

Deccan Education Society's

Kirti M. Doongursee College of Arts, Science and Commerce (AUTONOMOUS)



Affiliated to

UNIVERSITY OF MUMBAI

REVISED

National Education Policy (NEP) based

Syllabus for

Program: Bachelor of Science

Course: F.Y.B.SC.

Subject: BOTANY

Choice Based Credit System (CBCS)

with effect from

Academic Year 2024-2025

PROGRAM OUTCOMES

PO	Description
A student completing Bachelor's Degree in Science Program will be able to	
PO1	Disciplinary Knowledge: Demonstrate comprehensive knowledge of the disciplines that form a part of a graduate Programme. Execute strong theoretical and practical understanding generated from the specific graduate Programme in the area of work.
PO2	Critical Thinking and Problem solving: Exhibit the skills of analysis, inference, interpretation and problem-solving by observing the situation closely and design the solutions.
PO3	Social competence: Display the understanding, behavioral skills needed for successful social adaptation, work in groups, exhibits thoughts and ideas effectively in writing and orally.
PO4	Research-related skills and Scientific temper: Develop the working knowledge and applications of instrumentation and laboratory techniques. Able to apply skills to design and conduct independent experiments, interpret, establish hypothesis and inquisitiveness towards research.
PO5	Trans-disciplinary knowledge: Integrate different disciplines to uplift the domains of cognitive abilities and transcend beyond discipline-specific approaches to address a common problem.
PO6	Personal and professional competence: Performing dependently and collaboratively as a part of team to meet defined objectives and carry out work across interdisciplinary fields. Execute interpersonal relationships, self-motivation and adaptability skills and commit to professional ethics.
PO7	Effective Citizenship and Ethics: Demonstrate empathetic social concern and equity centered national development and ability to act with an informed awareness of moral and ethical issues and commit to professional ethics and responsibility.
PO8	Environment and Sustainability: Understand the impact of the scientific solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

Deccan Education Society's
Kirti M. Doongursee College (Autonomous)
Proposed Curriculum as per NEP 2020
Year of implementation- 2024-25
Name of the Department:
BOTANY
Class- F.Y.BSc

Semester	Course Code	Course Title	Vertical	Credit
I	24USBOTMJ111	Plant Diversity-Form and Function-I	Major	2
	24USBOTMJP111	Practical: Plant Diversity - Form and Function-I	Major Practical	2
	24USBOTOE131	Systems of medicine	OE	2
	24USBOTVCP141	Practical: Organic Farming	VSC Practical	2
	24USBOTSCP151	Practical: Morphology Based Identification of plants.	SEC Practical	2
II	24USBOTMJ211	Plant Diversity-Form and Function-II	Major	2
	24USBOTMJP 211	Practical: Plant Diversity - Form and Function-II	Major Practical	2
	24USBOTVCP241	Practical: Floriculture	VSC Practical	2
	24USBOTSEP251	Practical: Preservation techniques of fruits and vegetables	SEC Practical	2

Course Code	SEM – I: BOTANY- MAJOR	Credits	Lectures/Week
24USBOTMJ111	Plant Diversity-Form and Function-I	2	2
Course Outcomes: After successful completion of this course, students would be able to - Describe the major groups of algae, fungi and bryophyte with suitable examples, concept of ecosystem with its components, cell organelles and Genetic terminology. - Understand the Ecosystem, functions of different cell organelles, structure and systematic position related to cryptogam's viz. algae, fungi and bryophytes. - Apply basic concepts related to Mendelian Genetics, environmental landscape formations and functioning of an ecosystem and use of algae, fungi and bryophytes in day-to-day life. - Analyze systematic position and biotechnological aspects of algae, fungi and bryophyte, functioning of cell organelles, types of ecosystem and hereditary phenomenon observed in nature.			
Unit	Topics	No of Lectures	
I	ALGAE, FUNGI and BRYOPHYTA: 1. Structure and systematic position of: 1. <i>Spirogyra</i> . 2. <i>Rhizopus</i> 3. <i>Riccia</i> 2. Economic importance of Algae, Fungi and Bryophyta related to Horticulture.	15	
II	CELL BIOLOGY, GENETICS and ECOLOGY: 1. Ultra-structure and functions of the following cell organelles: Endoplasmic reticulum, and Chloroplast. 2. Genetic Terminology and Mendelian Genetics: monohybrid, dihybrid, test cross and back cross ratios. 3. Ecosystem (concept, components and functions) and Types of Ecosystems (aquatic and terrestrial).	15	

Textbooks:

1. Botany (I & II)-Sem. 1- By Dr. Avinash Patil, Dr. Darshana Patil, Dr. Anil Avhad, Tech-Max publications, Pune.
2. A New Course in Botany by Dr. Vikas V. Golatkar, Dr. Behnaz B. Patel and Dr. Neeraja S. Tutakne. Sheth Publication.

