of microbiology. Recent developments in the field of Microbiology. Branches of Microbiology. Scope of Microbiology	12
II	Microscopy: Different types of microscopes, their construction, and working principles. Simple microscope (dissection microscope). Compound microscope (types of microscopy: bright field, dark field, phase contrast and fluorescence. Stereo microscope. The principle, construction and mode of operation of scanning and transmission electron microscope, limitations.	11

III	<p>Microbiological stains and staining techniques: Types of stains and principles of staining. Preparations of bacterial smears for light microscopy: Fixation. Simple staining (direct and indirect), differential staining (Gram's staining and acid-fast staining), Structural staining (capsule, flagella, cell wall and endospore of bacteria, nuclear staining). Wet mounting of algae and fungi. Hanging drop technique.</p>	11
IV	<p>Principles and methods of Sterilization: Physical methods and their mode of action Heat- Dry heat – Hot air Oven, Incineration. Moist heat – Autoclave, Pressure cooker, Tyndallization (fractional sterilization). Definition of terms- TDT, TDP, D value, z value. Filtration- Types of filters (membrane filters, Sietz filter, sintered glass filter, diatomaceous earth filter and Chamberland filter, HEPA-Laminar airflow system). Chemical methods: Definition of terms – disinfectants, antiseptics, sanitizers, microbicides – bactericide, virucide, fungicide, and sporicide, micro biostatic – bacteriostatic and fungistatic agents. Use and mode of action of – alcohols, aldehydes, halogens, phenols, heavy metals, detergents: quaternary ammonium compounds.</p>	11
<p>Key word: Staining, Microscopy, Sterilization, incineration.</p>		

Part C -Learning Resources

1. Ananthanarayanan, C. and Paniker, C.K.J. 2006. **Text Book of Microbiology**, Seventh Edn. Orient Longman Ltd., Chennai.
2. Aneja, K.R. 1993. **Experiments in Microbiology, Plant Pathology**. Rastogi and Company, Meerut.
3. Brock T.D. 2012. **Biology of Microorganisms**, Thirteenth Edn. Prentice-Hall Publications.
4. Cappuccino, J.G. and Sherman, N. 2004. **Microbiology-A Laboratory Manual**, Seventh Edition. Addison –Wesley.
5. Edward Alcamo. 2010. **Fundamentals of Microbiology**, Ninth Edn. Jones and Barlett.
6. Salle, A.J. 1967. **Fundamental Principles of Bacteriology**, Sixth edition. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
7. Kathleen Park Talaro 2009. **Foundations in Microbiology**, 7th International Edn, McGraw Hill.
8. Pelczar, Jr., J.M., Chan, E.C.S. and Kreig, N.R. 1993. **Microbiology**, Fifth Edn. Tata McGraw Hill Publishing Co. Ltd.
9. Prescott, L.M., Harley, J.P. and Klein, D.A. 2008. **Microbiology**, International Edn., Seventh Edn. WBC McGraw Hill.

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 75

Continuous Comprehensive Evaluation (CCE): 15 Marks

Semester End Exam (SEE): 60 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation 15 (Best of two internal test) + 15 Assignment	Total Marks: 15 (Average of test and assignment)
External Assessment: Semester End Exam (SEE)	Section (A): Eight (8) Very Short Questions Section (B): Four (4) Short Questions Section (C): Four (4) Long Questions	Marks: 16 Marks: 16 Marks: 28
		Total Marks: 75

Signature of Convener & Members, Board of Studies:

Govt. Bilasa Girls P.G.(Autonomous) College Bilaspur (C.G.)

MICROBIOLOGY

B.Sc. I Semester Practical

Part A: Introduction				
Program: Certificate		Class B.Sc.-I Semester	Year: 2022	Session: 2022-23
1.	Course Code	BMCP -101		
2.	Course Title	Microbial Techniques and Staining.		
3.	Course Type	Core course- Practical		
4.	Pre-requisite (if any)	As per Govt. norms/ institutional schemes		
5.	Course Learning Outcomes (CLO):	After the completion of this lab course, the students will be able to: <ul style="list-style-type: none">• Understand the basics of laboratory rules and minimum requirements of a laboratory – equipment/instruments and their operations.• Understand media preparation methods.• Understand pure culture methods to isolate and enumerate microbes.• Understand various staining techniques.		
6.	Credit Value	01		
7.	Total Marks	Max. Marks: 25	Min. Passing Marks: 9	

Part B: Content of the Course

Total No. of Periods – 15

Tentative Practical List

Topic * (Minimum Any three from each unit depending on facilities and syllabus. 20% for spot, 10% each for viva and sessional, and the rest 60 % mark equally in each unit.)

