DEPARTMENT OF BOTANY

LIST OF COURSE CODE AND COURSE TITLE FOR I, II, III & IV SEMESTER

Semester	Credit Based Course and Course code				
	DSC(4c)	DSE(4c)	GE(4c)	SEC(2c)	VAC(2c)
First	BSC-1 (1T&1P)	NA	BGE-1 (1T&1P)	BSEC-1 BSEC-2	BVAC-1 BVAC-2
Second	BSC-2 (2T&2P)	NA	BGE-2 (2T&2P)		
Third	BSC-3 (3T&3P)	BSE-1 (1T&1P)	BGE-3 (3T&3P)		
Fourth	BSC-4 (4T&4P)	BSE-2 (2T&2P)	BGE-4 (4T&4P)		

COURSE, COURSE CODE AND COURSE TITLE

Semester	Course	Course code	Course Title
1st Sem.	DSC	BSC-1 (BSC-1T &BSC-1P)	Microbes, Algae and Fungi
	GE	BGE-1 (BGE-1T&BGE-1P)	Cryptogamic Botany (Lower Botany)
2nd Sem.	DSC	BSC-2 (BSC-2T &BSC-2P)	Cytology, Genetics & Cytogenetic
	GE	BGE-2 (BGE-2T&BGE-2P)	Angiospermic Botany (Higher Botany)
3rd Sem.	DSC	BSC-3 (BSC-3T &BSC-3P)	Archegoniate & Paleontology
	DSE	BSE-1 (BSE-1T&BSE-1P)	Biochemistry & Enzymology
	GE	BGE-3 (BGE-3T&BGE-3P)	Microbes, Algae and Fungi
4th Sem.	DSC	BSC-4 (BSC-4T &BSC-4P)	Plant Taxonomy, Anatomy & Embryology
	DSE	BSE-2 (BSE-2T&BSE-2P)	Molecular Biology and Bio-statistic
	GE	BGE-4 (BGE-4T&BGE-4P)	Cytology, Genetics & Cytogenetic
1st, 2nd, 3rd and 4th Sem.	SEC	BSEC-1	Gardening & Floriculture
		BSEC-2	Flower Decoration
	VAC	BVAC-1	Herbal plant & Human Health
		BVAC-2	Academic Research & Report writing

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DEPARTMENT OF BOTANY
UNDERGRADUATE COURSE CURRICULUM 2023-24

PART-A: Introduction				
Program: *Certificate Course*		**Class: B. Sc. Semester-I**	**Year: 2023**	**Session: 2023-2024**
1	Course Code	**BSC – 1T**		
2	Course Title	**Microbes, Algae and Fungi**		
3	Course Type	**Discipline Specific Course (DSC)**		
4	Pre-requisite(if,any)	As per Government norms / Institutional scheme		
5	Course Learning. Outcomes (CLO)	*After completion of this course, the students will be able to -* ➢ *- understand the nature, occurrence and diversity of Microorganisms and thallophytic plants (algae & fungi) in the environment* ➢ *- learn basic techniques of its collection, identification and preservation.* ➢ *– become familiar with the common features, habitat, structure, mode of reproduction of organism and their economic importance*		
6	CreditValue	**03** (Credit = 15 Hours Teaching-learning)		
7	Total Marks	**Max. Marks: 100**	**Min Passing Marks:** 40	

PART -B: Content of the Course		
Total No. of Teaching–learning - Hours– 45 / Periods-60		
Unit	**Topics (Course contents)**	**No. of Hours**
I	**Microbes-Viruses:** Concept of Microbe & Microbial world, Concept of Prokaryotes vs Eukaryotes. Viruses – Discovery, general structure, chemical composition, Virions, Viroids & Prions; Classification (Baltimore classification) Transmission, Multiplication, DNA virus (T-phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance Viruses	**12Hours**
II	**Microbes-Bacteria:** General concept / characteristics of Bacteria – Archea & Eu -bacteria, Cell structure and cell division; Reproduction and Recombination Transformation, Transduction and Conjugation. General account of Mycoplasma and Actinomycetes. Common bacterial disease of Plants.. General account of Cyanobacteria. Economic importance of Bacteria	**11Hours**
III	**Thallophyta–Algae:** Characteristics features and Classification (Lee 'classification) Range of thallus organization, Pigments & Stored food. Reproduction – types & mode, Concept & types of Life cycle and Economic importance. Life-cycles of *Volvox*, *Oedogonium*, *Vaucheria*, *Ectocarpus* & *Polysiphonia*. Economic importance of Algae. Eminent Phycologists.	**11Hours**
IV	**Thallophyta–Fungi:** Characteristics and Classification, thallus organization, Reproduction. Heterothallism & Parasexuality, Life cycle of *Rhizopus*. *Penicillium*, *Puccinia*, *Agaricus*, *Alternaria*, *Fusarium* & *Colletotrichum*. General account of Lichen and Mycorrhiza. Economic importance of Fungi. Eminent Mycologists.	**11Hours**
Keywords	***Microbes, Viruses, Bacteria, Cyanobacteria, Algae. Fungi***	

Signature of Convener & Members of BOS:

(1) Dr. A. N. Bahadur
(2) Dr. D. U. Srivastava
(3) Dr. Uttara Tiwari
(4) Dr. V. U. Nonnugo
(5) Dr. A Shahabir
(6) Dr. M. L. Jaiswal
(7) Miss Rashmi Kaushik

PART–C (BSC – 1T)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended

1. Kumar, H.D. (1999). Introductory phycology. Affiliated East-West. Press Pvt. Ltd. Delhi.2nd edition.
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. Powar C.B. and Daginawala H.I General Microbiology; Vol I & II, Himalayn Pub. House, Bombay.
7. Dubey & Maheshwari, A Text Book of Microbiology
8. R. P. Singh, A Text Book of Microbiology

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **Use of following sites**
  - https://microbeonline.com/types-of-staining-techniques-used-in-microbiology-and-their-applications/
  - **https://www.youtube.com/watch?v=gOFKk4LFYHI&ab_channel=MicrobialConcepts%28Microbiologychannel%29**
  - https://gclambathach.in/lms/Algae.pdf
  - **https://biologydictionary.net/bacteria/**
  - **https://byjus.com/biology/kingdom-fungi/#:~:text=Characteristics% 20of%20Fungi, Following%20are%20the&text=Fungi% 20are%20eukaryotic%2C% 20non% 2D vascular, phenomenon%20of%20alternation%20of%20generation.**
  - **http://eagri.org/eagri50/PATH171/lec03.pdf**
  - **https://byjus.com/biology/algae/**
  - **https://www.youtube.com/watch?v=Z_4UNFjqILo&ab_channel=subratadas**
  - **https://www.biologydiscussion.com/algae/algae-definition-characteristics-and-structure-with-diagram/46727**

Part - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Comprehensive Evaluation (CCE):	**20 Marks**
Semester End Exam (SEE):	**80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test - 02 of 10 Marks each Assignment –01 of 10 Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against 20 Marks
Semester End Exam (SEE):	Paper – **Two section – A & B** Section A: Objective and Short answer type questions – **10 + 30 = 40 Marks** **Objective-10 x 1=10; Short Answer Type Questions- 10 x 3=30** Section B: Descriptive answer type questions unit wise – **4 x 10 = 40 Marks**	

(1) (2) (3) (4) (5) (6) (7) Boshanik

PART-A: Introduction

Program: *Certificate Course*		Class: B. Sc. Semester - 1	Year: 2023	Session: 2023-2024
1	Course Code	BSC – 1P		
2	Course Title	Microbes, Algae and Fungi		
3	Course Type	Laboratory Course		
4	Pre-requisite (if, any)	As per Govt. norms / Institutional scheme		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ *Use of Compound light Microscope to study the microorganism and micro structures of various plant body* ➢ *Collect and identify microbes, Algae and Fungi* ➢ *Prepare, the temporary stained slides of Algae and Fungi* ➢ *Understand the symptoms of Viral, Bacterial & Fungal diseases of Plants in local area*		
6	Credit Value	01		
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20	

PART-B: Content of the Course

Total No. of Teaching-learning Hours– 30

Topics (Course contents) • **A tentative list lab work that can be amended by teacher /department concerned.**	No. of Hour
• EMS / Models of Viruses – T phage and TMV. • Study of different forms of Bacteria, Gram staining of Bacteria. • Preparation of temporary slides and study of permanent slides of Algae, mentioned in syllabus. • Preparation of temporary slides from culture and study of permanent slides of Fungi mention in syllabus. • Study of Plant disease symptoms and preparation of suitable slides of infected area of mention in syllabus. • Lichen: Study of specimens and permanent slides of Folliose, Crustose, and Fruticose Lichens. • Mycorrhiza: Ectomycorrhiza and endomycorrhiza (photographs). • Identification of Viral, Bacterial and Fungal diseases of plants based on their symptoms	**30 Hours**

Keywords | ***Temporary slide ,Staining, Identification, Symptoms***

PART– C: Learning Resources: Text Books, Reference Books and Others

Text Books Recommended:

1. Laboratory Manual in Microbiology. By P. Gunasekaran.
2. Practical Microbiology, R. C. Dubey and D. K. Maheshwari.
3. A Text Book of Practical Botany Vol-I. By Ashok Bendre

Online Resources–

1. https://open.umn.edu/opentextbooks/textbooks/499
2. https://www.projectandnotes.com/2022/01/bsc-1st-year-botany-practical-file-pdf.html
3. https://www.agrifs.ir/sites/default/files/A%20text%20book%20of%20practical%20botany%201%20%7BAshok%20Bendre%7D%20%5B8171339239%5D%20%281984%29.pdf
4. https://www.pdfdrive.com/a-textbook-of-practical-botany-e57965065.html

PART– D: Assessment & Evaluation

- ➢ *As an Assignment work for 10 marks –A project / field work may be allotted by the department or teacher concerned*
- ➢ *Examination of lab. course – BSC-1P shall be conducted combined with BSC-2P at the end of Sem.-II*
- ➢ *Exam pattern shall be followed to Microbiological laboratory norms and questions will be determined by the department / teacher concerned*

Name and Signature of Convener & Members of BOS:

(1) (2) (3) (4) (5) (6) (7) Boshamik

DEPARTMENT OF BOTANY
UNDERGRADUATE COURSE CURRICULUM 2023-24

PART-A: Introduction				
Program: *Certificate Course*		Class: B. Sc. Semester- II	Year: 2023	Session: 2023-2024
1	Course Code	BSC–2T		
2	Course Title	Cytology, Genetics and Cytogenetics		
3	Course Type	Core Course		
4	Pre-requisite (if, any)	As per Government norms / Institutional scheme		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ *Understand the cell structure as an unit of living beings* ➢ *Aware with the basic concept of Genetics and fundamentals of Cytogenetic- genetics based on chromosomes* ➢ *Become familiar with cellular mechanism of living organism, concept of nucleic acid as genetic material* ➢ *Understand the concept of Mendel's experiment, Mendelian genetics Post Mendelian – classical genetics*		
6	Credit Value	03		
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40	

PART- B: Content of the Course		
Total No. of Teaching Hours – 45 Hours		
Unit	**Topics (Course contents)**	**No.of Hours**
I	**Cytology-I / Plant cell:** Concept of cytology & The Cell Theory; Prokaryotic and eukaryotic cells; Ultra structure of Plant Cell & Cell Organelles –, Mitochondria, Chloroplast, E.R, Golgi-complex, Ribosome, Lysosome and Cell Membrane and Cell Wall – Chemical composition, Latest concept of structure and function.	**11 Hours**
II	**Cytology-II / Nucleus & Division:** Nucleus – nuclear envelop & nuclear pore, Nuclear material – Nucleic acid – DNA & RNA, Chromatin & Chromosome (DNA packaging in eukaryotes). Nucleolus (Structure, Function and Biogenesis). Overview of Cell cycle – G1, S, G2 & M phases, Events of Mitosis and Meiosis; its significance and Molecular controls.	**11 Hours**
III	**Genetics (Classical):** History of Mendel' experiments, Terminologies; Laws of Inheritance; Test cross, Co- dominance, incomplete dominance; Modified Mandelian Ratios: 2:1- lethal Genes; 9:7; 9:4:3; 13:3; 12:3:1. 15:1. Cytoplasmic Inheritance & Male sterility. Linkage: concept & types, complete & incomplete linkage, bridges experiment, coupling & repulsion, Crossing over: concept and significance.	**11 Hours**
IV	**Cytogenetic:** Structural chromosomal changes -Deletions, Duplications, Inversions & Translocations. Numerical chromosomal changes: Aneuploidy – types, cause& consequences; Euploidy, Polyploidy – types, origin and interrelation; Mutation – concept and molecular basis. Types of mutations, types, nature and effects of physical & chemical mutagens. Role of chromosomal aberration, polyploidy & mutation in evolution & crop improvement.	**12 Hours**
Keywords	*Cytology, Cyplasmic organelle, Cell cycle, Mendel's, Genetics, Cytogenetics*	

Signature Members of BOS-

(1) (2) (3) (4) (5) (6) Botanik

PART–C: (BSC–2T)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended -

1. Cell Biology; Powar C. B. and Daginawala H. I., Himalay Pub. House, Bombay.
2. Cell biology by Karp, G. 2010.
3. Cell and Molecular Biology: Concepts and Experiments. 6th Edition.John Wiley & Sons. Inc.
4. De Robertis, E.D.P. and De Robertis, E.M.F. 2006.Cell and Molecular Biology.8th edition. Lippincott Williams and Wilkins, Philadelphia.
5. Genetics by P. K. Gupta, Rastogi Publication
6. Gytogenetics, Molecular biology and Plant breeding by P. K. Gupta, Rastogi Publication
7. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009.The World ofof the Cell.7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

Online Resources–

- **e-Resources /e-books and e-learning portals**
- **Use of following sites**

1. ***http://rastogipublications.com/index.php?route=product/product&product_id=50***
2. https://www.uou.ac.in/sites/default/files/slm/BSCBO
3. https://dspace.uzhnu.edu.ua/jspui/bitstream/lib/2985/1/Cytology&Genetics.pdf
4. ***https://ysmubooks.am/uploads/MEDICAL_BIOLOGY.pdf***
5. ***https://www.biologyonline.com/dictionary/chromosomal-mutation***
6. ***https://www.bioexplorer.net/chromosomal-mutations.html/***
7. ***http://adpcollege.ac.in/online/attendence/classnotes/files/1589181737.pdf***
8. ***http://www.jnkvv.org/PDF/05052020112111552011 08.pdf***
9. ***http://icvcollege.edu.in/sites/default/files/mutation%2C%20types%2C%20and%20detection%20of%20mutation.pdf***
10. ***https://old.amu.ac.in/emp/studym/100005252.pdf***
11. ***http://eagri.org/eagri50/GBPR111/lec02.pdf***
12. ***https://www.ncbi.nlm.nih.gov/books/NBK9876/***
13. ***https://opentextbc.ca/biology/chapter/6-2-the-cell-cycle/***
14. ***https://www.biologydiscussion.com/genetics/linkage-of-genetics-features-examples-types-and-significance/5183***