Additional References:

1. College Botany Volume I and II Gangulee, Das and Dutta latest edition. Central Education enterprises
2. Cryptogamic Botany Volume I and II by G M Smith, McGraw Hill publication.
3. Book for Degree Students- Algae by B R Vasistha, A.K.Sinha, S Chand Publication.
4. Book for Degree Students- Fungi by B R Vasistha , A.K.Sinha, S Chand Publication.
5. Book for Degree Students- Bryophytes by B R Vasistha , A.K.Sinha, S Chand Publication.
6. Cell and Molecular Biology by De Robertis. Publisher- Walters Kluwer.
7. Fundamentals of Ecology by E P Odum and G W Barrett. Thompson Asia Pvt. Ltd. Singapore.
8. Ecology by P. D. Sharma.
9. Genetics by Russel. Wesley Longman inc. publishers. (5th edition)
10. An introduction to Genetics by A. M. Winchester, Publication-Barnes and Noble.

Course Code	SEM I: Botany –Major Practical	Credits	Lectures /Week
24USBOTMJ P111	Practical: Plant Diversity - Form and Function-I	2	4
Course Outcomes: After successful completion of this course, students would be able to - Describe algae, fungi bryophytes by observing them under microscope with the help of fresh/preserved material and permanent slides. - Understand the technique of chromosomal staining to observe the stages of cell division during mitosis. - Apply algae, fungi and bryophytes for day to day life and adaptations of plants to specific ecological conditions. - Perform biostatistics, sampling, central tendency calculation of mean, median and mode.			
Sr. No.	Experiment		
1	Study of structure of <i>Spirogyra</i> from fresh/ preserved material and permanent slides.		
2	Study of structure of <i>Rhizopus</i> from fresh/ preserved material and permanent slides.		
3	Economic importance of algae: <i>Ulva</i> (Biofuel), <i>Spirulina</i> (Neutraceutical), <i>Gelidium</i> (Agar).		
4	Preparation of Jelly/ Pudding / Custard using Agar-Agar and Dry Mushroom chips.		
5	Economic importance of Fungi: Mushroom and Yeast.		
6	Study of structure of <i>Riccia</i> from fresh/ preserved material and permanent slides.		
7	Economic importance of Bryophytes in Horticultural practices: Preparation of Moss sticks.		
8	Study of various stages of mitosis in root tip cells (<i>Allium</i>)		
9	Identification of cell organelles with the help of photomicrograph: Nucleus, Chloroplast and Endoplasmic Reticulum.		
10	Study of Human Karyotypes: Normal male and female.		
11	Identification of plants adapted to different environmental conditions: Hydrophytes: Floating: Free floating (<i>Pistia/Eichornia</i>); Rooted floating (<i>Nymphaea</i>); Submerged (<i>Hydrilla</i>)		
12	Xerophytes : Succulent (<i>Opuntia</i>); Woody Xerophyte (<i>Nerium</i>);Halophyte (<i>Avicennia pneumatophore</i>)		

	No sections in ecology, only identification and description of specimens. Morphological adaptations only.
13	Determination of mean, median and mode.