Laboratory Exercises

1. Laboratory rules and regulations.
2. Basic requirements of Microbiology laboratory.
3. Principles and operations – Autoclave, Hot Air Oven, Incubators, Laminar Air Flow, Filtration, colony counter, Centrifuge, pH meter, Colorimeter and Spectrophotometer
4. Cleaning and sterilization of glassware.
5. Preparation of culture media – solid, semi-solid and liquid.
6. Illustrate contributions of Antony Von Leuwenhoek Louis Pasteur, Sergi Winogradsky, Alexander Fleming, Robert Koch, Joseph Lister, and Edward Jenner.
7. Test for motility of bacteria – Hanging drop method
8. Staining techniques – Simple staining, Gram's staining, Spore-staining, Capsular staining and LPCB.
9. Observation of permanent slides to study the structural characteristics of algae (Anabena, Nostoc, Spirulina, Oscillatoria), fungi (Rhizopus,

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| <p>10. Saccharomyces, Penicillium, Aspergillus, Agaricus) and protozoa (Entamoeba histolytica, Giardia lamblia and Plasmodium sp.).</p> <p>11. Components and uses of Peptone, sodium chloride, Yeast extract, agar- agar,</p> <p>12. Nutrient agar, EMB agar, Mac Conkey agar, Mueller Hinton Agar and Potato Dextrose agar.</p> |
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Part C -Learning Resource

Text Books, Reference Books, Other Resources
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Suggested Readings:

REFERENCES:

1. Monica Cheesbrough. 2006. District Laboratory Practice in Tropical Countries - Part I and II 2 nd edition. Cambridge University Press, New Delhi.
2. Rajan S. 2012. Manual for Medical Laboratory Technology. Anajanaa Book House, Chennai.
3. Betty A Forbes, Daniel F Sahn and Alice S Weissfeld. 2007. Bailey and Scott's Diagnostic Microbiology, 12th Edition. Mosby Elsevier.
4. Mackie and McCartney. 2006. Practical Medical Microbiology, 14th Edition. South Asia Edition.
5. Rajan S and Selvi Christy R.2018. Experimental Procedures in Life Sciences. CBS Publishers, New Delhi.

Part D–Assessment and Evaluation

Practical exam at the end of odd Semester:

Maximum marks: 25

		Total marks: 25
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MICROBIOLOGY

B.Sc. II Semester

Part A: Introduction			
Program: Certificate course in Microbial diversity		Class: B.Sc. II Semester	Year: 2022
		Session: 2022-2023	
1.	Course Code	BMCT-201	
2.	Course Title	Microbial diversity	
3.	Course Type	Theory	
4.	Pre-requisite (if any)	As per Govt. norms/ institutional schemes	
5.	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> To get acquainted with the microbial world. To study the characteristics of prokaryotes and eukaryotes and understand the structural similarities and differences among various groups of microorganisms To study the cytology of microorganisms To study the diversity and biology of microorganisms with reference to their structure, reproduction, classification, identification and economic importance. 	
6.	Credit Value	Theory: 3	
7.	Total Marks	Max. Marks: 75	Min Passing Marks: 30

Part B: Content of the Course		
Total Periods: 45		
Unit	Topics	No. of Period
I	<p>The Microbial World Groups of microorganisms: viruses, prokaryotes (cyanobacteria, bacteria, archaea), eukaryotes (algae, fungi, protozoa). Ultrastructure of typical prokaryotic cell; the structure of bacterial cell-cell wall (Gram-positive, gram-negative, archaeobacteria), capsule, cell membrane (bacterial and archaeal), cytoplasm, ribosomes, nucleoid, plasmids, flagella, pili (fimbriae), inclusion bodies Ultrastructure of a eukaryotic cell. A comparative account of a prokaryotic and eukaryotic cell. General principles of classification and nomenclature of microorganisms (Haeckel's three kingdom classification and Whittaker's five kingdom classification), Carl Woese's domain system of classification</p>	12
II	<p>Virus : Definition, history of virology, general characteristics of viruses-size, shape and chemical composition, properties used for classification of viruses, isolation, and identification of viruses. Study of structure and replication of viruses: Phytophagenae-TMV. Zoophagenae-influenza and HIV Bacteriophages-T4 phage, λ phage Cyanophages Viroids, Prions and Virusoids. Importance of viruses</p>	11
III	<p>Bacteria: Occurrence, shape and arrangement of bacterial cells, reproduction in bacteria, endospore formation. Classification of bacteria in brief as per Bergey's Manual of Systematic</p>	11