Part - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: **100 Marks**

Continuous Comprehensive Evaluation (CCE): **20 Marks**

Semester End Exam (SEE): **80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test - 02 of 10 Marks each Assignment –01 of 10 Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against 20 Marks
Semester End Exam (SEE):	Paper – **Two section – A & B** Section A: Objective and Short answer type questions – **10 + 30 = 40 Marks** **Objective-10 x 1=10; Short Answer Type Questions- 10 x 3=30** Section B: Descriptive answer type questions unit wise – **4 x 10 = 40 Marks**	

Signature Members of BOS-

(1)

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PART - A: Introduction

Program: *Certificate Course*		Class: B. Sc. Semester-II	Year:2023	Session:2023-2024
1	Course Code	BSC–2P		
2	Course Title	Cytology, Genetics and Cytogenetics		
3	Course Type	Laboratory course		
4	Pre-requisite (if, any)	As per Govt. norms / Institutional scheme		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ Handle the Compound light Microscope and apply microscopy ➢ Achieve elaborate idea about cell staining procedures and mitotic plate observation & analysis ➢ Identify the various stages of cell division karyotype analysis ➢ Get practice of genetic crosses and genetic analysis		
6	Credit Value	01		
7	Total Marks	Max. Marks: 50	Min. Passing Marks: 20	

PART - B: Content of the Course

Total No. of Teaching Hours - 30

Topics (Course contents)	No. of Hours /
• Study different types of Plant cells. • Techniques of different staining methods of Cell organelles. • Study different stages of Mitosis. • Study different stages of Meiosis. • Exercises on Genetics (Mendelian ratios and Test crosses). • Karyotypes of Chromosomes. • Study of bar bodies. • Study of Polytene Chromosomes and lampbrush chromosome.	**30 Hrs /**

Keywords | ***Cyto-techniques, Microscopy, Mitotic plate, Karyotype.***

PART– C: (BCC–2P)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended–

1. Laboratory Manual of Cyto-tecnique and Chromosome handling By Sharma A K.
2. Manual of Cytology, Ministry of Health & Welfare.
3. Cytogenetics By P K Gupta.
4. Cell biology By C. B. Powar

Online Resources–

1. https://screening.iarc.fr/doc/Cancer_resource_Manual_3_Cytology_New.pdf
2. https://www.gribblesvets.co.nz/wp-content/uploads/2019/06/How-to-Prepare-Cyto-Smears.pdf
3. https://www.youtube.com/watch?v=SLkipIg4WRg&ab_channel=SridharRao

PART– D: Assessment & Evaluation

- ***As an Assignment work for 10 marks –A project / field work may be allotted by the department or teacher concerned***
- ***Examination of lab. course– BSC-1P shall be conducted combined with BSC-2P at the end of Sem.-II***
- ***Exam pattern shall be followed to Botany department laboratory norms and questions will be determined by the department / teacher concerned***

Signature Members of BOS-

(1)

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(7) Bashonik

DEPARTMENT OF BOTANY
UNDERGRADUATE COURSE CURRICULUM 2023-24

PART-A: Introduction

Program: *Diploma Course*	Class: B. Sc. Semester-III	Year: 2023	Session: 2023-2024

1	Course Code	**BSC – 3T**
2	Course Title	**Archegoniate and Paleontology**
3	Course Type	**Discipline Specific Course (DSC)**
4	Pre-requisite(if any)	As per Government norms / Institutional scheme
5	Course Learning Outcomes (CLO)	*After completion of this course, the students will be able to -* ➢ *- understand the concept, nature, occurrence and diversity and evolution of Archegoniate plant (Bryophyta, Pteridophyta and Gymnosperm)* ➢ *- learn basic techniques of its collection, identification and preservation.* ➢ *-- become familiar with the common features, habitat, structure, mode of reproduction of the land plant and their economic importance with evolutionary significance.*
6	Credit Value	**03** (Credit = 15 Hours Teaching-learning)
7	Total Marks	**Max. Marks: 100** — **Min Passing Marks: 40**

PART -B: Content of the Course

Total No. of Teaching–learning - Hours– 45

Unit	Topics (Course contents)	No. of Hours
I	**Bryophytes:** Unifying features and concept of archegoniate; General characteristics, adaptations to land habit. Classification. Range of thallus organization. Gametophyte and Sporophyte with evolutionary concept. Morphology, anatomy and reproduction of *Riccia, Marchantia, Anthoceros and Funaria* (Developmental details not to be included). Ecology and economic importance of bryophytes with special mention of *Sphagnum*.	**12Hours**
II	**Pteridophytes:** General characteristics, classification, concept of Heterospory, Telome and stellar evolution. Morphology, anatomy and reproduction of *Psilotum, Lycopodium, Selaginella, Equisetum and Marsilea* (Developmental details not to be included). General idea of Ferns. Ecological and economic importance	**11Hours**
III	**Gymnosperm:** General characteristics, Classification. Morphology, anatomy and reproduction of *Cycas, Pinus*, Taxus, Ginkgo and Gnetum (Developmental details not to be included). Concept of living fossils. Ecological & Economic importance of Gymnosperms.	**11Hours**
IV	**Paleobotany:** Basic concept fossils. Geological time table; Process of fossilization and types of fossil; Concept of Paleorcology and Paleopylanology; and Early land plants. Concept of Fossil-taxa - form species, genera and family; General account of Primitive vascular plants - Psilophytales (*Rhynia, Cooksonia, Psilophyton & Zosterophyllum*) and Calamitales (Calamites).	**11Hours**

Keywords ***Bryophytes, Pteridophyta, Gymnosperm, Paleobotany and Plant Fossil***

Signature of Convener & Members of BOS:

(1) (4)

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(7) Botanik

PART–C (BSC – 3T)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended

1. Sporne, K. K. (1991) The Morphology of Pteridophytes, B. I. Publishing Pvt. Ltd. Bombay.
2. Stewart, W. N. and Ruthwell, G. W. (1993) Paleobotany and the Evolution of Plants.Cambridge Univ. Press,
3. Vashishtha, B. R. (2005) Pteridophytes S. Chand and Co., Delhi.
4. Vashishtha, B. R. (2005) Bryophytes S. Chand and Co., Delhi.
5. Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India
6. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi.
7. Parihar, N.S. (1991). An introduction to Embryophyta. Vol. I. Bryophyta. Central Book Depot.

Online Resources–

❖ **e-Resources / e-books and e-learning portals**

- https://www.amazon.in/Introduction-Bryophytes-Alain-Vanderpoorten-ebook/dp/B007NWFWQK
- https://books.google.co.in/books/about/Introduction_to_Bryophytes.html?id=sgqQ2YZt6Q4C&redir_esc=y
- https://books.google.co.in/books/about/Botany_for_Degree_Students_Bryophyta.html?id=bgF1ngEACAAJ&redir_esc=y
- https://www.junkybooks.com/?gad_source=1&gclid=CjwKCAiAsIGrBhAAEiwAEzMlC5h664baQJnjBJ_bmQaqdXnDjK-gIatPWrmzcrPKuJkvmL5uxj7dQRoCBloQAvD_BwE
- https://link.springer.com/book/10.1007/978-3-662-13164-0
- https://books.google.co.in/books/about/The_Gymnosperms.html?id=FG3rCAAAQBAJ&redir_esc=y
- https://en.wikipedia.org/wiki/Paleobotany
- https://hdjaincollege.org/fileupload/uploads/5f0ec52e7e16520200715085822Scan%2015%20Jul%202020%20(3).pdf
- https://www.encyclopedia.com/plants-and-animals/botany/botany-general/psilophytales
- Use of following sites
  - https://uou.ac.in/sites/default/files/slm/BSCBO-103.pdf
  - https://uou.ac.in/sites/default/files/slm/MSCBOT-503.pdf
  - https://www.uou.ac.in/lecturenotes/science/MSCBOT-17/UNIT-PTERIDOPHYTA%20(BOT-502).pdf
  - https://www.scribd.com/document/522625106/Bryophyta-by-O-P-Sharma
  - https://www.perlego.com/book/3099288/textbook-of-bryophytes-pdf

Part - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Comprehensive Evaluation (CCE): 20 Marks

Semester End Exam (SEE): 80 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test - 02 of 10 Marks each Assignment –01 of 10 Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against 20 Marks
Semester End Exam (SEE):	Paper – **Two section – A & B** Section A: Objective and Short answer type questions – **10 + 30 = 40 Marks** **Objective-10 x 1=10; Short Answer Type Questions- 10 x 3=30** Section B: Descriptive answer type questions unit wise – **4 x 10 = 40 Marks**	

Name and Signature of Convener & Members of BOS:

(1) (2) (3) (4) (5) (6) (7) Boshanik

PART-A: Introduction

Program: *Diploma Course*	Class: B. Sc. Semester - III	Year: 2023	Session: 2023-2024

1	Course Code	BSC – 3P
2	Course Title	**Archegoniate and Paleontology**
3	Course Type	**Laboratory Course**
4	Pre-requisite (if, any)	As per Govt. norms / Institutional scheme
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ *prepare double stained slides and monographs* ➢ *understand about the land vascular plants and their importance* ➢ *understand about fossils and early vascular plants and their evolutionary significance* ➢ *identify the local flora and their preservation*
6	Credit Value	01
7	Total Marks	Max. Marks: 50 — Min Passing Marks: 20

PART-B: Content of the Course

Total No. of Teaching-learning Hours– 30

Topics (Course contents)	No. of Hour
• A tentative list lab work that can be amended by teacher /department concerned.	
• Preparation of temporary stained slide of different parts of thallus of Bryophyta and its microscopic study. • Study of sporophytes of Bryophytes (as per course) . • Preparation of temporary stained slide of different parts of Pteridophytes – Psilotum, Lycopodium, Selaginella, Equisetum, Dryopteris, Marsilea and its Monographic study • Study of Fossil' slides as per course • Preparation of temporary stained slide of different parts of Gymnoperms –Cycas, Pinus, and Gnetum and its Monographic study • Microscopic study of wood of Gymnospermes. • Collection and Identification of local flora.	**30 Hours**

Keywords | ***Thallus, Sporophytes, Monofrahic study, Fossil slides***

PART– C: Learning Resources: Text Books, Reference Books and Others

Text Books Recommended:

Practical Book by Bendre & Kumar

Online Resources–

1. https://ucanapplym.s3.ap-south-1.amazonaws.com/RGU/notifications/E_learning/study_online/Practical%20of%20Pteridophyte.pdf
2. https://www.google.com/search?q=ebook+practical+of+pteridophytes&newwi
3. https://www.perlego.com/book/3365246/practical-manual-for-bryophytes-and-pteridophytes-practical-manual-pdf
4. https://books.google.co.in/books/about/Practical_Manual_Of_Pteridophyta.html?id=UP1DMQAACAAJ&redir_esc=y

PART– D: Assessment & Evaluation

- ***As an Assignment work for 10 marks –A project / field work may be allotted by the department or teacher concerned***
- ***Examination of lab. course – BSC-3P shall be conducted combined with BSC-4P at the end of Sem.-IV***
- ***Exam pattern shall be followed to Microbiological laboratory norms and questions will be determined by the department / teacher concerned***

Name and Signature of Convener & Members of BOS:

(1) (2) (3) (4) (5) (6) (7) Botanik

DEPARTMENT OF BOTANY
UNDERGRADUATE COURSE CURRICULUM 2023-24

PART-A: Introduction				
Program: *Diploma Course*		Class: B. Sc. Semester-IV	Year: 2023	Session: 2023-2024
1	Course Code	**BSC – 4T**		
2	Course Title	**Plant Taxonomy, Anatomy & Embryology**		
3	Course Type	**Discipline Specific Course (DSC)**		
4	Pre-requisite(if any)	As per Government norms / Institutional scheme		
5	Course Learning. Outcomes (CLO)	*After completion of this course, the students will be able to -* ➢ *- understand the concept, diversity and evolution of Angiosperm plants* ➢ *- learn basics of plant systematic and status of flora* ➢ *identification and preservation and herbarium preparation of flora* ➢ *-- become familiar with the internal structure of plant and concept of plant tissues with its evolutionary concept* ➢ *Understand the reproductive mystery of plats and its importance*		
6	CreditValue	**03** (Credit = 15 Hours Teaching-learning)		
7	Total Marks	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course		
	Total No. of Teaching–learning - Hours– 45	
Unit	**Topics (Course contents)**	**No. of Hrs**
I	**Plant taxonomy:** Classification, Nomenclature. Functions of Herbarium, important herbaria and botanical gardens of the world and India. Principles and rules (ICN); Types of classification-artificial, natural and phylogenetic. Bentham & Hooker (upto series), Engler & Prantl (upto series) and Hutchinson system of classification with its merits and demerits. Modern trends of taxonomy and Numerical taxonomy.	**12Hours**
II	**Taxonomic Description:** Characteristics, systematics and economic importance of **Dicotyledonous** family- Brassicaceae, Malvaceae, Fabaceae (subfamily), Apiaceae, Rutaceae, Euphorbiaceae, Lamiaceae, Astraceae. And **Monocotyledonous** family – Orchidaceae, Lilliaceae, Cyperaceae and Poaceae. [Floral features, Floral formula and floral diagram are essential].	**11Hours**
III	**Anatomy:** Tissue system – features and function of different types of Meristematic and Permanent tissues. Internal Structure of dicot and monocot root stem and leaf. Root and shoot apex organization; Secondary meristem and Secondary growth in root and stem. Wood (heartwood and sapwood). Abnormal Secondary Growth (Achyranthus, Nyctanthus, Boerhavia, Dracaena).	**11Hours**
IV	**Embryology:** Structure of anther and pollen; Structure and types of ovules; Embryo sacs –types & typial, Pollination and Fertilization, Double fertilization; Endosperm types, structure and functions Development of embryo -Dicot and monocot embryo; Cocept of Apomixes and Polyembryony. Seed - structure appendages and dispersal mechanisms.	**11Hours**
Keywords	*Taxonomy, Systematic, Floral features, Anatomy, Tissue, Embryology*	

Signature of Convener & Members of BOS:

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PART– C (BSC – 4T)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended

1. Simpson, M.G. (2006). *Plant Systematics.*Elsevier Academic Press, San Diego, CA, U.S.A.
2. Singh, G. (2012). *Plant Systematics:* Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi.
3. Plant taxonomy by V. K. Jain
4. Bhojwani, S.S. &Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
5. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA.
6. Pandey, B. P. (LatesEdt.). Plant Anatomy

Online Resources–

- **e-Resources / e-books and e-learning portals**
- https://www.amazon.in/Plant-Taxonomy-past-present-future-ebook/dp/B01602IQI4
- https://books.google.co.in/books/about/PLANT_TAXONOMY_2E.html?id=Roi0lwSXFnUC&redir_esc=y
- https://www.kobo.com/ww/en/ebook/a-textbook-of-plant-taxonomy
- https://examupdates.in/plant-anatomy-and-embryology-book/
-

- **Use of following sites**
  - https://uou.ac.in/sites/default/files/slm/BSCBO-201.pdf
  - https://www.perlego.com/book/1975516/plant-taxonomy-and-biosystematics-classical-and-modern-methods-pdf
  - https://www.scribd.com/document/583581867/Plant-Systematics-By-Op-Sharma-Chapter-02
  - https://www.uou.ac.in/sites/default/files/slm/BSCBO-202.pdf
  - https://egyankosh.ac.in/bitstream/123456789/69535/1/Block-4.pdf
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Part - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Comprehensive Evaluation (CCE):	**20 Marks**
Semester End Exam (SEE):	**80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test - 02 of 10 Marks each Assignment –01 of 10 Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against 20 Marks
Semester End Exam (SEE):	Paper – **Two section – A & B** Section A: Objective and Short answer type questions – **10 + 30 = 40 Marks** **Objective-10 x 1=10; Short Answer Type Questions- 10 x 3=30** Section B: Descriptive answer type questions unit wise – **4 x 10 = 40 Marks**	

Name and Signature of Convener & Members of BOS:

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PART-A: Introduction

Program: *Diploma Course*	Class: B. Sc. Semester - IV	Year: 2023	Session: 2023-2024

1	Course Code	**BSC – 4P**
2	Course Title	**Plant Taxonomy, Anatomy & Embryology**
3	Course Type	**Laboratory Course**
4	Pre-requisite (if, any)	As per Govt. norms / Institutional scheme
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ ***Understand the systematic status of flowering plants*** ➢ ***Proper collection, identification and herbarium preparation of flowering plants/ local flora*** ➢ ***prepare double stained slides of plant tissue and understand about internal structure of different plants*** ➢ ***understand about the land vascular plants and their importance*** ➢ ***understand about embryology of plant and their significance*** ➢ ***identify the local flora and their preservation***
6	Credit Value	**01**
7	Total Marks	**Max. Marks: 50** — **Min Passing Marks: 20**

PART-B: Content of the Course

Total No. of Teaching-learning Hours– 30

Topics (Course contents) • **A tentative list lab work that can be amended by teacher /department concerned.**	No. of Hour
• To study the vegetative and floral characters of families mention in syllabus. • Mounting of a properly dried and pressed specimen of local flora of cultivated and wild plants species included in syllabus. • Anatomy of primary and secondary growth in monocots and dicots stem using hand sections or permanent slides, structure of secondary phloem and xylem, growth rings in wood microscopic study of wood in T.S, T.L.S. and R.L.S. • Anatomy of root , primary and secondary structure . • Examination of a wind range of flowers available in the locality and methods of their pollination . • Structure of ovule and embryo sac development (using serial sections) . • Study different types of ovule and embryo sac (using permanent slides/ photographs)	**30 Hours**

Keywords | ***Thallus, Sporophytes, Monofrahic study, Fossil slides***

PART– C: Learning Resources: Text Books, Reference Books and Others

Text Books Recommended:

Practical Book by Bendre & Kumar

Online Resources–

1. https://www.uou.ac.in/sites/default/files/slm/BSCBO-202.pdf
2. https://examupdates.in/plant-anatomy-and-embryology-book/
3. https://jrc.ac.in/working_folder/DOWNLOAD-D-12-180-618C09F7D0115.pdf
4. https://www.unitedkhoisan.co.za/free-books/?gad_source=1&gclid=CjwKCAiAsIGrBhAAEiwAEzMlC5oFedmUI51pu8rFEHGbC4_dL4vZ9MXsjuNxRKNZxPzJguFNDhPpMxoC6KEQAvD_BwE

PART– D: Assessment & Evaluation

- ***As an Assignment work for 10 marks –A project / field work may be allotted by the department or teacher concerned***
- ***Examination of lab. course – BSC-3P shall be conducted combined with BSC-4P at the end of Sem.-IV***
- ***Exam pattern shall be followed to Microbiological laboratory norms and questions will be determined by the department / teacher concerned***

Name and Signature of Convener & Members of BOS:

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DEPARTMENT OF BOTANY

LIST OF COURSE CODE AND COURSE TITLE FOR I, II, III & IV SEMESTER

Semester	Credit Based Course and Course code				
	DSC(4c)	DSE(4c)	GE(4c)	SEC(2c)	VAC(2c)
First	BSC-1 (1T&1P)	NA	BGE-1 (1T&1P)	BSEC-1 BSEC-2	BVAC-1 BVAC-2
Second	BSC-2 (2T&2P)	NA	BGE-2 (2T&2P)		
Third	BSC-3 (3T&3P)	BSE-1 (1T&1P)	BGE-3 (3T&3P)		
Fourth	BSC-4 (4T&4P)	BSE-2 (2T&2P)	BGE-4 (4T&4P)		

COURSE, COURSE CODE AND COURSE TITLE

Semester	Course	Course code	Course Title
1st Sem.	DSC	BSC-1 (BSC-1T &BSC-1P)	Microbes, Algae and Fungi
	GE	BGE-1 (BGE-1T&BGE-1P)	Cryptogamic Botany (Lower Botany)
2nd Sem.	DSC	BSC-2 (BSC-2T &BSC-2P)	Cytology, Genetics & Cytogenetic
	GE	BGE-2 (BGE-2T&BGE-2P)	Angiospermic Botany (Higher Botany)
3rd Sem.	DSC	BSC-3 (BSC-3T &BSC-3P)	Archegoniate & Paleontology
	DSE	BSE-1 (BSE-1T&BSE-1P)	Biochemistry & Enzymology
	GE	BGE-3 (BGE-3T&BGE-3P)	Microbes, Algae and Fungi
4th Sem.	DSC	BSC-4 (BSC-4T &BSC-4P)	Plant Taxonomy, Anatomy & Embryology
	DSE	BSE-2 (BSE-2T&BSE-2P)	Molecular Biology and Bio-statistic
	GE	BGE-4 (BGE-4T&BGE-4P)	Cytology, Genetics & Cytogenetic
1st, 2nd, 3rd and 4th Sem.	SEC	BSEC-1	Gardening & Floriculture
		BSEC-2	Flower Decoration
	VAC	BVAC-1	Herbal plant & Human Health
		BVAC-2	Academic Research & Report writing

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DEPARTMENT OF BOTANY:
UNDERGRADUATE COURSE CURRICULUM - 2023 - 24

PART- A: Introduction

Program: *Diploma course*		Class: B. Sc. SEM - III	Year: 2023	Session: 2023-2024
1	Course Code	BSE - 1T		
2	Course Title	Biochemistry & Enzymology		
3	Course Type	Discipline Specific Elective (DSE)		
4	Pre-requisite (if, any)	As per Govt. norms & Institutional scheme		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ *Understand the course and concept of Biochemistry* ➢ *get basic knowledge about Bio-molecules & Enzyme* ➢ *learn about various compounds related to common use* ➢ *Acquire fundamental idea about Enzyme kinetics*		
6	Credit Value	03		
7	**Total Marks**	Max. Marks: 100	Min. Passing Marks : 40	

PART-B: Content of the Course

Total No. of Teaching –Learning Period - 45 Hours

Unit	Topics (Course contents)	No. of Hours / Periods
I	**Bio-molecules – Carbohydrates:** Types and significance of chemical bonds; Structure and properties of water; pH and buffers. **Carbohydrates:** Concept, Nomenclature and classification; Role of monosaccharide (glucose, fructose, sugar alcohols – mannitol and sorbitol); Disaccharides (sucrose, maltose, lactose), Oligosaccharides and polysaccharides (structural-cellulose, hemicelluloses, pectin, chitin; storage – starch, inulin); Isomers and derivatives of glucose, glucosamine and gluconic acid	**12 Hours**
II	**Bio-molecules –Proteins and Lipids: Proteins:** Structure of amino acids; Peptide bonds; Levels of protein structure-primary, secondary, tertiary and quaternary; Isoelectric point; Protein denaturation and biological roles of proteins. **Lipids:** Definition and major classes of storage and structural lipids. Storage lipids. Fatty acids structure and functions. Essential fatty acids. Triacylglycerols structure, functions and properties. Structural lipids. Phosphoglycerides:	**11Hours**
III	**Nucleic acids and Bioenergetics:** Nucleic acids: Structure of nitrogenous bases; Structure and function of nucleotides; Types of nucleic acids; Structure of DNA & RNA. **Bioenergetics:** Laws of thermodynamics, concept of free energy, endergonic and exergonic reactions, coupled reactions, redox reactions. ATP: structure, its role as a energy currency molecule.	**11 Hours**
IV	**Basic concept of enzymes:** Nomenclature, classification, methods for determination of enzyme activity. Enzyme action, Enzyme kinetics: Michaelis – Menten equation, enzyme inhibition and factors affecting enzyme activity, effect of pH, substrate concentration, temperature and inhibitors. Iso-enzymes and allosteric enzymes. Enzyme inhibition-competitive and non-competitive inhibition.	**11 Hours**
Keywords	*Fermentation, Antimicrobial, Antibiotic, Industrial strain, Fermentation product*	

Signature of Convener and Members of BOS-

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PART–C: BSE – 1T

Suggested Readings:

Text Books Recommended–

1. Biochemistry by Lehninger
2. Principles of Biochemistry and molecular biology: Wilson & Walker
3. Plummer, D.T. (1996). An Introduction to Practical Biochemistry. Tata McGraw-Hill Publishing Co. Ltd. New Delhi. 3rd edition.
4. A text book of Biochemistry by Sttayer

Online Study Resources

e-learning Resources:

https://www.youtube.com/watch?v=CHJsaq2lNjU&ab_channel=ProfessorDaveExplains
https://www.youtube.com/watch?v=uM1t0mWXU30&ab_channel=Socratica
https://www.britannica.com/science/biochemistry
http://www.freebookcentre.net/Chemistry/BioChemistry-Books-Download.html
https://www.goodreads.com/shelf/show/biochemistry
https://www.researchgate.net/publication/322656101_Understanding_Enzymes_An_Introductory_Text

Part - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: **100 Marks**

Continuous Comprehensive Evaluation (CCE): **20 Marks**

Semester End Exam (SEE): **80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test - 02 of 10 Marks each Assignment –01 of 10 Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against 20 Marks
Semester End Exam (SEE):	Paper – **Two section – A & B** Section A: Objective and Short answer type questions – **10 + 30 = 40 Marks** **Objective-10 x 1=10; Short Answer Type Questions- 10 x 3=30** Section B: Descriptive answer type questions unit wise – **4 x 10 = 40 Marks**	

Section B: Descriptive answer type questions unit wise – 10 x 04 = 7...

Signature- Convener and Members of BOS-

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PART-A: Introduction

Program: *Diploma Course*	Class: B. Sc. Semester - III	Year: 2023	Session: 2023-2024

1	Course Code	**BSE – 1P**
2	Course Title	**Biochemistry and Enzymology**
3	Course Type	**Laboratory Course**
4	Pre-requisite (if, any)	As per Govt. norms / Institutional scheme
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to ➢ ***Understand fermentation processes involved in the production of various products.*** ➢ ***Get acquainted with the needs of a fermentation industry.*** ➢ ***Know about the large-scale production of various valuable products.***
6	Credit Value	**01**
7	Total Marks	**Max. Marks: 50** / **Min Passing Marks: 20**

PART-B: Content of the Course

Total No. of Teaching-learning Hours– 30

Topics (Course contents)	No. of Hour
• **A tentative list lab work that can be amended by teacher /department concerned.** 1. Isolation of industrially important microorganisms for microbial processes (citric / lactic/ alpha amylase) 2. Isolation of bacteria and fungi from spoiled food. 3. Determination of Thermal Death Point (TDP) and Thermal Death Time (TDT) of microorganisms for design of a sterilizer 4. Isolation, characterization and identification of bacteria from industrial wastes 5. Demonstration of production of ethanol by yeast. 6. Microbial fermentations for the production and estimation (qualitative and quantitative) of: (a) Enzyme: Amylase (b) Amino acid: Glutamic acid • (c) Organic acid: Citric acid.	**30 Hours**

Keywords | ***Temporary slide ,Staining, Identification, Symptoms***

PART– C: Learning Resources: Text Books, Reference Books and Others

Text Books Recommended:

1. Principles of Fermentation Technology by Stanbury, P.F., Whitekar A. and Hall. 1995., Pergaman. McNeul and Harvey
2. Laboratory Manual of Microbiology and Biotechnology. By Aneja K. R
3. Practical Microbiology, R. C. Dubey and D. K. Maheshwari.
4. Laboratory Manualin Microbiology. By P. Gunasekaran.

e-learning Resources:

https://books.google.co.in/books?id=Wh9OTbjesfUC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

PART– D: Assessment & Evaluation

- ***As an Assignment work for 10 marks –A project / field work may be allotted by the department or teacher concerned***
- ***Examination of lab. course – BSE-1P shall be conducted combined with BSE-2P at the end of Sem.-IV***
- ***Exam pattern shall be followed to Microbiological laboratory norms and questions will be determined by the department / teacher concerned***

Signature- Convener and Members of BOS-

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DEPARTMENT OF BOTANY:
UNDERGRADUATE COURSE CURRICULUM - 2023 - 24

PART- A: Introduction

Program: *Diploma course*		Class: B. Sc. SEM - IV	Year: 2023	Session: 2023-2024
1	Course Code	BSE - 2T		
2	Course Title	Molecular Biology & Biostatistics		
3	Course Type	Discipline Specific Elective (DSE)		
4	Pre-requisite (if, any)	As per Govt. norms & Institutional scheme		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ *Understand the concept of molecules of life and its arrangement* ➢ *Get acquaintance of the knowledge of chemical basis of life-nature, feature, activity and importance of nucleic acid* ➢ *Capture fundamental knowledge about genetic code and central dogma biochemical/genitival activity* ➢ *Understand mechanisms of replication, transcription &translation*		
6	Credit Value	03		
7	**Total Marks**	Max. Marks: 100	Min. Passing Marks : 40	

PART-B: Content of the Course

Total No. of Teaching –Learning Period - 45 Hours

Unit	Topics (Course contents)	No. of Hours / Periods
I	**Introduction:** Concept of Molecular biology, Molecules of life, Bio-macromolecules. Molecular concept of Bio-molecules- Aldehyde, Amino acids and Nucleotides. Nucleic acid as a genetic materials, Nucleic acids (Prokaryotes & Eukaryotes) – RNA and DNA, Basic structure and different forms of DNA, DNA Coiling, Plasmids: Concept, Properties, types and applications, Concept of Gene and its structural development – Cistron, Muton, Recon and Transposons	12 Hours
II	**Molecular Biology-I:** DNA Replication - Models of DNA replication. Enzymes, proteins and other factors involved in DNA replication. Mechanism of DNA replication in prokaryotes & eukaryotes. Inhibition of Replication DNA damage and repair. Molecular basis of Mutation, types of Mutation Mutagens and its action Genetic code.	11Hours
III	**Molecular Biology-I:** Concept Gene, Central dogma, Transcription & Translation: Steps of transcription in prokaryotes & Eukaryotes (RNA polymerases, promoters, inhibiters of transcription and post transcriptional modification). Mechanism of translation, Factors involved in translation and inhibition of protein synthesis. Regulation of Gene expression: Operon model, inducer and co repressor.	11 Hours
IV	**Biostatics:** Basic Concept and objectives of biostatics; Random Sampling, frequency distribution and Data collection; Data presentation; Central tendency – Mean, Median and Mode; Measurement of dispersion - Standard deviation and Standard error of mean. Test of significance– Chi square test for goodness of fit and t-test, Probability concept.	11 Hours

Keywords *Bio=molecules, Nucleic acid, Replication, Transcription & Translation*

Signature of Convener and Members of BOS -

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PART–C: BSE – 2T

Suggested Readings:

Text Books Recommended–

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition.John Wiley & Sons.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006.Cell and Molecular Biology.8th edition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition.ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009.The World ofof the Cell.7th edition. Pearson Benjamin Cummings Publishing, San Francisco.
5. Ruzin, S.E. (1999). Plant Micro-technique and Microscopy, Oxford University Press, New York.
6. Ausubel, F., Brent, R., Kingston, R. E., Moore, D.D., Seidman, J.G., Smith, J.A., Struhl, K. (1995). Short Protocols in Molecular Biology. John Wiley & Sons. 3rd edition
7. Zar, J.H. (2012). Biostatistical Analysis. Pearson Publication. U.S.A. 4th edition.

Online Study Resources

e-learning Resources

- https://bookauthority.org/books/new-molecular-biology-ebooks
- https://www.amazon.in/Molecular-Biology-Multicolour-Verma-Agarwal-ebook/dp/B06XKVVWT3
- https://tripurauniv.ac.in/Page/SubjectWiseOnline_EBooks_Cell_Molecular_Biology
- https://link.springer.com/book/10.1007/978-3-658-33920-3
- https://www.unitedkhoisan.co.za/free-books/?gad_source=1&gclid=CjwKCAiAsIGrBhAAEiwAEzMlC8DMd439ulAZae5g3iqR0P-J7fKdecznxiB_nsHFlXHjBo-CED9jwBoC3t0QAvD_BwE
- https://open.umn.edu/opentextbooks/textbooks/244
- https://filepdf.cloud/pdf/essentials-of-molecular-biology-by-david-freifelder-4823186
- https://www.unilus.ac.zm/lms/e-books/books/Basic_Sciences/Behavioural%20sciences%20and%20public%20health/Fundamentals%20of%20Biostatistics%20%287th%20Edition%29.pdf
- https://www.uou.ac.in/lecturenotes/science/MSCMT-19/BIOSTATISTICS.pdf

Part - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Comprehensive Evaluation (CCE):	**20 Marks**
Semester End Exam (SEE):	**80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test - 02 of 10 Marks each Assignment –01 of 10 Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against 20 Marks
Semester End Exam (SEE):	Paper – **Two section – A & B** Section A: Objective and Short answer type questions – **10 + 30 = 40 Marks** **Objective-10 x 1=10; Short Answer Type Questions- 10 x 3=30** Section B: Descriptive answer type questions unit wise – **4 x 10 = 40 Marks**	

Signature- Convener and Members of BOS-

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PART-A: Introduction

Program: *Diploma Course*	Class: B. Sc. Semester - IV	Year: 2023	Session: 2023-2024

1	Course Code	**BSE – 2P**
2	Course Title	**Molecular Biology & Biostatistics**
3	Course Type	**Laboratory Course**
4	Pre-requisite (if, any)	As per Govt. norms / Institutional scheme
5	Course Learning. Outcomes (**CLO**)	At the end of this course, the students will be able to ➢ *Understand the features of Bio-molecules and its chemistry* ➢ *Handling of bio-molecule and its isolation* ➢ *Quantitative determination and experimental practices Get acquaintance of the knowledge about the structure of DNA* ➢ *Capture fundamental knowledge about genetic code* ➢ *Understand mechanisms of replication, transcription &translation*
6	Credit Value	**01**
7	Total Marks	**Max. Marks: 50** **Min Passing Marks: 20**

PART-B: Content of the Course

Total No. of Teaching-learning Hours– 30

Topics (Course contents)	No. of Hour
• A tentative list lab work that can be amended by teacher /department concerned. 1. Isolation of DNA from plant cell (Onion/mustard). 2. Transformation of *E.coli*, preparation of competent cells. 3. Conjugation in *E. coli* using plate method. 4. Isolation of plasmid DNA from *E. coli.* 5. Isolation of genomic and plasmid DNA by polyethylene glycol method. • Colorimetric or spectrophotometric estimations of DNA, RNA	**30 Hours**

Keywords	***Temporary slide ,Staining, Identification, Symptoms***

PART– C: Learning Resources: Text Books, Reference Books and Others

Text Books Recommended:

1. Laboratory Manual of Microbiology And Biotechnology. Medtech;1st edition, 2017
2. Laboratory Manual of Microbiology and Biotechnology. By Aneja K. R
3. Practical Microbiology, R. C. Dubey and D.K. Maheshwari.
4. Laboratory Manual in Microbiology. By P. Gunasekaran.

Online Resources–

1. http://site.iugaza.edu.ps/mwhindi/files/Laboratory_Manual_And_Workbook_In_Microbiology.pdf http://site.iugaza.edu.ps/ydahdouh/files/General-Microbiology-Laboratory-pdf.pdf
2. https://ocw.mit.edu/courses/7-16-experimental-molecular-biology-biotechnology-ii-spring-2005/
3. https://www.fmed.uniba.sk/uploads/media/Introduction_to_Medical_and_Molecular_Biology.pdf

PART– D: Assessment & Evaluation

- ***As an Assignment work for 10 marks –A project / field work may be allotted by the department or teacher concerned***
- ***Examination of lab. course – BSE-1P shall be conducted combined with BSE-2P at the end of Sem.-IV***
- ***Exam pattern shall be followed to Microbiological laboratory norms and questions will be determined by the department / teacher concerned***

Signature- Convener and Members of BOS-

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DEPARTMENT OF BOTANY

LIST OF COURSE CODE AND COURSE TITLE FOR I, II, III & IV SEMESTER

Semester	Credit Based Course and Course code				
	DSC(4c)	DSE(4c)	GE(4c)	SEC(2c)	VAC(2c)
First	BSC-1 (1T&1P)	NA	BGE-1 (1T&1P)	BSEC-1 BSEC-2	BVAC-1 BVAC-2
Second	BSC-2 (2T&2P)	NA	BGE-2 (2T&2P)		
Third	BSC-3 (3T&3P)	BSE-1 (1T&1P)	BGE-3 (3T&3P)		
Fourth	BSC-4 (4T&4P)	BSE-2 (2T&2P)	BGE-4 (4T&4P)		

COURSE, COURSE CODE AND COURSE TITLE

Semester	Course	Course code	Course Title
1st Sem.	DSC	BSC-1 (BSC-1T &BSC-1P)	Microbes, Algae and Fungi
	GE	BGE-1 (BGE-1T&BGE-1P)	Cryptogamic Botany (Lower Botany)
2nd Sem.	DSC	BSC-2 (BSC-2T &BSC-2P)	Cytology, Genetics & Cytogenetic
	GE	BGE-2 (BGE-2T&BGE-2P)	Angiospermic Botany (Higher Botany)
3rd Sem.	DSC	BSC-3 (BSC-3T &BSC-3P)	Archegoniate & Paleontology
	DSE	BSE-1 (BSE-1T&BSE-1P)	Biochemistry & Enzymology
	GE	BGE-3 (BGE-3T&BGE-3P)	Microbes, Algae and Fungi
4th Sem.	DSC	BSC-4 (BSC-4T &BSC-4P)	Plant Taxonomy, Anatomy & Embryology
	DSE	BSE-2 (BSE-2T&BSE-2P)	Molecular Biology and Bio-statistic
	GE	BGE-4 (BGE-4T&BGE-4P)	Cytology, Genetics & Cytogenetic
1st, 2nd, 3rd and 4th Sem.	SEC	BSEC-1	Gardening & Floriculture
		BSEC-2	Flower Decoration
	VAC	BVAC-1	Herbal plant & Human Health
		BVAC-2	Academic Research & Report writing

① ② ③ ④ ⑤ ⑥ ⑦ Botanik

DEPARTMENT OF BOTANY
UNDERGRADUATE COURSE CURRICULUM 2023-24

PART-A: Introduction				
Program: *Certificate Course*		Class: B. Sc. Semester-I	Year: 2023	Session: 2023-2024
1	Course Code	BGE – 1T		
2	Course Title	Cryptogamic Botany (Lower Botany)		
3	Course Type	Generic Elective (GE)		
4	Pre-requisite(if,any)	As per Government norms / Institutional scheme		
5	Course Learning. Outcomes (CLO)	*After completion of this course, the students will be able to -* ➢ *- understand the nature, life – plant vs animal, occurrence & diversity of Microorganisms and thallophytic plants (algae & fungi) as well as Archegoniate in the environment* ➢ *- learn basic techniques of its collection, identification and preservation.* ➢ *-- become familiar with the common features, habitat, structure, mode of reproduction of organism and their economic importance*		
6	CreditValue	03 (Credit = 15 Hours Teaching-learning)		
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40	

PART -B: Content of the Course		
	Total No. of Teaching–learning - Hours– 45 / Periods-60	
Unit	**Topics (Course contents)**	**No. of Hours**
I	**Basic concept Botany:** Concept of living –origin & evolution, Plant & Animal, Introduction of Micro- & Macro plants – Thallophytes and Archegoniate-Bryophytes, Pteridophyte, Gymnosperm and Angiosperm –herb, shrub, trees and climbers. Plant & habitat – hydrophytes, xerophytes, lithophytes, mesophytes Plant and Environment, Branches of Botany and Eminent Botanists	**11 Hours**
II	**Concept of Microbes:** Concept of microorganism, prokaryote vs eukaryote. Basic knowledge of Viruses – nature, types, chemical composition and economic importance; Bacteria- nature, types, structure, reproduction and economic importance. General account of Mycoplasma, Lichen Actinomycetes and Cyanobacteria	**11 Hours**
III	**Basics of Thallophyta & Bryophyta:** Concept of thallophyta, Archegoniate and Bryophytes. Thallophyta – Features, general classification, thallus structure, mode of reproduction and life cycle of Algae with suitable example; Characteristic features, general classification, common structure and mode of reproduction of Fungi with suitable example. Economic importance of Algae & Fungi.	**11 Hours**
IV	**Basics of Pteridophyta & Gymnosperm:** Concept of land vascular plants, fossil, stele, telome, heterospory. Characteristic features, basic classification, features of classes of Pteridophytes and Gymnosperm with suitable examples. Concept of wood and ovules in Gymnosperm. Economic importance of Gymnosperm.	**12 Hours**
Keywords	*Microbes, Viruses, Bacteria, Cyanobacteria, Algae. Fungi*	

Signature of Convener & Members of BOS:

(1)

(2)

(3)

(4) AQ

(5)

(6)

(7) Botanist

PART–C (BGE – 1T)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended

1. Powar C.B. and Daginawala H.I General Microbiology; Vol I & II, Himalayn Pub. House, Bombay.
2. Dubey & Maheshwari, A Text Book of Microbiology
3. R. P. Singh, A Text Book of Microbiology
4. Pandey & Trivedi; A Text Book of Botany, Vol- I

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **Use of following sites**
- https://microbeonline.com/types-of-staining-techniques-used-in-microbiology-and-their-applications/
- **https://www.youtube.com/watch?v=gOFKk4LFYHI&ab_channel=MicrobialConcepts%28Microbiologychannel%29**
- https://gclambathach.in/lms/Algae.pdf
- **https://biologydictionary.net/bacteria/**
- **https://byjus.com/biology/kingdom-fungi/#:~:text=Characteristics% 20of%20Fungi, Following%20are%20the&text=Fungi% 20are%20eukaryotic%2C% 20non% 2D vascular, phenomenon%20of%20alternation%20of%20generation.**
- **http://eagri.org/eagri50/PATH171/lec03.pdf**
- **https://byjus.com/biology/algae/**
- **https://www.youtube.com/watch?v=Z_4UNFjqILo&ab_channel=subratadas**
- **https://www.biologydiscussion.com/algae/algae-definition-characteristics-and-structure-with-diagram/46727**
- **https://byjus.com/neet/classificationbryophytes/#:~:text=General%20Characteristics%20of%20Bryophytes%3A,like%20and%20leaf%2Dlike%20structure**
- **https://byjus.com/biology/pteridophyta/#:~:text=Primary%20characteristics%20of%20Pteridophytes%20are,may%20be%20homosporous%20or%20heterosporous.**
- **https://byjus.com/biology/gymnosperms/#:~:text=Gymnosperms%20are%20non%2Dflowering%20plants,%2C%20Cycadophyta%2C%20Ginkgophyta%20and%20Gnetophyta.**
- **https://www.britannica.com/plant/gymnosperm**
- **https://www.vedantu.com/biology/pteridophytes**
-

Part - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:		
Maximum Marks:	**100 Marks**	
Continuous Comprehensive Evaluation (CCE):	**20 Marks**	
Semester End Exam (SEE):	**80 Marks**	
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test - 02 of 10 Marks each Assignment –01 of 10 Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against 20 Marks
Semester End Exam (SEE):	Paper – **Two section – A & B** Section A: Objective and Short answer type questions – **10 + 30 = 40 Marks** **Objective-10 x 1=10; Short Answer Type Questions- 10 x 3=30** Section B: Descriptive answer type questions unit wise – **4 x 10 = 40 Marks**	

Name and Signature of Convener & Members of BOS:

(4)

(5)

(6)

(7) Botanik

PART-A: Introduction

Program: *Certificate Course*		Class: B. Sc. Semester - I	Year: 2023	Session: 2023-2024
1	Course Code	BGE – 1P		
2	Course Title	Cryptogamic Botany (Lower Botany)		
3	Course Type	Laboratory Course		
4	Pre-requisite (if, any)	As per Govt. norms / Institutional scheme		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ *Use of Compound light Microscope to study the microorganism and micro structures of various plant body- Microbes, Algae, Fungi and Bryophytes, parts of plant body – Pteridophytes & Gymnosperm* ➢ *Collect and identify microbes, Algae, Fungi, Bryophytes, Pteridophytes & Gymnosperms* ➢ *Prepare, the temporary stained slides of Algae, Fungi, Bryophytes, Pteridophytes & Gymnosperms* ➢ *Understand the symptoms of Viral, Bacterial & Fungal diseases of Plants in local area*		
6	Credit Value	01		
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20	

PART-B: Content of the Course

Total No. of Teaching-learning Hours– 30

Topics (Course contents) • **A tentative list lab work that can be amended by teacher /department concerned.**	No. of Hour
• EMS / Models of Viruses – T phage and TMV. • Study of different forms of Bacteria, Thallus of Algae, Fungi and Bryophytes. • Preparation of temporary slides and study of permanent slides of Algae & Fungi as an example • Preparation of temporary slides and study of permanent slides of Bryophytes, Pteridophytes. • Preparation of temporary slides and study of permanent slides of Bryophytes, Gymnosperms. • Study of Plant disease symptoms and preparation of suitable slides of infected area of local plant • Identification of Viral, Bacterial and Fungal diseases of plants based on their symptoms	**30 Hours**
Keywords | *Temporary slide ,Staining, Identification, Symptoms*	

PART– C: Learning Resources: Text Books, Reference Books and Others

Text Books Recommended:

1. Laboratory Manual in Microbiology. By P. Gunasekaran.
2. Practical Microbiology, R. C. Dubey and D. K. Maheshwari.
3. A Text Book of Practical Botany Vol-I. By Ashok Bendre and Kumar

Online Resources–

1. https://open.umn.edu/opentextbooks/textbooks/499
2. https://www.projectandnotes.com/2022/01/bsc-1st-year-botany-practical-file-pdf.html
3. https://www.agrifs.ir/sites/default/files/A%20text%20book%20of%20practical%20botany%201%20%7BAshok%20Bendre%7D%20%5B8171339239%5D%20%281984%29.pdf
4. https://www.pdfdrive.com/a-textbook-of-practical-botany-e57965065.html
5. https://www.britannica.com/plant/gymnosperm
6. https://study.com/learn/lesson/bryophytes-characteristics-examples.html
7. https://biologydictionary.net/bryophyte/
8. https://www.biologydiscussion.com/botany/pteridophyta/characteristics-of-pteridophyta-botany/5406

PART– D: Assessment & Evaluation

- ➢ *As an Assignment work for 10 marks –A project / field work may be allotted by the department or teacher concerned*
- ➢ *Examination of lab. course – BGE-1P shall be conducted at the end of Sem.-II*
- ➢ *Exam pattern shall be followed to Microbiological laboratory norms and questions will be determined by the department / teacher concerned*

Name and Signature of Convener & Members of BOS:

(1) (2) (3) (4) (5) (6) (7) Bashanik

DEPARTMENT OF BOTANY
UNDERGRADUATE COURSE CURRICULUM 2023 - 24

PART-A: Introduction				
Program: *Certificate Course*		Class: B. Sc. Semester-II	Year: 2023	Session: 2023-2024
1	Course Code	**BGE – 2T**		
2	Course Title	**Angiospermic Botany (Higher Botany)**		
3	Course Type	**Generic Elective (GE)**		
4	Pre-requisite(if,any)	As per Government norms / Institutional scheme		
5	Course Learning. Outcomes (CLO)	*After completion of this course, the students will be able to -* ➢ *- understand the nature & feature and diversity of angiosperm plants* ➢ *- learn basic techniques of its collection, identification and preservation.* ➢ *- become familiar with the common features, habitat, structure, mode of reproduction and physiology of higher plants and their economic importance*		
6	CreditValue	**03** (Credit = 15 Hours Teaching-learning)		
7	Total Marks	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course		
Total No. of Teaching–learning - Hours– 45 / Periods-60		
Unit	**Topics (Course contents)**	**No. of Hours**
I	**Basic concept of higher plants:** Concept of angiosperm - herb, shrub & tree; Root, stem, leaf, flower and fruits. General idea of taxonomy of angiosperm – concept of genus & species, family & order; natural, artificial and phylogenetic system of classification – Benthem & Hooker system of classification. Concept of ICBN, and Herbaria.	**11 Hours**
II	**Basics of Cytology, Genetics and molecular biology:** Plant cell – typical cell structure and cell organelles and nucleus & chromosome, Concept of cell cycle – different phases – cell division – phases of mitosis and meiosis. Concept of Genetics and mutation. Concept of DNA & RNA, central dogma – Replication, transcription & Translation.	**12 Hours**
III	**Basics of Plant Anatomy, Embryology & Ecology:** Concept of plant tissue – meristem & permanent tissues. Anatomy of root, stem & leaf, Primary & secondary growth. Concept Embryology – Pollination & fertilization, embryogeny & Seed. Concept of Ecology – Ecosystem, Hydrophytes & Xerophytes.	**11 Hours**
IV	**Basics of Plant physiology and Economic botany:** Concept of Plant physiology Pl water. ant & water relation – Absorption, translocation & excretion of water. Concept of Photosynthesis and respiration in plants. Economic importance of plants – Cereals, pulses, spices and timber with suitable examples.	**11 Hours**
Keywords	***Microbes, Viruses, Bacteria, Cyanobacteria, Algae. Fungi***	

Signature of Convener & Members of BOS:

① Dr. A.N. Balodi

② Dr. Dr. D.K. Srivastava

③ Dr. Uttara Tiwari

⑤ Dr. Ashahabir

⑥ Dr. M.I. Jamshed

⑦ Miss Roshani Ranchhi

PART–C (BGE – 1T)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended

1. Pandey & Trivedi; A Text Book of Botany, Vol- II
2. College Botany by Das, Dutta and Gangullee – Vol. – I
3. Plant Physiology by S. N. Pandey & V. K. Sinha
4. Plant Ecology by P. D. Sharma
5. Cytology & Genetics by P. K. Gupta
6. Plant anatomy by B. P. Pandey

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **Use of following sites**
- **https://byjus.com/biology/angiosperms/**
- **https://biologydictionary.net/angiosperm/**
- **https://www.brainkart.com/article/TAXONOMY-OF-ANGIOSPERMS---Types-of-classification_996/**
- **https://www.biologydiscussion.com/essay/angiosperms-essay/taxonomy-of-angiosperms-aims-and-principles-essay-botany/76587**
- **https://ncert.nic.in/textbook/pdf/kebo106.pdf**
- **https://byjus.com/jee/anatomy-of-flowering-plants/**
- **https://agriculturistmusa.com/plant-embryology/**
- **http://www.vpscience.org/materials/US04CBOT22%20UNIT%20II.pdf**
- **https://dspace.uzhnu.edu.ua/jspui/bitstream/lib/2985/1/Cytology&Genetics.pdf**
- **https://horizon.documentation.ird.fr/exl-doc/pleins_textes/divers21-03/010006778.pdf**
- **http://ppup.ac.in/download/econtent/pdf/JNL%20College%20(%20Pallavi%20for%20Botany%20B.Sc%20Part%20I%20)%20Topic-%20Introduction%20to%20cytology.pdf**
- **https://byjus.com/biology/plant-physiology/**
- **https://www.youtube.com/watch?v=S0Y6oPjqfVY&ab_channel=GurMantra-shikshakagranth**
- **https://www.youtube.com/watch?v=sYoZV6ODdbs**

Part - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Comprehensive Evaluation (CCE):	**20 Marks**
Semester End Exam (SEE):	**80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test - 02 of 10 Marks each Assignment –01 of 10 Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against 20 Marks
Semester End Exam (SEE):	Paper – **Two section – A & B** Section A: Objective and Short answer type questions – **10 + 30 = 40 Marks** **Objective-10 x 1=10; Short Answer Type Questions- 10 x 3=30** Section B: Descriptive answer type questions unit wise – **4 x 10 = 40 Marks**	

Name and Signature of Convener & Members of BOS:

(1) (4)

(2) (5)

(3) (6)

(7) Basanti

PART-A: Introduction

Program: *Certificate Course*		Class: B. Sc. Semester -II	Year: 2023	Session: 2023-2024
1	Course Code	BGE – 2P		
2	Course Title	Angiospermic Botany (Higher Botany)		
3	CourseType	Laboratory Course		
4	Pre-requisite (if, any)	As per Govt. norms / Institutional scheme		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ *Understand the features and importance of higher plants* ➢ *Identified the plant with scientific name and categorized the plants* ➢ *Prepare, the temporary stained slides of different parts of the plant* ➢ *Understand the ecology and physiology of plant community*		
6	Credit Value	01		
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20	

PART-B: Content of the Course

Total No. of Teaching-learning Hours– 30

Topics (Course contents) • A tentative list lab work that can be amended by teacher /department concerned.	No. of Hour
• Collection & Identification of plants and preparation of herbarium • Study of different parts of the plant – morphology and Anatomy • Description of plants and characterization of family – Cruciferaceae, Solanaceae, Astraceae • Preparation of temporary slides and study of permanent slides of Root, Stem and Leaf • Preparation of temporary slides and study of permanent slides of Ovules & Embryo. • Preparation of temporary slides and study of permanent slides of Cell division. • Demonstration of the experiments showing physiological phenomena • Identification and collection of economically important plants	30 Hours
Keywords | ***Temporary slide ,Staining, Identification, Herbarium***	

PART– C: Learning Resources: Text Books, Reference Books and Others

Text Books Recommended:

1. Laboratory Manual in Microbiology. By P. Gunasekaran.
2. Practical Botany by Pndey & Trivedi
3. A Text Book of Practical Botany Vol-II. By Ashok Bendre and Kumar

Online Resources–

- https://byjus.com/biology/angiosperms/
- https://biologydictionary.net/angiosperm/
- https://www.brainkart.com/article/TAXONOMY-OF-ANGIOSPERMS—Types-of-classification_996/
- https://www.biologydiscussion.com/essay/angiosperms-essay/taxonomy-of-angiosperms-aims-and-principles-essay-botany/76587
- https://ncert.nic.in/textbook/pdf/kebo106.pdf
- https://byjus.com/jee/anatomy-of-flowering-plants/
- https://www.sciencedirect.com/science/article/abs/pii/S0065229620300732
- https://www.sciencebuddies.org/science-fair-projects/project-ideas/experiment-in-plant-ecology

PART– D: Assessment & Evaluation

- ***As an Assignment work for 10 marks –A project / field work may be allotted by the department or teacher concerned***
- ***Examination of lab. course – BGE-2P shall be conducted at the end of Sem.-II with BGE-1P***
- ***Exam pattern shall be followed to Microbiological laboratory norms and questions will be determined by the department / teacher concerned***

Name and Signature of Convener & Members of BOS:

(1) (2) (3) (4) (5) (6) (7) Bashamik

DEPARTMENT OF BOTANY
UNDERGRADUATE COURSE CURRICULUM 2023-24

PART-A: Introduction				
Program: *Diploma Course*		Class: B. Sc. Semester-III	Year: 2023	Session: 2023-2024
1	Course Code	**BGE – 3T**		
2	Course Title	**Microbes, Algae and Fungi**		
3	Course Type	**Generic Elective (GE)**		
4	Pre-requisite(if,any)	As per Government norms / Institutional scheme		
5	Course Learning. Outcomes (CLO)	*After completion of this course, the students will be able to -* ➢ *- understand the nature, occurrence and diversity of Microorganisms and thallophytic plants (algae & fungi) in the environment* ➢ *- learn basic techniques of its collection, identification and preservation.* ➢ *-- become familiar with the common features, habitat, structure, mode of reproduction of organism and their economic importance*		
6	CreditValue	**03** (Credit = 15 Hours Teaching-learning)		
7	Total Marks	**Max. Marks: 100**	**Min Passing Marks: 40**	

PART -B: Content of the Course		
	Total No. of Teaching–learning - Hours– 45	
Unit	**Topics (Course contents)**	**No. of Hours**
I	**Microbes-Viruses:** Concept of Microbe & Microbial world, Concept of Prokaryotes vs Eukaryotes. Viruses – Discovery, general structure, chemical composition, Virions, Viroids & Prions; Classification (Baltimore classification) Transmission, Multiplication, DNA virus (T-phage); Lytic and lysogenic cycle, RNA virus (TMV); Economic importance Viruses	**12Hours**
II	**Microbes-Bacteria:** General concept / characteristics of Bacteria – Archea & Eu -bacteria, Cell structure and cell division; Reproduction and Recombination Transformation, Transduction and Conjugation. General account of Mycoplasma and Actinomycetes. Common bacterial disease of Plants.. General account of Cyanobacteria. Economic importance of Bacteria	**11Hours**
III	**Thallophyta–Algae:** Characteristics features and Classification (Lee 'classification) Range of thallus organization, Pigments & Stored food. Reproduction – types & mode. Concept & types of Life cycle and Economic importance. Life-cycles of *Volvox*, *Oedogonium*, *Vaucheria*, *Ectocarpus* & *Polysiphonia*. Economic importance of Algae. Eminent Phycologists.	**11Hours**
IV	**Thallophyta–Fungi:** Characteristics and Classification, thallus organization, Reproduction. Heterothallism & Parasexuality, Life cycle of *Rhizopus*. *Penicillium*, *Puccinia*, *Agaricus*, *Alternaria*, *Fusarium* & *Colletotrichum*. General account of Lichen and Mycorrhiza. Economic importance of Fungi. Eminent Mycologists.	**11Hours**
Keywords	*Microbes, Viruses, Bacteria, Cyanobacteria, Algae. Fungi*	

Signature of Convener & Members of BOS:

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(6)
(7) Botanik

PART–C (BGE – 3T)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended

1. Kumar, H.D. (1999). Introductory phycology. Affiliated East-West. Press Pvt. Ltd. Delhi.2nd edition.
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. Powar C.B. and Daginawala H.I General Microbiology; Vol I & II, Himalayn Pub. House, Bombay.
7. Dubey & Maheshwari, A Text Book of Microbiology
8. R. P. Singh, A Text Book of Microbiology

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **Use of following sites**
  - https: microbeonline.com/types-of-staining-techniques-used-in-microbiology-and-their-applications/
  - **https://www.youtube.com/watch?v=gOFKk4LFYHI&ab_channel=MicrobialConcepts%28Microbiologychannel%29**
  - https://gclambathach.in/lms/Algae.pdf
  - **https://biologydictionary.net/bacteria/**
  - **https://byjus.com/biology/kingdom-fungi/#:~:text=Characteristics% 20of%20Fungi, Following%20are%20the&text=Fungi% 20are%20eukaryotic%2C% 20non% 2D vascular, phenomenon%20of%20alternation%20of%20generation.**
  - **http://eagri.org/eagri50/PATH171/lec03.pdf**
  - **https://byjus.com/biology/algae/**
  - **https://www.youtube.com/watch?v=Z_4UNFjqILo&ab_channel=subratadas**
  - **https://www.biologydiscussion.com/algae/algae-definition-characteristics-and-structure-with-diagram/46727**

Part - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Comprehensive Evaluation (CCE): 20 Marks

Semester End Exam (SEE): 80 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test - 02 of 10 Marks each Assignment –01 of 10 Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against 20 Marks
Semester End Exam (SEE):	Paper – **Two section – A & B** Section A: Objective and Short answer type questions – **10 + 30 = 40 Marks** **Objective-10 x 1=10; Short Answer Type Questions- 10 x 3=30** Section B: Descriptive answer type questions unit wise – **4 x 10 = 40 Marks**	

Name and Signature of Convener & Members of BOS:

1) 2) 3) 4) 5) 6) 7) Bothanik

PART-A: Introduction

Program: *Diploma Course*	Class: B. Sc. Semester - III	Year: 2023	Session: 2023-2024

1	Course Code	**BGE – 3P**
2	Course Title	**Microbes, Algae and Fungi**
3	Course Type	**Laboratory Course**
4	Pre-requisite (if, any)	As per Govt. norms / Institutional scheme
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ *Use of Compound light Microscope to study the microorganism and micro structures of various plant body* ➢ *Collect and identify microbes, Algae and Fungi* ➢ *Prepare, the temporary stained slides of Algae and Fungi* ➢ *Understand the symptoms of Viral, Bacterial & Fungal diseases of Plants in local area*
6	Credit Value	**01**
7	Total Marks	**Max. Marks: 50** — **Min Passing Marks: 20**

PART-B: Content of the Course

Total No. of Teaching-learning Hours– 30

Topics (Course contents) • **A tentative list lab work that can be amended by teacher /department concerned.**	No. of Hour
• EMS / Models of Viruses – T phage and TMV. • Study of different forms of Bacteria, Gram staining of Bacteria. • Preparation of temporary slides and study of permanent slides of Algae, mentioned in syllabus. • Preparation of temporary slides from culture and study of permanent slides of Fungi mention in syllabus. • Study of Plant disease symptoms and preparation of suitable slides of infected area of mention in syllabus. • Lichen: Study of specimens and permanent slides of Folliose, Crustose, and Fruticose Lichens. • Mycorrhiza: Ectomycorrhiza and endomycorrhiza (photographs). • Identification of Viral, Bacterial and Fungal diseases of plants based on their symptoms	**30 Hours**

Keywords	*Temporary slide ,Staining, Identification, Symptoms*

PART– C: Learning Resources: Text Books, Reference Books and Others

Text Books Recommended:

1. Laboratory Manual in Microbiology. By P. Gunasekaran.
2. Practical Microbiology, R. C. Dubey and D. K. Maheshwari.
3. A Text Book of Practical Botany Vol-I. By Ashok Bendre

Online Resources–

1. https://open.umn.edu/opentextbooks/textbooks/499
2. https://www.projectandnotes.com/2022/01/bsc-1st-year-botany-practical-file-pdf.html
3. https://www.agrifs.ir/sites/default/files/A%20text%20book%20of%20practical%20botany%201%20%7BAshok%20Bendre%7D%20%5B81713392395D%20%281984%29.pdf
4. https://www.pdfdrive.com/a-textbook-of-practical-botany-e57965065.html

PART– D: Assessment & Evaluation

- ➢ *As an Assignment work for 10 marks –A project / field work may be allotted by the department or teacher concerned*
- ➢ *Examination of lab. course – BGE-3P shall be conducted combined with BGE-4P at the end of Sem.-IV*
- ➢ *Exam pattern shall be followed to Microbiological laboratory norms and questions will be determined by the department / teacher concerned*

Name and Signature of Convener & Members of BOS:

(1) (2) (3) (4) (5) (6) (7) Botanist

DEPARTMENT OF BOTANY
UNDERGRADUATE COURSE CURRICULUM 2023-24

PART-A: Introduction

Program: *Diploma Course*	Class: B. Sc. Semester- IV	Year: 2023	Session: 2023-2024

1	Course Code	**BGE–4T**	
2	Course Title	**Cytology, Genetics and Cytogenetics**	
3	Course Type	**Generic Elective**	
4	Pre-requisite (if, any)	As per Government norms / Institutional scheme	
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to ➢ *Understand the cell structure as an unit of living beings* ➢ *Aware with the basic concept of Genetics and fundamentals of Cytogenetic- genetics based on chromosomes* ➢ *Become familiar with cellular mechanism of living organism, concept of nucleic acid as genetic material* ➢ *Understand the concept of Mendel's experiment, Mendelian genetics Post Mendelian – classical genetics*	
6	Credit Value	**03**	
7	Total Marks	**Max. Marks: 100**	**Min Passing Marks: 40**

PART- B: Content of the Course

Total No. of Teaching Hours – 45 Hours

Unit	Topics (Course contents)	No. of Hours
I	**Cytology-I / Plant cell:** Concept of cytology & The Cell Theory; Prokaryotic and eukaryotic cells; Ultra structure of Plant Cell & Cell Organelles –, Mitochondria, Chloroplast, E.R, Golgi-complex, Ribosome, Lysosome and Cell Membrane and Cell Wall – Chemical composition, Latest concept of structure and function.	**11 Hours**
II	**Cytology-II / Nucleus & Division:** Nucleus – nuclear envelop & nuclear pore, Nuclear material – Nucleic acid – DNA & RNA, Chromatin & Chromosome (DNA packaging in eukaryotes). Nucleolus (Structure, Function and Biogenesis). Overview of Cell cycle – G1, S, G2 & M phases, Events of Mitosis and Meiosis; its significance and Molecular controls.	**11 Hours**
III	**Genetics (Classical):** History of Mendel' experiments, Terminologies; Laws of Inheritance; Test cross, Co- dominance, incomplete dominance; Modified Mandelian Ratios: 2:1- lethal Genes; 9:7; 9:4:3; 13:3; 12:3:1. 15:1. Cytoplasmic Inheritance & Male sterility. Linkage: concept & types, complete & incomplete linkage, bridges experiment, coupling & repulsion, Crossing over: concept and significance.	**11 Hours**
IV	**Cytogenetic:** Structural chromosomal changes -Deletions, Duplications, Inversions & Translocations. Numerical chromosomal changes: Aneuploidy – types, cause& consequences; Euploidy, Polyploidy – types, origin and interrelation; Mutation – concept and molecular basis. Types of mutations, types, nature and effects of physical & chemical mutagens. Role of chromosomal aberration, polyploidy & mutation in evolution & crop improvement.	**12 Hours**

Keywords ***Cytology, Cyplasmic organelle, Cell cycle, Mendel's, Genetics, Cytogenetics***

Signature Members of BOS-

(1) (2) (3) (4) (5) (6) (7) Barhanik

PART–C: (BGE–4T)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended -

1. Cell Biology; Powar C. B. and Daginawala H. I., Himalay Pub. House, Bombay.
2. Cell biology by Karp, G. 2010.
3. Cell and Molecular Biology: Concepts and Experiments. 6th Edition.John Wiley & Sons. Inc.
4. De Robertis, E.D.P. and De Robertis, E.M.F. 2006.Cell and Molecular Biology.8th edition. Lippincott Williams and Wilkins, Philadelphia.
5. Genetics by P. K. Gupta, Rastogi Publication
6. Gytogenetics, Molecular biology and Plant breeding by P. K. Gupta, Rastogi Publication
7. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009.The World ofof the Cell.7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

Online Resources–

- **e-Resources /e-books and e-learning portals**
- **Use of following sites**

1. ***http://rastogipublications.com/index.php?route=product/product&product_id=50***
2. https://www.uou.ac.in/sites/default/files/slm/BSCBO
3. https://dspace.uzhnu.edu.ua/jspui/bitstream/lib/2985/1/Cytology&Genetics.pdf
4. ***https://ysmubooks.am/uploads/MEDICAL_BIOLOGY.pdf***
5. ***https://www.biologyonline.com/dictionary/chromosomal-mutation***
6. ***https://www.bioexplorer.net/chromosomal-mutations.html/***
7. ***http://adpcollege.ac.in/online/attendence/classnotes/files/1589181737.pdf***
8. ***http://www.jnkvv.org/PDF/05052020112111155201108.pdf***
9. ***http://icvcollege.edu.in/sites/default/files/mutation%2C%20types%2C%20and%20detection%20of%20mutation.pdf***
10. ***https://old.amu.ac.in/emp/studym/100005252.pdf***
11. ***http://eagri.org/eagri50/GBPR111/lec02.pdf***
12. ***https://www.ncbi.nlm.nih.gov/books/NBK9876/***
13. ***https://opentextbc.ca/biology/chapter/6-2-the-cell-cycle/***
14. ***https://www.biologydiscussion.com/genetics/linkage-of-genetics-features-examples-types-and-significance/5183***

Part - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Comprehensive Evaluation (CCE):	**20 Marks**
Semester End Exam (SEE):	**80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test - 02 of 10 Marks each Assignment –01 of 10 Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against 20 Marks
Semester End Exam (SEE):	**Paper – Two section – A & B** Section A: Objective and Short answer type questions – **10 + 30 = 40 Marks** **Objective-10 x 1=10; Short Answer Type Questions- 10 x 3=30** Section B: Descriptive answer type questions unit wise – **4 x 10 = 40 Marks**	

Signature Members of BOS-

(1) (2) (3) (4) (5) (6) (7) Botany

PART - A: Introduction

Program: *Diploma Course*	Class: B. Sc. Semester-IV	Year: 2023	Session: 2023-2024

1	Course Code	BGE–4P
2	Course Title	Cytology, Genetics and Cytogenetics
3	Course Type	Laboratory course
4	Pre-requisite (if. any)	As per Govt. norms / Institutional scheme
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to ➢ Handle the Compound light Microscope and apply microscopy ➢ Achieve elaborate idea about cell staining procedures and mitotic plate observation & analysis ➢ Identify the various stages of cell division karyotype analysis ➢ Get practice of genetic crosses and genetic analysis
6	Credit Value	01
7	Total Marks	Max. Marks: 50 — Min. Passing Marks: 20

PART - B: Content of the Course

Total No. of Teaching Hours - 30

Topics (Course contents)	No. of Hours /
• Study different types of Plant cells. • Techniques of different staining methods of Cell organelles. • Study different stages of Mitosis. • Study different stages of Meiosis. • Exercises on Genetics (Mendelian ratios and Test crosses). • Karyotypes of Chromosomes. • Study of bar bodies. • Study of Polytene Chromosomes and lampbrush chromosome.	30 Hrs /

Keywords ***Cyto-techniques, Microscopy, Mitotic plate, Karyotype.***

PART– C: (BGE–4P)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended–

1. Laboratory Manual of Cyto-tecnique and Chromosome handling By Sharma A K.
2. Manual of Cytology, Ministry of Health & Welfare.
3. Cytogenetics By P K Gupta.
4. Cell biology By C. B. Powar

Online Resources–

1. https://screening.iarc.fr/doc/Cancer_resource_Manual_3_Cytology_New.pdf
2. https://www.gribblesvets.co.nz/wp-content/uploads/2019/06/How-to-Prepare-Cyto-Smears.pdf
3. https://www.youtube.com/watch?v=SLkiplg4WRg&ab_channel=SridharRao

PART– D: Assessment & Evaluation

- ***As an Assignment work for 10 marks –A project / field work may be allotted by the department or teacher concerned***
- ***Examination of lab. course BGE-4P shall be conducted combined with BGE-3P at the end of Sem.-IV***
- ***Exam pattern shall be followed to Botany department laboratory norms and questions will be determined by the department / teacher concerned***

Signature Members of BOS-

(1)
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(7) Bohanik

DEPARTMENT OF BOTANY
UNDERGRADUATE COURSE CURRICULUM 2023-24

PART-A: Introduction					
Program: FYUP *Certificate / Diploma / Degree*		Class: **B. Sc./BCA** Semester - I/II/III/IV		Year: **2023**	Session: **2023-2024**
1	Course Code	**BSEC –1**			
2	Course Title	**Gardening and Floriculture**			
3	Course Type	**Skill Enhance Course (SEC)**			
4	Pre-requisite(if,any)	As per Government norms / Institutional scheme			
5	Course Learning. Outcomes (CLO)	*After completion of this course, the students will be able to -* ➢ *- understand the concept of Gardening & Floriculture* ➢ *- learn about the gardening technique and familiar with gardening tools* ➢ *- adopt the skill of gardening as well as floriculture*			
6	CreditValue	02	**(01 Theme learning + 01 Practices & Hands-on performance)** (Credit = 15 Hours - learning & Observation and 30 Hrs for Practices/ Field work)		
7	Total Marks	**Max. Marks: 50**		**Min Passing Marks: 20**	

PART -B: Content of the Course		
Total No. of Teaching–learning - Hours– 15 + 30 Hrs		
Module	**Topics (Course contents): learning, Observation and Preparation**	**No. of Hrs**
I	**Concept & Types of Garden:** Concept of Garden & Landscape Gardening, Styles of garden – Formal & Informal garden, Free style gardens, Home garden, Hanging garden Types of gardens – English, Mughal, Babylonian garden *[Observation & Practices]*	**05 Hours**
II	**Garden plants:** Ornamental plants - Shrubbery, Fernery, Arches (climbers and creepers), Pergolas, Edges & Hedges and Pot plants, Cacti and Succulents plants, Flower borders and beds, Ground covers and carpet beds *[Observation & Practices]*	**05 Hours**
III	**Floriculture:** Present situation & scope in India. Various types of flowers - Seasonal flowers, Cut flowers. Flower Crops - Rose, Chrysanthemum, Carnation, Gerbera, Gladioli, Tuberose, Aster, Lilly, Dahlia and Marigold. *[Observation & Practices]*	**05 Hours**
Topics (Course contents): Practices / Field learning		
IV	1. Familiarization with different tools and equipments used in gardening work. 2. Design and Plotting of Garden and Preparation of Soil for Garden 3. Soil decontamination techniques, Planting methods, Fertigation method. Propagation techniques for selected ornamental plants Weed management 4. Harvesting techniques, Post-harvest handling, Pre cooling, Pulsing, Packing, 5. Preparation of composite mixture and manuring practice in nursery and pots. 6. Practice in budding, cutting, layering and grafting etc. 7. Practice of flower arrangements, flower bouquet.	**30 Hours**
Keywords	*Garden, Flower, Floriculture, Garden tools*	

Signature of Convener & Members of BOS:

① Dr. A.N. Kalaskar

② Dr. D.U. Srivastava

③ Dr. Uttara Tiwari

④ Dr. V. Hanmgo

⑤ Dr. Asha Kabir

⑥ Dr. M.I. Jamsual

⑧ Miss Roshni Vaishali

PART–C **BSEC – 1 (Gardening and Floriculture)**

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended

1. Randhawa, G. S. and Mukhopadhyay, A. (1986)"Floriculture in India." Allied Publisher (India)
2. Bhattacharjee, S. K. (2006) "Advances in Ornamental Horticulture." Vols. I-VI. Pointer Pub.
3. Lauria, A. and Victor, H. R. (2001) "Floriculture – Fundamentals and Practices." Agrobios.
4. Sabina, G. T. and Peter, K. V. (2008) "Ornamental Plants for Gardens." New India pub. India.

Online Resources–

- **e-Resources / e-books and e-learning portals**
- **Use of following sites**

- **https://indiaagronet.com/horticulture/CONTENTS/LANDSCAPE.htm**
- **https://www.youtube.com/watch?v=ZUIh6ZFO48c&ab_channel=MountainGardens**
- **https://www.youtube.com/watch?v=EE0oQO6n9iA**
- **https://www.teachmint.com/tfile/studymaterial/b-sc/j1063fog/l1styleofgardeningpdf/0dba825b-d66d-4180-afe1-28950aa42454**
- **https://k8449r.weebly.com/uploads/3/0/7/3/30731055/types_of_gardens_[compatibility_mode]_pdf-signed.pdf**
- **https://www.egyankosh.ac.in/bitstream/123456789/73050/1/Unit-2.pdf**
- **https://www.academia.edu/40140208/A_HANDBOOK_ON_FLORICULTURE_And_Landscaping**
- **https://k8449r.weebly.com/uploads/3/0/7/3/30731055/landscape_gardening.pdf**
- **https://homeguides.sfgate.com/gardening-tools-uses-41745.html**
- **https://tractorguru.in/blog/floriculture-types-of-flowers-tips-and-importance-of-floriculture/**

Part-D:Assessment and Evaluation

Suggested Continuous Evaluation Methods:	
Maximum Marks:	**50 Marks**
Continuous Comprehensive Evaluation (CCE):	**10Marks**
Semester End Exam(SEE):	**40 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test-2 of 05Marks each Assignment / Seminar –01 of 05 Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against 10 Marks
Semester End Exam (SEE): Spot Performance / Project work	**Two section– A &B** Section A: Field work task/Project/Practice performance = 10x2 = 20Marks Section B: Spot writing +Spot task + Viva-voce– 10 + 05 + 05= 20Marks	

Amendment or Modification shall may be made by Course Coordinator as per situation or directed by the department / Examination Cell / NEP-20 Scheme coordinator

Name and Signature of Convener & Members of BOS:

(1) (5)

(2)

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(7) Botany

DEPARTMENT OF BOTANY

UNDERGRADUATE COURSE CURRICULUM 2023-24

SEC –1: Gardening and Floriculture (Amendment)

Component	Previous (2022-23)	Present (2023-24)	Justification
PART-A: Introduction	**Program:** *Certificate Course* Class: **B. Sc. Semester-I**	**Program: FYUP** ***Certificate / Diploma / Degree*** Class: **B. Sc. Semester- I/II/III/IV**	As per CCFUP to implement from 2023-24
	Credit Value: 2 (01 theoretical + 01 Practical aspect) Credit = 15 Hours Teaching-learning for Theory & 30 Hrs for Practical work)	**Credit Value:** 2 (01 Theme learning + 01 Practices & Hands-on performance) Credit = 15 Hours - learning & Observation and 30 Hrs for Practices/ Field work)	Proper enhancement of skill, it has been decided to introduce that would be useful for learners
	Max. Marks- 50, Passing marks-17	Max. Marks- 50, Passing marks-20	As per Ordinance
PART -B: Content of the Course			
Module	**Topics (Course contents): Theoretical learning**	**Topics (Course contents): learning, Observation and Preparation**	As per nature of the course
I	**Concept & Types of Garden:** Concept of Garden Landscape Gardening, Styles of garden – Formal, informal and free style gardens, Home garden, Hanging garden; Types of gardens – English, Mughal, Babylonian garden	**Concept & Types of Garden:** Concept of Garden & Landscape Gardening, Styles of garden – Formal & Informal garden, Free style gardens, Home garden, Hanging garden; Types of gardens – English, Mughal, Babylonian garden ***[Observation & Practices]***	Proper learning towards objectives / LOCF and convenience of learners
II	**Garden plant components:** Ornamental plants, Shrubbery, fernery, arches and pergolas, edges and hedges, climbers and creepers, cacti and succulents, annuals, flower borders and beds, ground covers and carpet beds	**Garden plants:** Ornamental plants - Shrubbery, Fernery, Arches (climbers and creepers), Pergolas, Edges & Hedges and Pot plants, Cacti and Succulents plants, Flower borders and beds, Ground covers and carpet beds ***[Observation & Practices]***	Proper learning towards objectives / LOCF and convenience of learners
III	**Floriculture:** Present situation & scope in India. Flower Crops, various types of flowers, seasonal flowers, cut flowers, pot plants, seeds and bulbs and aquatic plants, Crops - Rose, Chrysanthemum, Carnation, Gerbera, Gladioli, Tuberose, Aster, Lilly, Dahlia and Marigold.	**Floriculture:** Present situation & scope in India. Various types of flowers - Seasonal flowers, Cut flowers. Flower Crops - Rose, Chrysanthemum, Carnation, Gerbera, Gladioli, Tuberose, Aster, Lilly, Dahlia and Marigold. ***[Observation & Practices]***	Proper learning towards objectives / LOCF and convenience of learners
IV	**Topics (Course contents): Practical learning**	**Topics (Course contents): Practices / Field learning**	As per nature of the course
Part - D: Assessment and Evaluation			
Semester End Exam (SEE):	Paper – **Two section – A & B** Section A: Objective type questions – **10 x 1 = 10 Marks** Section B: Short answer type questions unit wise– **5 x 02 =10 Marks** Exercise /Field work/Task- **20Marks**	**Two section – A & B** Section A: Field work task/Project/ Practice performance- **10 x 2 = 20 Marks** Section B: Spot writing + Spot task + Viva-voce- **10 + 05 + 05 = 20 Marks**	Following the scheme of assessment / pattern of question paper as determined by Autonomous cell for proper assessment

Name and Signature of Convener & Members of BOS:

(1) (2) (3) (4) (5) (6)

DEPARTMENT OF BOTANY
UNDERGRADUATE COURSE CURRICULUM- 2023-24

PART-A: Introduction					
Program: FYUP *Certificate/Diploma/Degree*		Class: B. Sc./BCA Semester-I/II/III/IV		Year:2023	Session:2023-2024
1	Course Code	BSEC–2			
2	Course Title	Flower Decoration			
3	Course Type	Skill Enhance Course (SEC)			
4	Pre-requisite (if, any)	As per Government norms / Institutional scheme			
5	Course Learning. Outcomes(CLO)	*After completion of this course, the students will be able to-* ➢ *-understand the concept of Flower arrangement & Decoration* ➢ *-learn the idea, design and style of Flower decoration and its importance* ➢ *-learn the skill of different types Flower arrangement with local/social application, commercial value and social demand* ➢ *-adopt the skill of Indian, Western, Japanese and other/local style of flower arrangement / decoration towards level of entrepreneurs' start-up*			
6	Credit Value	02	(01Themelearning +01 Practices &Hands-on performance) (Credit=15Hours –learning & Observation And 30Hrs for Practices/Field work)		
7	Total Marks	Max.Marks:50		MinPassingMarks:20	

PART-B: Content of the Course		
Total No. of Teaching–learning-Hours– 15 Hrs+ 30 Hrs		
Module	Topics (Course contents): learning, Observation and Preparation	No. of Hrs
I	**Introduction:** Basic knowledge of Flowering plants, Ornamental plants, Decorative plants- Shade plants, Ferns, Bonsai, Decorative Flowers, Flower shows. Commercial flowers, Common Ornamental plants and flowers of local area /state. Famous flower Gardens of India. *[Learning and Practices]*	04Hours Learning and 07 Hours Practices
II	**Floral ornaments & Flower arrangements:** Garlands, Floral bouquets, Floral rangoli, Flower arrangements – concept, idea , design and style – Western styles, Japanes or Ikebana styles, Common types of Flower arrangement – Elliptical, Vertical, Horizontal Triangular, Crescent, S & Oval shapes and Cascade .flower arrangement. *[Learning and Practices]*	04Hours Learning and 07HoursPractices
III	**Flower decoration:** Flowers used for decoration; Different idea of flower decoration for Home, Festivals, office, Gallery, Stage, Wall, Table, Gate. Flower Pot / Vas / Bottle decoration. *[Learning and Practices]*	03 Hours + 07 Hours
IV	**Creative decorations:** Flower drying and Dry flower decoration, Foliage arrangement; Dry foliage decoration; Flower decoration by Oil Painting, Resin art of Flower decoration Terrarium – concept, design and creation of different forms. Bonsai, Shady foliage, Fern and Water plant/ flower decoration. *[Learning and Practices]*	04Hours Learning and 09 Hours Practices
Keywords	*Floral ornaments, Flower arrangement, Flower decoration*	

Signature of Convener & Members of BOS:

(1) Dr. A.N. Sahadeo
(2) Dr. D.U. Srinivastava
(3) Dr. Uttara Tiwari
(4) Dr. V.U. Kanungo
(5) Dr. Asha Kabir
(6) Dr. M.J. Jaiswal
(7) Miss. Kashmi Kaushik Botanist

PART–C BSEC–2 (Flower Decoration)

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended

Textbooks:

1. Floriculture in India, G. S. Randhawa and A. Mukhopadhyay, Allied Publishers Pvt. Ltd.
2. Modern Ikebana: A New Wave in Floral Design Hardcover–2020byTom Loxley &VictoriaGaiger
3. On Flowers: Lessons from an Accidental Florist, Illustrated,2019byAmy Merrick(Author)
4. Flower School: A Practical Guide to the Art of Flower Arranging,2020 by Calvert Crary(Author)
5. The Flower Expert: Ideas and Inspiration for a LifeWithFlowers,2019byFleurMcHarg(Author)
6. The Art of FlowerArranging,1992 by Jan Hall(Author)
7. A Personal Guide to Flower Arranging: Volume 2 Spring and Summer, 2021 by Wendy Markby
8. The Flower Chef: A Modern Guide to Do-It-Yourself Floral Arrangements,2016byCarlyCylinder
9. Easy Ikebana: 30Beautiful FlowerArrangements,2020 by Shinichi Nagatsuka(Author)

Reference Book:

https://www.gardensillustrated.com/reviews/the-best-new-floristry-books

Online Resources–

❖ **e-Resources/e-books and e-learning portals Use of following sites**

- **https://en.wikipedia.org/wiki/Ikebana**
- **https://www.artsy.net/article/artsy-editorial-thriving-art-ikebana-japanese-tradition-flower-arranging**
- **https://agritech.tnau.ac.in/horticulture/horti_Landscaping_dryflower_tech.html**
- **https://library.ihbt.res.in/Institute%20Brochures/dry%20flower.pdf**
- **https://static.vikaspedia.in/media/files_en/agriculture/farm-based-enterprises/value-added-products/dry-flower-production-1.pdf**
- **https://www.researchgate.net/publication/362645798_Dry_Flower_Technology_A_Value_Addition_to_Floriculture_Industry**
- **https://in.pinterest.com/smsastry/flower-decoration/**
- **https://in.pinterest.com/galisreelatha/flower-decoration/**
- **https://www.britannica.com/art/floral-decoration**
- **https://homebnc.com/best-creative-flower-decoration-ideas/**
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Part-D:Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: **50 Marks**

Continuous Comprehensive Evaluation (CCE): **10Marks**

Semester End Exam(SEE): **40 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test-**2 of 05**Marks each Assignment / Seminar –**01 of 05** Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against **10 Marks**
Semester End Exam (SEE): Spot Performance / Project work	**Two section– A &B** Section A: Field work task/Project/Practice performance = **10x2 = 20Marks** Section B: Spot writing +Spot task + Viva-voce– **10 + 05 + 05= 20Marks**	

Amendment or Modification shall may be made by Course Coordinator as per situation or directed by the department / Examination Cell / NEP-20 Scheme coordinator

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DEPARTMENT OF BOTANY
UNDERGRADUATE COURSE CURRICULUM 2023-24

PART-A: Introduction				
Program: FYUP *Certificate / Diploma / Degree*		Class: B. Sc./BCA Semester - I/II/III/IV	Year: 2023	Session: 2023-2024
1	Course Code	BVAC –1		
2	Course Title	Herbal Plant & Human Health		
3	Course Type	Value Addition Course (VAC)		
4	Pre-requisite(if,any)	As per Government norms / Institutional scheme		
5	Course Learning. Outcomes (CLO)	*After completion of this course, the students will be able to -* ➢ *Understand the value of herbs, herbal medicine and use of herbal medicine.* ➢ *Know about botanical medicine professionals in the complementary and alter medicine (CAM)* ➢ *Demonstrates the knowledge of the toxicity of plant and essential oil ingredients.* ➢ *Understand the possibility for allergic and unpleasant reactions to herbal pro and the impact of herbal quality on potential toxicity.* ➢ *Use the herbal plants in their daily life* ➢ *Adopt the value of herbal medicine to save their health*		
6	CreditValue	02	Credit = 15 Hours Teaching-learning	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20	

PART -B: Content of the Course		
Total No. of Teaching–learning - Hours– 30 Hrs		
Module	Topics (Course contents): Learning and Practices	No. of Hrs
I	**Introduction:** Basic knowledge of Herbal plant and Concept of Herbal medicine. Concept of ethno-medicine, folk medicines, ethno-ecology, ethnic communities of India &d Chhattisgarh. Concept of Herbal garden. Collection of ethnic information. ***Observation/In Practices - Survey and familiarization with herbs & local herbal plants***	07 Hours
II	**Importance of medicinal plants:** Importance of Herbal / Medicinal plant in human health care – health and balanced diet (Role of proteins, carbohydrates, lipids and vitamins). Common plants & plant parts providing metals and vitamins. ***Observation/In Practices - Survey and familiarization with local herbal medicinal plants***	07 Hours
III	**Tribal medicine and Traditional knowledge**: Introduction, Concept of Tribal medicine, methods of disease diagnosis and treatment – common Plants in folk religion. Traditional knowledge and utility of some medicinal plants in Chhattisgarh. ***Collection /Identification of Herbal plants commonly used by villagers of the state -*** *Centella asiatica, Aloe vera, Solanum nigrum, Achyranthus aspera, Withania somnifera, Papaver somniferum, Strychnos nux– vomica, Atropa belladonna;*	08 Hours
IV	**Plants in day to day life**: Nutritive and medicinal value of common herbal fruits and vegetables of daily use. Precautions during use of herbal medicinal products. Basic idea of contribution of national research laboratories like CDRI, CIMAP, NBRI, etc. ***Collection /Identification of Herbal plants commonly used in daily life -*** *Tulsi, Garlic, Ginger, Turmeric, Ajwain, Methi, Flax, Tea and Coffee.*	08 Hours
Keywords	***Herbal medicine, Folk medicine, Ethno-medicine, Tribal medicine***	

Signature of Convener & Members of BOS:

① Dr. A. N. Balodi
② Dr. D. U. Srivastava
③ Dr. Uttara Tiwari
④ Dr. V. K. Kanungo
⑤ Dr. Asha Kabi
⑥ Dr. M. K. Jaiswal
⑦ Miss Roshni Kaushik

PART–C **BVAC – 1 (Herbal Plant & Human Health)**

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended

1. Kumar, N.C. (1993). An Introduction to Medical botany and Pharmacognosy. EmkayPublications, New Delhi. Rao,
2. A.P. (1999). Herbs that heal. Diamond Pocket Books (P) Ltd., New Delhi.
3. Iris F. F. Benzie and Sissi Wachtel-Galor. Herbal Medicine, 2nd edition Biomolecular and Clinical Aspects, CRC Press/Taylor & Francis; 2011
4. Fabrizio Donovan (2020) Medicinal Herbs: The Ultimate Guide to Natural Healing, Learn The Benefits of Herbs and Use the Nature's Most Powerful Medicinal Plants in Making Your Own A-Z Remedies to Treat Diseases, Author's Republic.
5. Stargrove Mitchell Bebel ND, Herb, Nutrient, and Drug Interactions, Publisher: Elsevier - Health Sciences Division

Iris F. F. Benzie (Editor), Herbal Medicine (Oxidative Stress and Disease) 2nd Edition,

Online Resources–

- **e-Resources / e-books and e-learning portals**

❖ **Use of following sites**

- https://pubmed.ncbi.nlm.nih.gov/22593937/
- https://link.springer.com/article/10.1007/s40898-017-0004-7#:~:text=Medicinal %20plants%20and%20 natural%20compounds,vivo%20or%20in%20clinical%20trails.
- https://crimsonpublishers.com/acam/pdf/ACAM.000551.pdf
- https://www.researchgate.net/publication/329823398_Medicinal_Plants_Used_in_the_Treatment_of_Mental_and_Neurological_Disorders_in_Ghana
- https://www.sciencedirect.com/science/article/abs/pii/S0378874115003013
- https://core.ac.uk/download/pdf/143841457.pdf
- https://practicalselfreliance.com/medicinal-plants/
- https://practicalselfreliance.com/medicinal-plants/
- https://www.pdfdrive.com/medicinal-plants-books.html

Part - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:		**50 Marks**
Continuous Comprehensive Evaluation (CCE):		**10 Marks**
Semester End Exam (SEE):		**40 Marks**
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test - **02 of 05** Marks each Assignment/Seminar –**01 of 05** Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against **10 Marks**
Semester End Exam (SEE):	Paper – **Two section – A & B** Section A: Objective & Short answer type questions – $5 \times 1 + 5 \times 3 = 20$ Marks Section B: Descriptive answer type questions unit wise – $4 \times 5 = 20$ Marks	

(1) Name and Signature of Convener & Members of BOS

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DEPARTMENT OF BOTANY

UNDERGRADUATE COURSE CURRICULUM 2023-24

BVAC – 1: Herbal Plant & Human Health (Amendment)

Component	Previous (2022-23)	Present (2023-24)	Justification
PART-A: Introduction	**Program:** *Certificate Course* **Class: B. Sc. Semester-I**	**Program: FYUP** ***Certificate / Diploma / Degree*** **Class: B. Sc. Semester- I/II/III/IV**	As per CCFUP to implement from 2023-24
	Max. Marks- 50, Passing marks-17	Max. Marks- 50, Passing marks-20	As per Ordinance
PART -B: Content of the Course			
Module	**Topics (Course contents): Theoretical learning**	**Topics (Course contents): Learning and Practices**	As per nature of the course
I	**Introduction:** Basic knowledge of Herbal plant and Concept of Herbal medicine. Concept of ethno-medicine, folk medicines, ethno-ecology, ethnic communities of India &d Chhattisgarh. Concept of Herbal garden. Collection of ethnic information. **– 05 Hrs.**	**Introduction:** Basic knowledge of Herbal plant and Concept of Herbal medicine. Concept of ethno-medicine, folk medicines, ethno-ecology, ethnic communities of India &d Chhattisgarh. Concept of Herbal garden. Collection of ethnic information. ***Observation /In Practices - Survey and familiarization with herbs & local herbal plants*** **——— 07 Hrs.**	Proper learning towards objectives / LOCF and convenience of learners
II	**Importance of medicinal plants:** Importance of Herbal / Medicinal plant in human health care – health and balanced diet (Role of proteins, carbohydrates, lipids and vitamins). Common plants & plant parts providing metals and vitamins. **—— 05Hrs.**	**Importance of medicinal plants:** Importance of Herbal / Medicinal plant in human health care – health and balanced diet (Role of proteins, carbohydrates, lipids and vitamins). Common plants & plant parts providing metals and vitamins. ***Observation/In Practices - Survey and familiarization with local herbal medicinal plants*** **——— 07 Hrs.**	Proper learning towards objectives / LOCF and convenience of learners
III	**Tribal medicine and Traditional knowledge:** Introduction, Concept of Tribal medicine, methods of disease diagnosis and treatment – common Plants in folk religion. Traditional knowledge and utility of some medicinal plants in Chhattisgarh. **——— 05 Hrs.**	**Tribal medicine and Traditional knowledge:** Introduction, Concept of Tribal medicine, methods of disease diagnosis and treatment – common Plants in folk religion. Traditional knowledge and utility of some medicinal plants in Chhattisgarh. ***Collection /Identification of Herbal plants commonly used by villagers of the state - Centella asiatica, Aloe vera, Solanum nigrum, Achyranthus aspera, Withania somnifera, Papaver somniferum, Strychnos nux–vomica, Atropa belladonna;*** **- 08 Hrs.**	Proper learning towards objectives / LOCF and convenience of learners
IV	**Plants in day to day life:.** Nutritive and medicinal value of some fruits and vegetables Precautions during use of herbal medicinal products. Basic idea of quality control and contribution of national research laboratories like CDRI, CIMAP, NBRI, etc. **– ——— 05 Hrs.**	**Plants in day to day life:** Nutritive and medicinal value of common herbal fruits and vegetables of daily use. Precautions during use of herbal medicinal products. Basic idea of contribution of national research laboratories like CDRI, CIMAP, NBRI, etc. ***Collection /Identification of Herbal plants commonly used in daily life - Tulsi, Garlic, Ginger, Turmeric, Ajwain, Methi, Flax, Tea and Coffee.*** **—— 08 Hrs.**	As per nature of the course and decided by Autonomy cell under scheme
V	**Removed / Deleted**		
Part - D: Assessment and Evaluation			
Semester End Exam (SEE):	Paper – **Two section – A & B** Section A: Objective & Short answer type questions – **10 x1 + 5x2 =20 Marks** Section B: Descriptive answer type questions unit wise – **05 x 04 = 20 Marks**	Paper – **Two section – A & B** Section A: Objective & Short answer type questions **–1 x5 + 3 x 5 = 20 Marks** Section B: Descriptive answer type questions unit wise – **05 x 04 = 20 Marks**	Following the scheme of assessment / pattern of question paper as determined by Autonomous cell

Name and Signature of Convener & Members of BOS:

(1) (2) (3) (4) (5) (6) (7) Botanik

DEPARTMENT OF BOTANY
UNDERGRADUATE COURSE CURRICULUM 2023-24

PART-A: Introduction				
Program: FYUP *Certificate / Diploma / Degree*		Class: B. Sc./BCA Semester - I/II/III/IV	Year: 2023	Session: 2023-2024
1	Course Code	BVAC – 2		
2	Course Title	Academic Research & Report Writing		
3	Course Type	Value Addition Course (VAC)		
4	Pre-requisite(if,any)	As per Government norms / Institutional scheme		
5	Course Learning. Outcomes (CLO)	*After completion of this course, the students will be able to -* ➢ *Understand the academic research and its scope & prospects.* ➢ *Know the Importance of Report writing in academic and Research and Necessity of report writing for achievement of academic & research goals* ➢ *Demonstrates the knowledge of the toxicity of plant and essential oil ingredients.* ➢ *Understand the kinds & characteristics of academic and research reports / presentation and its prospective application.* ➢ *Use the tools and techniques of academic research and report writing* ➢ *Adopt the skill of research designing and report/ paper / thesis writing*		
6	CreditValue	02	Credit = 15 Hours Teaching-learning	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20	

PART -B: Content of the Course

Total No. of Teaching–learning - Hours– 30 Hrs

Module	Topics (Course contents): Learning and Practices	No. of Hrs
I	**Introduction:** Concept of - Academic Research and Research Project, Component of a concept Paper for academic research, Research–Characteristics, Type, Formulation & Design, Format, Scope, Motivation & Prospects. Popular Scheme & Organization in India promoting Research - INSPIRE, NSF, MEF, DBT, DST, DNES, STARD, ICAR, ICMR, CSIR, INSA.	08 Hours
II	**Research paper / Review writing:** Steps of writing a research report. Types of Research paper, Structure of Research papers, Research paper formats, Abstract writing, Methodology, Results and Discussion, Different formats referencing, Ways of communicating a research papers, (Assignments)	07 Hours
III	**Report/ Dissertation / Thesis Writing** - Structure of a thesis , Scope of the work, Literature review, Experimental / Computational details, Preliminary studies, Result and Discussion, Figures & Table Preparation, Conclusion and Future works, Bibliography, Appendixes (Assignments)	07 Hours
IV	**Tools, Techniques & Presentation**-- Various word processors - MS Office- Word, Excel & PowerPoint, Libra-office, Latex etc. Making effective presentations using Power Point and Beamer. Basic idea of Data collection, Tabulation & Presentation. Plagiarism detection tools (Assignments)	08 Hours
Keywords	*Academic Research, Research report, Project, Thesis/ Dissertation/ Review writing*	

Signature of Convener & Members of BOS:

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PART–C **BVAC – 14 (Academic Research & Report Writing)**

Learning Resources: Text Books, Reference Books and Others

Text Books Recommended –

- Technical Report Writing and Research Methodology by Dr Naushad Alam Dr Quadri Javeed Ahmad Peer Dr Banarsi Lal, Write & Print Publications
- Research Writing A Complete Guide (PB) by Srinivasan R, How Academics
- GUIDE TO REPORT WRITING by Netzley, Snow, PEARSON INDIA
- A Student Guide to Writing Research Reports, Papers, Theses and Dissertations By Cathal Ó Siochrú; ISBN 9780367621049. Published 2022 by Routledge
- **https://www.goodreads.com/shelf/show/report-writing**

Online Resources–

- **e-Resources / e-books and e-learning portals**
  - **https://www.questionpro.com/blog/research-reports/**
  - **https://egyankosh.ac.in/bitstream/123456789/39238/1/Unit-5.pdf**
  - **https://www.studocu.com/in/document/visvesvaraya-technological-university/research-methodology/general-format-of-a-research-report/33791300**
  - **https://students.unimelb.edu.au/academic-skills/resources/report-writing/research-reports**
  -

❖ **Use of following sites**

- https://www.wiley.com/en-ie/Student+Research+and+Report+Writing:+From+Topic+Selection+to+the+Complete+Paper-p-9781118963913
- https://www researchgate net/publication/275654158 HAND BOOK FOR WRITING RESEARCH PAPER

Part - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: **50 Marks**

Continuous Comprehensive Evaluation (CCE): **10 Marks**

Semester End Exam (SEE): **40 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test - **02 of 05** Marks each Assignment/Seminar –**01 of 05** Marks	The best obtained marks of both test exam and marks of Assignment shall be considered against **10 Marks**
Semester End Exam (SEE):	Paper – **Two section – A & B** Section A: Objective & Short answer type questions – **5 x1 + 5 x 3 = 20 Marks** Section B: Descriptive answer type questions unit wise – **4 x 5 = 20 Marks**	

the department / Examination Cell / NEP-20 Scheme coordinator

Signature of Convener & Members of BOS:

1. BKU
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4. Adl
5.
6.
7. Bodhanik