Course Code	SEM – I: BOTANY-Open Elective (OE)	Credits	Lecture s/Week
24USBOTOE131	Systems of Medicine	2	2
About the Course:			
Course Objectives After successful completion of this course, students would be able to • Understand history of medicine • Know different systems of traditional medicines • Apply the knowledge of Indian systems of medicine • Analyze and apply alternative therapy for day to day life.			
Unit	Topics	No	of Lectures
I	SYSTEMS OF MEDICINE 1: 1. Introduction and history of medicine 2. Ayurveda - Shusrut Samhita, Charak Samhita, Philosophy 3. Unani -Introduction History , Principal and concept 4. Homeopathy - Principal and concept	15	
II	SYSTEMS OF MEDICINE 2: 1. Allopathy- Pharmaceutical medicine, Psychotherapy, Surgery , radiation therapy, Physical rehab 2. Alternative therapy – Acupuncture, Acupressure, Massage therapy, Yoga. Reiki, Tai chi and aromatherapy 3. Infectious and contagious disease -Symptoms and prevention	15	
References: 1. The practical guide to Healthy Living, Danny Cavanagh and Carol Willis, Ayurveda UK publication 2. Ayurvedic Healing by Dr. David Frawley and O.M.D, Motilal Banarasidass Publishers 1989. 3. Unani: The system of Medicine, Prof. Rais-Ur-Rahman; Advisor, Department of Ayush, Ministry of Health and Family Welfare, Govt of India. 4. Homeopathic Principles and Practice of Medicine, Dr. V.K. Chauhan, B. Jain Publishers.			

5. Aromatherapeutic Blending, Jennifer Peace Rhind, Singing Dragon Publishers.
6. Physical Rehabilitation, 5th Edition, Susan B. O'Sullivan, F.A. Davis Company, USA
7. Tai-Chi Beginners Guide, Dr. Aihan Kuhn, YMAA Publication.
8. Book on Ancient Wisdom Modern concept, Indus Valley ayurvedic Centre, Mysore Karnataka.
9. Charak Samhita – 4 volumes, P.V. Sharma, Chaukhambha Orientalia Publisher
10. Acupuncture from ancient art to modern medicine by Alexander Macdonald, George Allen, Unwin London, 1982.
11. Hand Book of Aromatic Plants by Prof. Supriya Kumar Bhattacharjee, Pointer Publishers, 2000.

Course Code	SEM-I: Vocational Skill Course (VSC) – Practical	Credits	Lectures/Week
24USBOTVCP141	Organic Farming	2	4
About the Course:			
Course Objectives:			
After successful completion of this course, students would be able to • Explain fundamentals of farming with pure organic methodologies. • Describe various applications of organic farming. • Analyze possibility of setting business with the organic commodities (sales and marketing). • Build and promote demand for organic product commodities.			
Sr. No.	Experiment		
1	Application of organic materials for mulching- E.g. Coconut husk, Sugarcane bagasse and leaf litter.		
2	Study of concept and examples of friends of farmers- E.g. Earthworm, Trichogramma parasitoides Wasp (egg parasite) for preventing insects and Trichoderma Beetle for control of Congress grass (Parthenium).		
3	Study of Green Manures. E.g. Sunhemp (Crotalaria juncea), Cowpea (Vigna sinensis), Green gram (Vigna radiate) & Dhaincha (Sesbania aculeate).		
4	Study of Organic Manures and their uses. E.g. Farm Yard Manure and Oil cakes		
5	Process of Composting and Vermicomposting.		
6	Study of Materials and Methodology for City Farming.		
7	Study of Bio-pesticides and Bio-control agents-E.g. Zygomorpha bicolorata for control of Confess Grass or Carrot Grass, Beauveria bassiana fungus for insect management, Trichogramma harzianum fungus for control of Phytopathogens and Predaceous fungi for control of nematodes which cause root knot disease and root destruction.		
8	Study of Bio-fertilizers and their uses-E.g. Nostoc, Anabaena and Rhizobium in root nodule.		
9	Testing of Soil parameters- pH and Organic matter.		
10	Testing of Water quality parameters- pH, Acidity and Alkalinity.		

11	Preparation of Plant Health Promoters-E.g. Amrutpani. Panchgavya, Jeevamrut and Beejamrut.
12	Process of Organic Certification.
13	Field study- Report.
References: 1. Manual of Doshi City farming Published by Marathi Vidnyan Parishad ‘ Shahari Sheti’ 2. Hand book of Organic farming By Arun K. Sharma, Agrobios India, 2001. 3. Organic Farming for Business By Dr. T. Natrajan, Swastik Publications Delhi, 2011.	

Course Code	SEM-I: Skill Enhancement Course (SEC) – Practical	Credits	Lectures/Week
24USBOTSCP151	Morphology Based identification of plants.	2	4
About the Course:			
Course Objectives:			
After successful completion of this course, students would be able to			
• Identify the plants by observations. • Develop insight in nature education so that they help in conservation of nature. • Apply acquired knowledge of techniques to do survey of habitats and local areas. • Analyze changes in the habitat over a period of time.			
Sr. No.	Experiment		
1	Study of useful tools for field visits – Books, Magnifying glass, Catalogues, Herbaria and Cooks flora.		
2	Application of advance devices for field study: Plant identifications Apps- GIS and GPS		
3	Contemporary trends in field study- Digital cameras for Photographs and Reels.		
4	Study of seed collection method.		
5	Testing of seed viability.		
6	Study of pant morphology related to Habit- Herbs, Shrubs, Trees, Climbers and Creepers.		
7	Study of Root morphology – Tap root and Adventitious root.		
8	Study of Leaf morphology – Simple, Compound and Venation.		
9	Study of Flower morphology – Parts of flower, pedicellate, sessile, unisexual, bisexual, and symmetry.		
10	Study of Inflorescence morphology – Racemose and Cymose.		
11	Association of plants- Epiphyte (Vanda) and Parasite (Cuscuta).		
12	Visit to College Garden-Field report.		

13	Visit outside College Garden for study of vegetation.
References:	
1. College Botany Vol I, II and III by Gangulee Das and Dutta Central Education enterprises. Ecology by Santra 2. Ecology by Kumar 3. A handbook of city trees and urban planting by S.G. Neginhal. 4. Leaf based Identification for Trees of Sanhydri by Shrikant Ingalhalikar 2021, Corolla Publication.	

Course Code	SEM – II: BOTANY-MAJOR	Credits	Lecture s/Week
24USBOTMJ211	Plant Diversity-Form and Function-II	2	2
Course Outcomes: After successful completion of this course, students would be able to			
- Describe structure of <i>Nephrolepis</i> (Pteridophyta), characters of Gymnosperm and Angiosperm plants. - Understand systematic position, structure of <i>Nephrolepis</i>, morphology of flower and primary structure of Dicot and Monocot stem. - Use Gymnosperms in day-to-day life and also apply patterns of arrangement of flowers. - Analyze structure of <i>Nephrolepis</i>, the characters of plants to assign them to respective families and household remedies with traditional knowledge for common ailments.			
Unit	Topics	No of Lectures	
I	PTERIDOPHYTES, GYMNOSPERMS and ANGIOSPERMS: 1. Structure and systematic position of <i>Nephrolepis</i> . 2. General characteristics and Economic importance of Gymnosperms. 3. Morphology of Flower: Parts of flower, calyx, corolla, androecium and gynoecium. 4. Study of family: Amaryllidaceae.	15	
II	ANATOMY and APPLICATIONS OF PLANT SCIENCE: 1. Primary structure of dicot and monocot stem. 2. Traditional medicinal practices for various ailments: (a) Cough and Cold - <i>Occimum sanctum</i> (Tulsi) and <i>Adathoda vasaka</i> (Adulsa). (b) Gastrointestinal- <i>Cuminum cymium</i> (Jeera) and <i>Ferula narthex</i> (Hing). 3. Introduction to the concept and branches of Horticulture. 4. Analytical technique- Chromatography : Introduction and types.	15	
Textbooks: 1. A New Course in Botany by Dr. Vikas V. Golatkar, Dr. Behnaz B. Patel and Dr. Neeraja S. Tutakne. Sheth Publication.			
Additional References:			

1. Book for Degree Students- Pteridophyta by P C Vasistha (2010) S. Chand Delhi India.
2. Book for Degree Students- Gymnosperms by P C Vasistha (2010) S. Chand Delhi India.
3. College Botany Volume I, II and III Gangulee, Das and Dutta latest edition. Central Education enterprises.
4. Plant Anatomy by B. P. Pandey, Publisher S. Chand.
5. A Handbook of Ethnobotany by S.K. Jain, V. Mudgal.
6. Plants in folk religion and mythology (Contribution to Ethnobotany by S.K.Jain 3rd Rev. Ed.).
7. Complete Herbalist Volume I & II By Prof. O. Phelps Brown, Logos Press New Delhi, 2009.
8. Herbal Plants and their applications in Cosmeceuticals by Kuntal Das CBS Publishers, 2014.
9. Branches of Horticulture – by Dennisen.
10. Fundamental of Horticulture - 4th edition by Edmand, Senn, Andrew's Halfacre 1990, Tata Mc Graw Hill publishing Company Ltd. New Delhi.
11. Principles of Horticulture - Denisen E. L. Macmillan Publication.

Course Code	SEM II: Botany-Major practical	Credits	Lectures /Week
24USBOTMJP211	Plant Diversity- Form and Function-II	2	4
Course Outcomes: After successful completion of this course, students would be able to - Describe the structure of <i>Nephrolepis</i>. - Explain plant specimens and their identification with the help of morphological and anatomical characters. - Apply economic importance of Gymnosperms (<i>Pinus</i>). - Analyze separation techniques by paper chromatography.			
Sr. No.	Experiment		
1.	Study of structure of <i>Nephrolepis</i> .		
2.	Economic importance of Gymnosperms: <i>Pinus</i> (turpentine, wood and seeds)		
3.	Flower morphology : Calyx and Corolla		
4.	Flower morphology : Androecium and Gynoecium		
5.	Angiosperms: Family Amaryllidaceae		
6.	Primary structure of Dicot stem.		
7.	Primary structure of Monocot stem.		
8.	Study of Dicot and Monocot stomata.		
9.	Identification of plants or plant parts for Traditional medicinal practices for various ailments as per theory. Conservation of one medicinal plant in college garden.		
10.	Branch of horticulture with respect to PHT-Preservation- drying Vegetable (Methi), Fruit (Chiku), Medicinal (Turmeric).		
11.	Separation of amino acids by Circular Paper Chromatography.		
12.	Change in colour due to change in pH: Anthocyanin- Blackgrapes/Purple cabbage.		

Course Code	SEM-II: Vocational Skill Course (VSC) - Practical	Credits	Lectures/Week
24USBOTVCP241	Floriculture	2	4
About the Course:			
Course Objectives:			
After successful completion of this course, students would be able to			
• Discuss basic concepts of floriculture to make use of floriculture techniques in daily life. • Understand cultivation practices of different flowers. • Outline the aspects of cut flower industry to explore business opportunities. • Impart advanced knowledge about field cultivation and Hi-tech methodologies related with floral crops.			
Sr. No.	Experiment		
1	Study of various types of Green houses for the cultivation of flowers.		
2	Process of cultivation of flowers in Poly-house-Gerbera, Orchid, Carnation, Lily and Anthurium.		
3	Method of open field cultivation of Gladiolus and Heliconias.		
4	Study of small ornamental plants- (Related to the concept)		
5	Study of plants for Butterfly Garden- (Related to the concept)		
6	Study of Foliage plants- E.g. Tulsi, Cycas, Pandanus, Kunti (Kamini) and Money plant.		
7	Study of plants for fillers-E.g. Golden rods, Gypsophila, Daisies, Candy tuft and Pimpinella.		
8	Methods of drying of flowers- Air drying. Sun drying, Pressing and Oven drying.		
9	Study of dry flower arrangements.		
10	Study of procedure for Potpourri.		
11	Use of cut flowers for flower arrangements.		
12	Method of post-harvest handling of flowers.		

13	Use of flowers for- Flower arrangement, Floral rangoli, Floral jewelry, Flower remedies (essential oils) and Floral cuisine.
References: 1. Roy A.L.(1992) Introduction to Floriculture, 2nd Edition 2. Gurcharan Singh, Randhawa and Amitabha Mukhopadhyay, Floriculture in India, Allied Publishers 3. Adams, C. R., Principles of Horticulture, Elsevier Publication, 4th edition, 2004. 4. Debashish Sengupta and Raj Kamal, Floriculture Marketing in India, (Excel Books). 5. Sudheer, K. P. and Indira V, Post -Harvest Technology of Horticultural Crops, New Delhi Publications. 6. Introduction to Floriculture Second Edition By Roy A. Larson, Academic Press Elsevier, 2014. 7. Floriculture Fundamentals & Practices By Alex Lauric, Victor H. Ries, Agrobios India, 2001. 8. Ornamental Plants for Gardening by V. L. Chopra and Markanday Singh, Scientific Publishers, 2012.	

Course Code	SEM-II: Skill Enhancement Course (SEC) - Practical	Credits	Lectures/Week
24USBOTSEP251	Preservation Techniques of Fruits and Vegetables.	2	4
About the Course:			
Course Objectives:			
After successful completion of this course, students would be able to • Explain different concepts related with food preservation. • Explore various ways and means for excessive production of perishable food materials. • Impart knowledge for development of business in food preservation industry. • Apply concepts of preservation for value added products from fruits and vegetables.			
Sr. No.	Experiment		
1	Study of organic preservatives- Sugar, Jaggery, Salt, Oil and Citric acid.		
2	Study of chemical preservatives- Sodium benzoate, Potassium meta bi sulphide and Acetic acid (Vinegar).		
3	Study of Equipment for drying – Solar dryer, Oven, Micro wave and Electrical dryer.		
4	Study of equipment for Canning, Sealing and other related techniques- Drying trays, Bottle sealer, Electric packet sealing, Mixer, Grinder, Weighing balance and Containers (bottles, cans, boxes, plastic bags and packaging materials).		
5	Study of types of Pickles- Sweet, Sour and Pungent.		
6	Study of Sugar Concentrates- Jam. Jelly, Squash, Syrup and Fruit leather.		
7	Study of Dry preparation- Chutney and Mouth freshner.		
8	Study of Ready to cook vegetables.		
9	Preparation of Sauce and Ketchup.		
10	Method of Hygiene control-Sterilization.		
11	Tools and techniques for the selection of fruits-Refractometer and Acidity titration.		

12	Study of commercial aspects and technical details- Preparation of project report, Necessary permissions and Laws (Rules and Regulations) related to food processing, Quality control and Patent for processing of products-form fill.
References: 1. Post-harvest an Introduction to the physiology and handling of fruits, vegetables and ornamentals. By R.B.H. Wills, W.B. McGleson & e.t.a.l Univ. of New South Wahs Press, 2007. 2. Post-Harvest Technology by Verma and Joshi, Indus Publication. 3. Horticulture Marketing and post-harvest management By R. K. Meena and J. S. Yadav, Pointers Publishers, 2012. 4. Fruit Preservation by Daru Jagtiani 1993. Tarang Paperbacks, Vikas Publishing House Pvt. Ltd - New Delhi. 5. Food Science by B. Shrilakshmi 1997 , New age international Pvt. Ltd New Delhi.	

Evaluation Scheme for First Year (UG) under NEP (2 credits)

I. Internal Evaluation for Theory Courses – 20 Marks

1) Continuous Internal Assessment (CIA-1) Assignment - Tutorial- 10 marks

2) Continuous Internal Assessment(CIA-2) ONLINE Unit Test – 10 marks

II. External Examination for Theory Courses – 30 Marks

Duration: 1 Hours

Theory question paper pattern: All questions are compulsory.

Question	Based on	Marks
Q.1	Unit I	15
Q.2	Unit II	15

- All questions shall be compulsory with internal choice within the questions.
- Each Question may be sub-divided into sub questions as a, b, c, d, etc. & the allocation of Marks depends on the weightage of the topic.

III. Practical Examination:

- Each core subject carries 50 Marks.
- Duration: 2 Hours for each practical course.
- Minimum 80% practical from each core subjects are required to be completed.
- Certified Journal is compulsory for appearing at the time of Practical Exam.

Practical Question Paper Pattern:

All questions are compulsory.

Question No.	Topic	Marks
1.	Experiment No.1	10
2.	Experiment No.2	09
3.	Experiment No.3	08

4.	Experiment No.4 / Identification	08
5.	Certified Journal	05
6.	Field Report	05
7	Viva	05

PASSING STANDARD NEP First Year :

- The learners /students shall obtain minimum of 40% marks in the Internal Assessment and External Assessment (Semester End Examination) COMBINED, to pass the course in a particular semester. A learner / student will be said to have passed the course if He/She passes the Internal Assessment + Semester End Examination COMBINED.
- To pass the examination attendance is compulsory in both internal and external (theory plus practical) examination.

Note:

Short field excursions for habitat studies are compulsory, if inclusive of syllabus. Field work of not less than eight hours duration is equivalent to one period per week for a batch of 15 students.

A candidate will be allowed to appear for the practical examinations only if he/she submits a certified journal of FYBSC or a certificate from the Head of the department / Institute to the effect that the candidate has completed the practical course of FYBSC as per the minimum requirements. In case of loss of journal, a candidate must produce a certificate from the Head of the department/Institute that the practical for the academic year were completed.