	Bacteriology. Study of the following bacteria: <i>E. coli</i> , <i>Staphylococcus aureus</i> , <i>Bacillus</i> spp. <i>Pseudomonas</i> spp. Study of the following in brief with examples: Rickettsiae, Chlamydias, Mycoplasmas, Spirochaetes, Actinomycetes, Archaea. Study of Cyanobacteria: Occurrence, structure, reproduction of the following: <i>Microcystis</i> , <i>Spirulina</i> , and <i>Anabaena</i> .	
IV	Algae and Fungi: Distribution, the structure of the typical algal cell (E.g. <i>Chlamydomonas</i>). A brief account of reproduction. Study of thallus structure, reproduction (in brief), and economic importance of the following: <i>Chlorella</i> , <i>Cosmarium</i> , <i>Scenedesmus</i> , <i>Spirogyra</i> , diatoms, and <i>Gracilaria</i> . Study of thallus structure, reproduction (in brief), life cycle, and economic importance of the following: <i>Pythium</i> , <i>Rhizopus</i> , <i>Saccharomyces</i> , <i>Penicillium</i> , <i>Aspergillus</i> , <i>Fusarium</i> , <i>Agaricus</i> .	11
Key word: Vriods, prions, Heterothallism, Symbiotic, Cynobacteria		

Part C -Learning Resources

1. Alexopoulos, C.J., Mims, C.W. and Blackwell, M. 1996. **Introductory Mycology**, Fourth Edn. Wiley Eastern Limited, Singapore.
2. Ananthanarayanan, C. and Paniker, C.K.J. 2013. **Text Book of Microbiology**, Ninth Edn. Orient Longman Ltd., Chennai.
3. Biswas S.B. 1984. **An Introduction to Viruses**. Preface Books.
4. Brock T.D. **Biology of Microorganisms**. Prentice Hall Publications.
5. David R. Boone, Goerge M. Garrity .2012, 2011, 2009, 2005, 2001. **Bergey's Manual of Systematic Bacteriology**, 2nd Edn. Vol. I to V.Springer Publications
6. Flint S.J., Enquist L.W., Krug.2009. **Principles of Virology**, 3rdEdn. ASM Press.
7. John G. Holt .1994.**Bergey's Manual of Determinative Bacteriology**, 9thEdn. Williams and Wilkins.
8. Kotpal R.L. 2000.**Protozoa**. Rastogi Publications.
9. Vashishta, B.R., Sinha, A.K.2016. **Fungi**. S. Chand & Co.
10. Vashishta, B.R., Sinha, A.K. 2012. **Algae**. S. Chand & Co.

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 75

Continuous Comprehensive Evaluation (CCE):

Semester End Exam (SEE):

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation 15 (Best of two internal test) + 15 Assignment	Total Marks: 15 (Average of test and assignment)
External Assessment: Semester End Exam (SEE)	Section (A): Eight (8) Very Short Questions Section (B): Four (4) Short Questions Section (C): Four (4) Long Questions	Marks: 16 Marks: 16 Marks: 28
		Total Marks: 75

Signature of Convener & Members, Board of Studies:

Govt. Bilasa Girls P.G.(Autonomous) College Bilaspur (C.G.)

MICROBIOLOGY

B.Sc. II Semester Practical

Part A: Introduction			
Program: Certificate		Class B.Sc.-II Semester	Year: 2022 Session: 2022-23
13.	Course Code	BMCP-201	
14.	Course Title	Microbial Diversity	
15.	Course Type	Practical	
16.	Pre-requisite (if any)	No	
17.	Course outcomes:	After the completion of this lab course, the students will be able to: <ul style="list-style-type: none"> • Understand the cytology of microorganisms • Understand morphological features of micro-organisms • Understand pure culture methods to isolate and enumerate microbes. 	
18.	Credit Value	1	
19.	Total Marks	Max. Marks: 25	Min. Passing Marks:9

Part B: Content of the Course	
Total No. of Periods – 15	
Tentative Practical List	Topic * (Minimum Any three from each unit depending on facilities and syllabus. 20% for spot, 10% each for viva and sessional, and the rest 60 % marks equally in each unit.)
	Laboratory Exercises <ol style="list-style-type: none"> 1. Study of cyanobacteria- <i>Microcystis</i>, <i>Spirulina</i>, and <i>Anabaena</i>. 2. Study of the following algae – <i>Chlorella</i>, <i>Cosmarium</i>, <i>Scenedesmus</i>, <i>Spirogyra</i>, diatoms and <i>Gracilaria</i>. 3. Study of the following fungi – <i>Pythium</i>, <i>Rhizopus</i>, <i>Saccharomyces</i>, <i>Penicillium</i>, <i>Aspergillus</i>, <i>Fusarium</i>, and <i>Agaricus</i>. 4. Isolation of TMV in crude form (by sucrose gradient method) and inoculation to healthy plants. 5. Study of the following protozoa- <i>Euglena</i>, <i>Paramecium</i>, and <i>Entamoeba</i>. . Display of photographs/materials of – Bacteriophages, TMV, HIV, <i>E. coli</i>, <i>Staphylococcus aureus</i>, <i>Pseudomonas sp.</i>, <i>Bacillus sp.</i>, rickettsia, chlamydiae, mycoplasmas, spirochaetes, and actinomycetes.

Part C -Learning Resource

Text Books, Reference Books, Other Resources
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Suggested Readings:

REFERENCES:

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|---|
| <ol style="list-style-type: none">1. Monica Cheesbrough. 2006. District Laboratory Practice in Tropical Countries - Part I and II 2 nd edition. Cambridge University Press, New Delhi.2. Rajan S. 2012. Manual for Medical Laboratory Technology. Anajanaa Book House, Chennai.3. Betty A Forbes, Daniel F Sahm and Alice S Weissfeld. 2007. Bailey and Scott's Diagnostic Microbiology, 12th Edition. Mosby Elsevier.4. Mackie and McCartney. 2006. Practical Medical Microbiology, 14th Edition. South Asia Edition.5. Rajan S and Selvi Christy R.2018. Experimental Procedures in Life Sciences. CBS Publishers, New delhi. |
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Part D–Assessment and Evaluation

Practical exam at the end of even Semester Maximum Marks :25

		Total marks: 25
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Govt. Bilasa Girls P.G.(Autonomous) College Bilaspur (C.G.)
MICROBIOLOGY(SEC)
B.Sc. II Semester

Part A: Introduction			
Total Periods: 30			
Course Certificate: Food Fermentation and Technology		Class: B.Sc.I Semester	Year: 2022 Session: 2022-2023
8.	Course Code	BMSECT-201	
9.	Course Title	Food Fermentation and Technology	
10.	Course Type	Skill enhancement course	
11.	Pre-requisite (if any)	As per Govt. norms/ institutional schemes	
12.	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> • Have developed a very good understanding of practical aspects of commercially produced food and fermentative products. • Have developed a very good understanding of the practical use of microbiology for better production of home-based food and fermentation products for day-to-day use 	
13.	Credit Value	02	
14.	Total Marks	Max. Marks: 50	Min Passing Marks: 17

Part B: Content of the Course		
Total Periods: 30		
Unit	Topics	No. of Period
I	Fermented Foods: Definition, types, advantages and health benefits, fermented foods used by Common public, domestication.	4
II	Milk Based Fermented Foods: Dahi, Yogurt, Buttermilk (Chach) and cheese: Preparation of inoculums, types of microorganisms and production process.	8
III	Grain Based Fermented Foods: Soy sauce, Bread, Idli and Dosa: Microorganisms and production process, Preparation and preservation	9
IV	Vegetable Based Fermented Foods: Pickels, Saeurkraut: Microorganisms and production process. Preparation and preservation methods. Fermented Meat and Fish: types, microorganisms involved, fermentation process Probiotic Foods: Definition, types, microorganisms and health benefits	9

Key Words: Fermentation; Saeurkraut; Yogurt; Pickles

Part C -Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

REFERENCES:

1. Banwart, GJ. Basic Food Microbiology. CBS Publishers and Distributors, Delhi. (1989).
2. Hobbs BC and Roberts D. Food poisoning and Food Hygiene. Edward Arnold (A division of Hodder and Stoughton) London.
3. Dolle Michael P.. Food Microbiology: Fundamentals and Frontiers.
4. John C. Ayres. J. Orwin Mundt. William E. Sandinee. Microbiology of Foods. W.H. Freeman and Co
5. Joshi. Biotechnology: Food Fermentation Microbiology, Biochemistry and Technology. Volume 2.

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE): 10 Marks

Semester End Exam(SEE): 40 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test- 02 of 10 marks each Assignment: 01 of 10 marks	Total Marks: 10 (Average of test and assignment)
Semester End Exam(SEE):	Section (A): Eight (8) Very Short Questions Section (B): Four (4) Short Questions Section (C): Two (2) Long Questions	Marks: 08 Marks: 12 Marks: 20
		Total Marks: 50 (40+10)

Amendments or modifications may be made by the course coordinator, as per the situation or directed by the examination cell/ NEP-20 scheme coordinator.

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MICROBIOLOGY

B.Sc. I Semester

Generic Elective Course

[Elementary Microbiology]

Part A: Introduction			
Program: Certificate course in Elementary Microbiology		Class: B.Sc.I Semester	Year: 2022 Session:2022-2023
15.	Course Code	BMGECT-101	
16.	Course Title	Elementary Microbiology	
17.	Course Type	Generic Elective course	
18.	Pre-requisite (If any)	As per institutional guidelines	
19.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to <ul style="list-style-type: none"> • Understand the Viruses, Bacteria, Phycology, Mycology, and Plant pathology • Learn microbial techniques which will be beneficial for agriculture and industry. • Learn life cycles of selected genera of different groups 	
20.	Credit Value	04	
21.	Total Marks	Max. Marks: 75	Min Passing Marks: 28

Part B: Content of the Course		
Total Periods: 60		
Unit	Topics	No. of Period
I	History of Microbiology: Development of microbiology as a discipline, Spontaneous generation vs. biogenesis. Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming.	15
II	Scope of Microbiology: Microbes in food, dairy, agriculture, and pharmaceutical. Bioweapons.	15
III	Types of microorganisms: Concept of prokaryotes, and Eukaryotes. General features and significance of bacteria, algae, fungi, and virus.	15

IV	Control of Microorganisms: Physical method of sterilization (moist and dry heat)chemical sterilization(Disinfectant, antiseptic, germicide). Mode of action of aldehyde, alcohol, halogens, phenolic compounds	15
Key word: sterilizations, antibiotics, disinfectant, sanitizer		

Part C -Learning Resource
Text Books, Reference Books, Other Resources
<p>Suggested Readings:</p> <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. Kumar, H.D. (1999). Introductory phycology.Affiliated East-West.Press Pvt. Ltd. Delhi.2ndedition. 2. Tortora, G.J., Funke, B.R., Case, C.L. (2010). Microbiology: An Introduction, Pearson Benjamin Cummings, U.S.A. 10th edition. 3. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi & Their Allies, MacMillan Publishers Pvt. Ltd., Delhi. 4. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley and Sons (Asia), Singapore.4th edition. 5. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R., (2005). Biology.Tata McGraw Hill, Delhi, India. 6. Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India. 7. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) LtdPublishers, New Delhi, India. 8. Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot, Allahabad

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE): 20 Marks

Semester End Exam(SEE): 80 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation 20 (best of two internal tests)/ 20 Assignment	Total Marks: 20 (Average of test and assignment)
Semester End Exam(SEE):	Section (A): Eight (8) Very Short Questions Section (B): Four (4) Short Questions Section (C): Four (4) Long Questions	Marks: 16 Marks: 16 Marks: 48
		Total Marks: 100

Amendments or modifications may be made by the course coordinator, as per the situation or directed by the examination cell/ NEP-20 scheme coordinator.

Signature of Convener & Members, Board of Studies: