AC –28/03/2025
Item No. – 6.11(N)

As Per NEP 2020

University of Mumbai

Syllabus for Major Vertical – 1 & 4		
Name of the Programme – B.Sc. (BIOTECHNOLOGY)		
Faulty of SCIENCE		
Board of Studies in BIOTECHNOLOGY		
U.G. Second Year Programme	**Exit Degree**	**U.G. Diploma in Biotechnology**
Semester		**III & IV**
From the Academic Year		**2025-26**

University of Mumbai

(As per NEP 2020)

Sr. No.	Heading	Particulars
1	**Title of program** **O:_____**	**B.Sc. (Biotechnology)**
2	**Exit Degree**	**U.G. Diploma in Biotechnology**
3	**Scheme of Examination** **R: _____**	NEP 40% Internal 60% External, Semester End Examination Individual Passing in Internal and External Examination
4	**Standards of Passing** **R: _____**	**40%**
5	**Credit Structure** **R. SU-505C** **R. SU-505D**	**Attached herewith**
6	**Semesters**	**Sem. III & IV**
7	**Program Academic Level**	**5.00**
8	**Pattern**	**Semester**
9	**Status**	**New**
10	**To be implemented from Academic Year**	**2025-26**

Sd/-	**Sd/-**	**Sd/-**
Sign of the BOS Chairman **Dr. Varsha Kelkar-Mane** **BOS Chairperson in Biotechnology**	**Sign of the Offg. Associate Dean** **Dr. Madhav R. Rajwade** **Faculty of Science & Technology**	**Sign of the Offg. Dean** **Prof. Shivram S. Garje** **Faculty of Science & Technology**

Preamble

Introduction

Biotechnology is a multidisciplinary subject that deals with the application of biological processes for solving problems and designing eco-friendly products and processes. At Undergraduate level, learners are offered various subjects that would strengthen their fundamentals in basic sciences as well as explore the fundamentals as well as applications of biotechnology. Subjects such as Chemistry, Biology and Information Technology, computer language form an integral part of the syllabus. Biotechnology plays a key role in industries such as refining, environmental remediation, agriculture and food production, healthcare, pharmacy, animal husbandry, textiles, and nutrition.

Learners after completing their biotechnology course can find suitable employment in the research and development laboratories, pharmaceutical companies etc. The syllabus herein discusses the subjects offered at undergraduate level highlighting the respective course as well as program outcomes

Aims and Objectives:

The course aims at empowering the learners with a strong knowledge base of fundamental sciences, as well as applied sciences that would be useful in process development in various sectors of Biotechnology. On completion of the course the learner will be skilled and equipped with contemporary knowledge in Biotechnology and would be eligible for jobs in varied industrial sectors.

Learning Outcomes

The Undergraduate program in Biotechnology has been designed on learning outcome-based curriculum framework. The course covers the areas of Biotechnology along with fundamental Sciences with a range of core subjects in each semester. Along with providing the requisite biotechnology knowledge, the course has enough scope for inter- and multidisciplinary subjects in the form of electives. This course also caters the skill enhancement needs of the learners as well as provides opportunities for exchanges and learning from other disciplines. Every semester has a practical course for strengthening skills in designing and conducting experiments in the field of Biotechnology.

Under Graduate Diploma in Biotechnology

Credit Structure (Sem. III & IV)

R. SU-505C

Level	Semester	Major		Minor	OE	VSC, SEC (VSEC)	AEC VEC IKS	OJT, FP, CEP, CC, RP	Cum Cr./Sem.	Degree /Cum Cr.
		Mandatory	Electives							
5.0	III	8(4T+4P) Course I - (2 Credits) 2 modules Immunology Course II- (2 Credits) 2 modules Molecular biology II Practical I (2 Credits) Practicals in Immunology Practical II (2 Credits) Practicals in Molecular Biology II		4 Credits To be taken from University Minor basket	2 Credits To be taken from University OE basket	<u>VSC:2,</u> Introduction to Bioinformatics (Practical based)		FP:2 (BT) CC:2	22	UG Diploma 88

R. SU-505D										
	IV	8 (4T+4P) Course III- (2 Credits) 2 modules Biochemistry Course IV- (2 Credits) 2 modules Medical Biotechnology Course III Practicals in Biochemistry (2 Credits) and Course IV Practicals in Medical Biotechnology(2 Credits)		4 Credits To be taken from University Minor basket	2 Credits To be taken from University OE basket	SEC:2 Microbial laboratory techniques		CEP : 2 (BT) CC:2	22	
	Cum Cr.	28			10	12	6+6	8+4+2	8+4	88
Exit option; Award of UG Diploma in Major and Minor with 80-88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor										

[Abbreviation - OE – Open Electives, VSC – Vocation Skill Course, SEC – Skill Enhancement Course, (VSEC), AEC – Ability Enhancement Course, VEC – Value Education Course, IKS – Indian Knowledge System, OJT – on Job Training, FP – Field Project, CEP – Community Engagement Project, CC – Co-Curricular, RP – Research Project]

S.Y.B.Sc. Biotechnology (USBT) Course Structure

Semester III

Ladder	Course Type	Title of the paper	Credits	Hours
Major 1	Theory	Immunology	2	30
Major 2	Theory	Molecular biology II	2	30
Major 3	Practical	Practical I- Immunology	2	60
Major 4	Practical	Practical II- Molecular biology II	2	60
VSC	Practical	Bioinformatics	2	60

Semester IV

Ladder	Course Type	Title of the paper	Credits	Hours
Major 1	Theory	Biochemistry	2	30
Major 2	Theory	Medical Biotechnology	2	30
Major 3	Practical	Practical I- Biochemistry	2	60
Major 4	Practical	Practical II- Medical Biotechnology	2	60
SEC	Practical	Microbial laboratory techniques	2	60

Sem - III

Vertical – 1
Major

Major

Course I

Title of Paper: Immunology

Sr. No.	Heading	Particulars
1	**Description the course: Including but not limited to:**	This course includes a detailed description of the immune response made in humans to foreign antigens including microbial pathogens. A description of cells involved in the immune response either innate or acquired, organs of the immune system and specific responses. Other topics covered will include the basis and types of immune reactions.
2	**Vertical:**	Major
3	**Type:**	Theory
4	**Credits:**	2 credits
5	**Hours Allotted:**	30 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives (CO):** CO1: To promote critical thinking among students and understand how the immune system works. CO2: To provide students with a foundation in concepts related to immunology. CO3: To provide students with knowledge on how the immune system works, building on their knowledge from biochemistry, genetics, cell biology and microbiology. CO4: To clearly state the role of the immune system. CO5: To understand the types of Antigen-Antibody interactions	
8	**Course Outcomes (OC):** Learner will be able to: OC1: Explain the immunological terms. OC2: Discuss the concepts of antigen and antibody. OC3: Diagrammatically depict with appropriate labels the organs of the human immune system. OC4: Explain the significance of cells of immune system- Granulocytic cells, T , B, NK and DC, Phagocytic cells, Mast cells, NKT and FDCs OC5: Discuss the types of antigen antibody interactions based on nature of antigen OC6: Explain the features of antibody structure using a labelled diagram OC7: Compare and contrast: five classes of Ig	

9	**Modules: -** **Module 1: Introduction to cells and organs of immune system**

Cells of Immune system

- Lymphoid cells - B lymphocytes, T Lymphocytes and NK cells. Subclasses of T cells: T helper cell ($T_{H)}$, T cytotoxic cell (T_C), Cytotoxic T Lymphocyte (CTLs), T regulatory (Treg).
- Antibody Dependent Cell Cytotoxicity.
- Natural Killer T (NKT) cells, Mononuclear phagocytes, Phagocytosis
- Granulocytic cells, Mast cells.
- Dendritic cells (DC), Follicular Dendritic cells (FDC). **(8 lectures)**

Organs of Immune system

- Primary Lymphoid organs- Thymus, Bone marrow
- Lymphatic system.
- Secondary Lymphoid organs- Lymph nodes, Spleen.
- An introduction to Lymphoid tissue- Mucosa Associated Lymphoid Tissue (MALT), Bronchus Associated Lymphoid Tissue (BALT), Gut Associated Lymphoid Tissue (GALT). (**4 lectures)**

Immunity:

- Innate Immunity VS Adaptive Immunity. **(1 lecture)**
- Active VS Passive immunity. (**1 lecture)**
- Herd Immunity. (**1 lecture)**

Module 2: Antigen Antibody interactions

Antigens:

- Introduction and definition of antigen.
- Factors governing antigenicity.
- Types of Antigens - Intracellular, extracellular and auto antigens.
- Complete and incomplete antigens, hapten, superantigens.
- Concept of: epitopes, adjuvants.

(4 lectures)

Antibodies:

- Definition, Discovery and Basic structure of Immunoglobulins (Ig).
- Classes of Igs & Biological functions
- Concept of: Antigenic determinants on Ig.
- Immunoglobulin superfamily. **(4 lectures)**

Antigen - Antibody Reactions **(7 lectures)**

- General features of Ag-Ab reactions- Prozone, Post zone, Zone of Equivalence.

Types of Antigen Antibody reactions

- Precipitation - Ouchterlony, SRID, Immunoelectrophoresis, Rocket Electrophoresis.
- Agglutination - Blood grouping and WIDAL.
- Complement fixation tests.

	● Coomb's test ● An introduction to types of ELISA- Direct, Indirect, Sandwich, Competitive	
10	**Text Book- —**	
11	**Reference Books** 1. Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6 th edition Saunders Publication, Philadelphia. 2. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York. 3. Ananthanarayan and Paniker's Textbook of Microbiology, Eleventh Edition 4. Rao C. V. (2007). Immunology. 2nd Edition. Narosa Publishing House Pvt. Ltd. 5. Pathak S. and Palan U. (2005) Immunology: Essential and Fundamental. Science Publishers, U.S.; 2nd Revised edition edition (1 February 2005) ISBN-10:1578083796; ISBN-13:97857883794 6. Immunology, 7th edition (2006), David Male, Jonathan Brostoff, David Roth, Ivan Roitt, Mosby, USA. 7. Parham, P. (2005). The Immune System. New York: Garland Science.	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60% (Refer format of Question paper Below)**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	

Course II
Title of the paper: Molecular biology II

Sr.No.	Heading	Particulars
1	**Description the course: Including but Not limited to:**	This molecular biology course provides a comprehensive exploration of transcription and translation mechanisms. This course provides an in-depth analysis of how genetic information is decoded, synthesized, and transformed into functional proteins across prokaryotic and eukaryotic systems.
2	**Vertical :**	Major
3	**Type :**	Theory
4	**Credits :**	2 credits
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** CO1. To develop an understanding of molecular mechanisms underlying gene expression and regulation. CO2. To explain the mechanisms of transcription in prokaryotic and eukaryotic organisms. CO3. To explore the processes of protein translation and translational regulation. CO4. To develop student's skills in understanding complex molecular biological mechanisms.	
8	**Course Outcomes (OC):** Learner will be able to: OC1: Outline the flow of genetic information from DNA to RNA to proteins. OC2: Explain the molecular events of transcription in prokaryotes and eukaryotes. OC3: Explain characteristics of genetic code. OC4: Describe the detailed process of protein synthesis. OC5: Analyze basic regulatory mechanisms controlling gene expression.	
9	**Modules: -** **Module 1: Transcription**	
	Transcription in Prokaryotes: (6 lectures) ● Components of prokaryotic transcription unit. ● Initiation of Transcription at Promoters - Role of promoter, consensus sequences. ● Action of RNA polymerase in initiation and elongation ● Elongation of an RNA Chain.	

	● Termination of an RNA Chain - Rho-dependent and Rho-independent termination. **Transcription in Eukaryotes: (9 lectures)** ● Components of eukaryotic transcription unit. ● Eukaryotic RNA Polymerases - types and functions, Eukaryotic Promoters and Enhancers. ● Assembly of transcription initiation machinery. ● Structure and Production of Eukaryotic mRNAs. ● Eukaryotic mRNA processing, Spliceosomes. ● RNA editing.
	Module 2: Translation
	Nature of Genetic Code - Characteristics, ORF, Wobble Hypothesis. **(2 lectures)** Role of different types of RNA in translation. **(1 lecture)** Charging of tRNA. **(1 lecture)** **Translation in Prokaryotes and Eukaryotes** - Process of Protein Synthesis (Initiation, Elongation, Translocation, Termination); Polyribosomes. **(7 lectures)** **Protein sorting** - Signal hypothesis, effect of overlapping genes. **(2 lectures)** **Post Translational Modifications. (2 lectures)**
	Text Books ● iGenetics- molecular approach - Peter Russell -3rd Edition Chapter 5 pg no. **81-101** ● iGenetics- molecular approach - Peter Russell -3rd Edition Chapter 6 pg no. **102-123**
11	**Reference Books** ● Cell and Molecular Biology, De Robertis, Lippincott Williams& Wilkins ● Karp's Cell and Molecular Biology: Concepts and Experiments—Karp – Wiley International ● Molecular Biology of the Cell, Bruce Alberts, Garland Science, Taylor & Francis group ● Molecular Cell Biology, Lodish, W.H.Freeman & Co Ltd

12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** **(Refer format of Question paper Below)**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc .(at least 3)	

Course III - Practical I

Title of the paper: Practicals in Immunology

Sr.No.	Heading	Particulars
1	**Description the course: Including but Not limited to:**	This course includes a detailed description of the immune response made in humans to foreign antigens including microbial pathogens. A description of cells involved in the immune response either innate or acquired, organs of the immune system and specific responses. Other topics covered will include the basis and types of immune reactions.
2	**Vertical :**	Major
3	**Type :**	Practical
4	**Credits :**	2 credits
5	**Hours Allotted :**	60 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives (CO):** CO1: To provide students with a foundation in concepts related to immunology CO2: To familiarise with the basic principles of innate and acquired immunity. CO3: To provide students with knowledge on how the immune system works and depict the organs cells and organs diagrammatically. CO4: To acquaint the learners about the serological procedures that demonstrate the immunological reactions of agglutination and precipitation formation. CO5: To understand rapid immunodiagnostic screening procedures.	
8	**Course Outcomes (OC):** Learner will be able to: OC1: Will be able to explain the immunological terms. OC2: Discuss the concepts of antigen and antibody. OC3: Diagrammatically depict the organs of the human immune system with appropriate labels OC4: Explain the serological procedures demonstrating interactions between antigen and antibodies. OC5: Discuss the varied types of serological and immunodiagnostic methods.	
9	**List of Experiments:**	
	1. Blood grouping 2. Total WBC count 3. Differential WBC Count 4. Total RBC count	

	5. Separation of serum from blood 6. Immunodiffusion technique - Double immunodiffusion test by Ouchterlony. 7. Quantitative Immunodiffusion technique - Single Radial Immunodiffusion by Mancini 8. DOT - ELISA 9. Serum Electrophoresis 10. Qualitative detection of *Salmonella spp* - Rapid Slide agglutination test 11. Quantitative detection of *Salmonella spp* - Tube Agglutination test 12. Passive Agglutination- RA Factor Test 13. Coomb's test (Direct) 14. Complement Fixation Test (CFT)	
10	**Text Books —-**	
11	**Reference Books:** 1. Microbiology - A Laboratory Manual, 7th Edition, Cappuccino and Sherman, Pearson Education 2. Practical immunology, Frank Hay, 4th Edition , Blackwell Science 3. Medical Microbiology, Anantnarayan and Paniker 4. Immunology, fifth Ed Goldsby, T J. Kindt, Osborne, Janis Kuby Freeman and company.	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** **(Refer format of Question paper Below)**
13	**Continuous Evaluation through: (Refer format of Question paper Below)**	

Course IV- Practical II

Title of the paper: Practicals in Molecular Biology

Sr.No.	Heading	Particulars
1	**Description the course : Including but Not limited to:**	This molecular biology laboratory course equips students with practical skills in genomic and proteomic techniques, covering DNA and RNA extraction, electrophoretic profiling, molecular techniques and spectrophotometric analysis. Students will learn critical laboratory techniques through hands-on experiments and demonstrations, developing comprehensive skills in molecular research and biotechnological investigations.
2	**Vertical :**	Major
3	**Type :**	Practical
4	**Credits :**	2 credits
5	**Hours Allotted :**	60 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** CO 1. To develop practical skills in genomic DNA and RNA extraction techniques. CO 2. To learn fundamental molecular biology laboratory methods. CO 3. To understand the principles of molecular analysis and characterization. CO 4. To learn advanced techniques for studying genetic and protein interactions.	
8	**Course Outcomes (OC):** Learner will be able to OC1: Execute molecular biology extraction and separation techniques with. OC2: Analyze and interpret molecular data using spectrophotometric and electrophoretic methods. OC3: Demonstrate comprehensive understanding of genetic expression and molecular interaction principles. OC4: Design and critically evaluate experimental strategies for investigating cellular molecular processes.	
9	**Module:**	
	1. Isolation of genomic DNA from plant cells. 2. Isolation of genomic DNA from bacterial cells. 3. Comparative genomic DNA profiling from different organisms using AGE. 4. Isolation and detection of RNA from bacteria or yeast. 5. Purity assessment of extracted RNA samples using spectrophotometry. 6. Purity assessment of extracted DNA samples using spectrophotometry.	

	7. Protein extraction from plant cells. 8. Protein extraction from bacterial cells. 9. Separation of extracted proteins using PAGE. 10. DNA Amplification – PCR. (Demonstration0 11. Demonstration of protein-DNA interactions through gel shift assays. is this doable 12. Study of *lac* gene expression using blue-white selection. 13. DNA microarray - Demonstration. 14. Chromatin immunoprecipitation - Demonstration. 15. Virtual lab for transcription and translation - https://learn.genetics.utah.edu/content/basics/transcribe.	
10	**Text Books: —**	
11	**Reference Books:** 1. Sambrook, J., & Russell, D. W. (2001). Molecular cloning: A laboratory manual (3rd ed.). Cold Spring Harbor Laboratory Press. 2. Brown, T.A. (2016). Gene Cloning and DNA Analysis: An Introduction. 7th ed. Chichester: John Wiley & Sons Ltd. 3. Green, M.R. & Sambrook, J. (2012). Molecular Cloning: A Laboratory Manual (Fourth Edition). Cold Spring Harbor, NY: Cold Spring Harbor Laboratory Press. 4. Primrose, S.B. & Twyman, R. (2006). Principles of Gene Manipulation and Genomics. 7th Edition. Chichester: Wiley-Blackwell. ISBN: 978-1-405-13544-3. 5. Dieffenbach, C.W. & D'Veksler, G.S. (2003). PCR Primer: A Laboratory Manual. 2nd ed. Cold Spring Harbor Laboratory Press.	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** **(Refer format of Question paper Below)**
13	**Continuous Evaluation through: (Refer format of Question paper Below)**	

AC – AC – 20/05/2025
Item No. – 6.6 (3ab) Sem. III & IV

As Per NEP 2020

University of Mumbai

Syllabus for Minor Vertical 2 (Scheme – I)		
Faculty of Science		
Board of Studies in Microbiology		
Second Year Programme in Minor (Microbiology)		
Semester	**III & IV**	
Title of Paper	**Sem.**	**Total Credits 4**
I) Basic Concepts of Microbiology **II)** Fundamental Techniques in Microbiology	**III**	**2**
Title of Paper		**Credits**
I) Microbial Growth and Cultivation **II)** Basic Techniques in Microbiology	**IV**	**2**
From the Academic Year		**2025-26**

Sem. - III

Syllabus
B.Sc. (Second year)
(Sem.- III)

III) Title of Paper Basic Concepts of Microbiology

Sr. No.	Heading	Particulars
1	**Description of the course :** **Including but Not limited to :**	The Basic Concepts of Microbiology course introduces microorganisms' structure, classification, and functions. It includes the role of key biomolecules like proteins, carbohydrates, lipids, and nucleic acids. Students learn how microbes generate energy and carry out essential biochemical processes. The course also focuses on methods to control microorganisms, including sterilization, disinfection, and antibiotic use. Emphasis is placed on both physical and chemical control techniques. Practical sessions train students in culturing, staining, and identifying microbes. The course highlights the importance of microbes in health, industry, and the environment. It builds a strong foundation in Microbiology and Biochemistry. Students gain essential laboratory and analytical skills. This course is essential for preparing students for advanced studies in Microbiology and related fields.
2	**Vertical :**	Minor
3	**Type :**	Theory / Practical
4	**Credit**:	2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	**Hours Allotted :**	30 Hours / 60 Hours
6	**Marks Allotted**:	50 Marks/100 Marks
7	**Course Objectives**: CO1. To introduce the learners to biomolecules. CO2. To narrate the types and functions of biomolecules CO3.To explain the role of biomolecules CO4.To give an overview of general terms used in the control of microorganisms. CO5 To study the importance of physical and chemical methods of microbial control. CO6 To understand factors affecting the effectiveness of antimicrobial agents. CO7 To acquire skills for evaluation of disinfectants	
8	**Course Outcomes**: On completion of this course learner will be able to: OC1.Recall different types of biomolecules and their role. OC2 Understand the Chemical foundations of life OC3 Apply the knowledge of structure of biomolecules to interpret their role. OC4 Differentiate between various types of physical and chemical methods of microbial control. OC5 Assess the physical and chemical methods of microbial control. OC6 Elaborate on the mechanism , advantages and disadvantages of chemical methods of microbial control	
9	**Modules**	

Course code	Minor Course	Credits 2 (30 L/hr)
Module 1	**The Foundations of Biochemistry**	**15 Lectures**
1.1	**Chemical foundations:** 1.1.1 Biomolecules are compounds of carbon with a variety of functional groups. 1.1.2 Macromolecules as the major constituents of cells. 1.1.3 Configuration and Conformation with definitions and suitable examples only. 1.1.4 Types of Stereoisomers and the importance of stereoisomerism in biology. 1.1.5 Types of bonds and their importance: Electrovalence, covalent, ester, phosphodiester, thioester, peptide, glycosidic	2
1.2	**Water- Structure, properties in brief.**	1
1.3	**Carbohydrates:** Definition, Classification, Biological role. Monosaccharides, Disaccharides (maltose, cellobiose, sucrose, lactose) and polysaccharide (starch, glycogen, peptidoglycan, cellulose)	3
1.4	**Lipids:** Fatty acids as basic components of lipids and their classification nomenclature, storage lipids and structural lipids.Types of lipids with general structure of each and mention examples.	2
1.5	**Amino acids Peptides & proteins:** General structure and features of amino acids (emphasis on amphoteric nature) Classification by R-groups Peptides and proteins- Definition and general features and examples with biological role. Primary, secondary, tertiary, quaternary structures of proteins- Brief outline.	4
1.6	**Nucleotides and Nucleic acids:** Nitrogenous bases- Purines , Pyrimidines Pentoses-Ribose, Deoxyribose, Nomenclature of Nucleosides and nucleotides glycosidic bond, polynucleotide chain to show bonding between nucleotides (Phosphodiester bonds). Basic structure of RNA and DNA.	3
Module 2	**Control of Microorganisms**	**15 Lectures**
2.1	Definition of general terms used in control of microorganisms Rate of microbial death Properties of an ideal disinfectant	1
2.2	Physical methods of microbial control	5

	a. Dry & moist heat – mechanisms, instruments used and their operations b. Electromagnetic radiations – Ionizing radiations, mechanisms c. Bacteria proof filters	
2.3	Chemical methods of microbial control - mechanism & advantages & disadvantages applications. a. Phenolics and Alcohols b. Heavy metals and their compounds c. Halogens d. Detergents	6
2.4	Gaseous sterilising agents- formaldehyde, ethylene oxide, hydrogen peroxide	1
2.5	Disinfection of surfaces and spillages Disinfection of biosafety cabinets Disinfection of rooms	2
10	**Text Books:** 1. Principles of Biochemistry 5th Edition Lehninger 2. Microbiology TMH 5th Edition by Michael J.Pelczar Jr., E.C.S. Chan ,Noel R. Krieg	
11	**Reference Books:** 1. Prescott ,Harley.Klein-Microbiology, 5th & 6th edition, International edition 2002 & 2006, McGraw Hill. 2. Michael T.Madigan & J.M.Martin,Brock ,Biology of Microorganisms 11th Ed. International edition ,2006, Pearson Prentice Hall.	

12	**Internal Continuous Assessment: 40%**	**External, Semester End Examination 60% Individual Passing in Internal and External Examination**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	As per paper pattern*

Paper Pattern for 30 marks :
30 Marks per paper Semester End Theory Examination:
Duration - These examinations shall be of one hour duration

Question	Option	Marks	Questions Based on
Q1A	Attempt any two out of four (5 marks each)	10	Based on Module 1
Q1B	Attempt any five out of ten objective (MCQ type only) questions (1 marks each)	5	Based on Module 1
Q2A	Attempt any two out of four (5 marks each)	10	Based on Module 2
Q2B	Attempt any five out of ten objective (MCQ type only) questions (1 marks each)	5	Based on Module 2
	Total	**30**	

	Minor Course Practical Fundamental Techniques in Microbiology	2 Credits (60 L/hr)
1.	Microbiology lab tour- Safety, Common glassware, equipments and instruments	3
2.	Qualitative tests of carbohydrates - Molisch	3
3.	Qualitative tests of Proteins- Biuret.	3
4.	Qualitative tests of Amino acids- Ninhydrin.	3
5.	Qualitative tests of DNA- DPA	3
6.	Qualitative tests of RNA - Orcinol.	3
7	Solubility test of lipids in different solvents	3
8.	Working of Colorimeter, Autoclave , Hot air oven	6
9.	Determination of lambda max- copper sulfate and Potassium permanganate	5
10.	Verification of Beer and Lambert's law - copper sulfate	5
14.	Aseptic transfer techniques (broth, butt, slant, plate)	5
15.	Effect of Triphenylamine dyes using disc diffusion	5
17.	Effect of Antibiotics by disc diffusion	5
18.	Study of Oligodynamic effect of heavy metals	4
19.	Effect of disinfectants used in the lab (Swabbing of surfaces)	4

Internal Continuous Assessment: 40%	**External, Semester End Examination 60% Individual Passing in Internal and External Examination**
Continuous Evaluation through: Minor experiment /Viva/ Assignment/ objective question test (15 Marks), Overall performance (5 Marks) = 20 Marks	As per the pattern given below* 2 hours each day (2 days)
*Pattern of the end-semester practical examination Experiments (15 marks Major + 5 marks Viva/Spots + 5 marks Quiz and 5 Marks for Journal = 30 Marks)	

Name of the Course: Environmental Management & Sustainable Development -I

Sr. No.	Heading	Particulars
1	Description the course : Including but Not limited to :	Environmental awareness transcends academic boundaries. This course transcends academic boundaries, equipping you with a foundational understanding of ecosystems, biodiversity, and the human impact on natural resources and climate. Students will learn about critical issues like pollution and explore solutions for a sustainable future. The knowledge you gain here connects with diverse fields such as biology, economics, and even engineering. It is a foundation for further exploration in environmental science, conservation biology, and environmental policy. This course ignites your interest in environmental issues and opens doors to exciting careers in environmental management, conservation, and sustainable development – fields with growing demand across industries. Prepare for an interactive learning experience through engaging lectures, stimulating group discussions, and insightful case studies examining real-world environmental challenges and solutions.
2	Vertical :	Open Elective
3	Type :	Theory
4	Credit:	2 credits / (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	Hours Allotted :	30 Hours
6	Marks Allotted:	50 Marks
7	**Course Objectives:** 1. To create and disseminate knowledge to the students about environmental problems at local, regional and global scale. 2. To introduce about ecosystems, biodiversity and to make aware for the need of conservation. 3. To sensitize students towards environmental concerns, issues, and impacts of	

	human population. 4. To prepare students for successful career in environmental departments, research institutes, industries, consultancy, and NGOs, etc.
8	**Course Outcomes:** 1. Use principles of Environmental Science for explaining sustainable development and its related ethical concerns 2. Display scientific perspective for issues confronting our present day environment. 3. Analyze the national and global environmental issues relating air, water, soil, and land use, biodiversity, and pollution. 4. Explain the Role of an individual in relation to human population and environmental pollution.
9	**Modules:-**
	Unit I: Ecosystems, Biodiversity and Conservation (8 lectures)
	Introduction, structure, and function of ecosystems; Energy flow: food chains, food webs and ecological succession. Case studies of the following: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) 1. Levels of biological diversity : genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns 2. India as a mega-biodiversity nation; Endangered and endemic species of India 3. Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. 4. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.
	Unit II: Natural Resources and Sustainable Development (7 lectures)
	Overview of natural resources: Definition of resource; Classification of natural resources- biotic and abiotic, renewable and non-renewable. Biotic resources: Major type of biotic resources- forests, grasslands, wetlands, wildlife and aquatic (fresh water and marine); Microbes as a resource; Status and challenges. Water resources: Types of water resources- fresh water and marine resources; Availability and use of water resources; Environmental impact of over-exploitation, issues and challenges; Water scarcity and stress; Conflicts over water. Soil and mineral resources: Important minerals; Mineral exploitation; Environmental problems due to extraction of minerals and use; Soil as a resource and its degradation. Energy resources: Sources of energy and their classification, renewable and non-renewable sources of energy; Conventional energy sources- coal, oil, natural gas, nuclear energy;

	Non-conventional energy sources- solar, wind, tidal, hydro, wave, ocean thermal, geothermal, biomass, hydrogen and fuel cells; Implications of energy use on the environment. Introduction to sustainable development: Sustainable Development Goals (SDGs)-

	targets and indicators, challenges and strategies for SDGs.
	Unit III: **Human Communities and the Environment (8 lectures)**
	1. Human population growth: Impacts on environment, human health and welfare. 2. Resettlement and rehabilitation of project affected persons; case studies. 3. Disaster management: floods, earthquake, cyclones and landslides. 4. Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan. 5. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. 6. Environmental communication and public awareness, case studies (e.g. CNG vehicles in Delhi).
	Unit IV: Environmental Issues; Local, Regional, and Global (7 lectures)
	Environmental issues and scales: Concepts of micro-, meso-, synoptic and planetary scales; Temporal and spatial extents of local, regional, and global phenomena. Pollution: Impact of sectoral processes on Environment, Types of Pollution- air, noise, water, soil, municipal solid waste, hazardous waste; Transboundary air pollution; Acid rain; Smog. Land use and Land cover change: land degradation, deforestation, desertification, urbanization. Biodiversity loss: past and current trends, impact. Global change: Ozone layer depletion; Climate change.
10	**Text Books** 1. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006. 2. Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders. 3. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi. 4. Chiras, D. D and Reganold, J. P. (2010). Natural Resource Conservation: Management for a Sustainable Future.10th edition, Upper Saddle River, N. J. Benjamin/Cummins/Pearson. 5. John W. Twidell and Anthony D. (2015). Renewable Energy Sources, 3rd Edition, Weir Publisher (ELBS) 6. Singh, J.S., Singh, S.P. & Gupta, S.R. 2006. Ecology, Environment and Resource Conservation. Anamaya Publications https://sdgs.un.org/goals 7. Down to Earth, Centre of Science and Environment ®. 8. Hawkins R. E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay ®. 9. Harper, Charles L. (2017) Environment and Society, Human Perspectives on Environmental Issues 6th Edition. Routledge. 10. Rajagopalan, R. (2011). Environmental Studies: From Crisis to Cure. India: Oxford University Press. 11. Harris, Frances (2012) Global Environmental Issues, 2nd Edition. Wiley-Blackwell.

11	**Reference Books** 1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt. 2. Gadgil, M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press. 3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge. 4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.

	5. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons. 6. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent. 7. Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders. 8. Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York: Norton. 9. World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press.	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, Visits, assignment etc. (at least 4)	
14	**Format of Question Paper:** for the final examination For OE: External - 30 Marks (2 Credits) Internal - 20 Marks Question Paper Format for 30 Marks Format of Question Paper: 30 Marks per paper Semester End Theory Examination: 1. Duration - These examinations shall be of one hour duration. 2. Theory question paper pattern: a. There shall be 04 questions each of 10 marks out of which students will attempt ANY THREE	

Signature:
Prof. Kavita Laghate
Chairman of Board of Studies in Value Education

Vertical - 4

VSC

Title of the paper: Introduction to Bioinformatics

Sr.No.	Heading	Particulars
1	**Description the course: Including but Not limited to:**	This course provides an in-depth exploration of biological databases and sequence analysis tools, essential for modern bioinformatics and molecular biology. Emphasis is placed on practical applications, such as detecting restriction enzyme sites using NEBcutter, designing PCR primers with NCBI Primer BLAST, and predicting protein domains, motifs, and functions using InterPro. Additionally, students will gain experience in chemical structure analysis using the PDB Chemical Component Dictionary and apply bioinformatics skills to real-world assignments, including designing primers for gene amplification
2	**Vertical :**	VSC
3	**Type :**	Practical
4	**Credits :**	2 credits
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** 1. The primary objective of this course is to provide students with a comprehensive understanding of biological databases and sequence analysis tools. 2. The course aims to equip learners with the skills to retrieve and analyze DNA and protein sequences, perform sequence alignment, classify proteins, and predict protein structures and functions. 3. Additionally, the course emphasizes hands-on experience with molecular visualization tools, restriction mapping and primer design.	
8	**Course Outcomes (OC):** Learner will be able to 1. Demonstrate proficiency in retrieving DNA and protein sequences from major biological databases such as GenBank, UniProt, and PDB. 2. Perform pairwise and multiple sequence alignments using tools such as BLAST and Clustal Omega to analyze nucleotide and protein sequences. 3. Use chemical sketch tools and the PDB Chemical Component Dictionary to search for and analyze molecular structures. 4. Visualize and interpret 3D molecular structures using tools like PyMOL and Swiss-PDB Viewer. 5. Classify proteins based on their structural and functional properties using classification systems like CATH and SCOP. 6. Detect restriction enzyme sites and design custom restriction digests using NEBcutter.	

	7. Predict domains, motifs, and functions of proteins using bioinformatics tools such as InterPro. 8. Design primers for PCR amplification using NCBI Primer BLAST and validate their suitability for target gene amplification.
9	**Modules:- Biological Databases and Analysis Tools** 1. Introduction to Biological Databases: GenBank, EMBL, PDB, UniProt, Ensembl. 2. Retrieve a sequence from Databases: Retrieve a DNA sequence from GenBank. 3. Retrieve a sequence from Databases: Retrieve a Protein sequence from UniProt, PDB. 4. Sequence alignment: Pairwise and Multiple Sequence Alignment of nucleotide sequences using BLASTn and Clustal Omega. 5. Sequence alignment: Pairwise and Multiple Sequence Alignment of protein sequences using BLASTp, Clustal Omega and PDB tool. 6. Chemical Sketch Tool- Search for matching molecules in the PDB Chemical Component Dictionary. 7. Visualization PDB Molecules using PyMOL and Swiss-PDB Viewer. 8. Classification of Proteins using CATH and SCOP. 9. Detect restriction enzyme sites on a sequence map and perform a custom digest with selected enzymes using NEBcutter. 10. Predict domains, motifs, and functions of proteins using InterPro. 11. PCR Primer design using NCBI Primer BLAST. 12. Verification of sequence for a target gene and primers for amplification of the gene. (based on published article).
10	**Reference Book** 1. Mount, David W.. Bioinformatics: Sequence and Genome Analysis. Thailand, Cold Spring Harbor Laboratory Press, 2004. 2. Bioinformatics - Volume I: Data, Sequence Analysis, and Evolution. Second Edition Jonathan M. Keith, Monash University, Humana Press 3. Bioinformatics for DNA Sequence Analysis, David Posada, University of Vigo, Spain, Humana Press
11	Web Links 1. https://www.ncbi.nlm.nih.gov/ 2. https://www.ebi.ac.uk/jdispatcher/ 3. https://www.uniprot.org/ 4. https://www.ebi.ac.uk/interpro/ 5. https://www.rcsb.org/alignment 6. https://www.pdbus.org/docs/search-and-browse/advanced-search/chemical-sketch-tool 7. https://www.ebi.ac.uk/jdispatcher/msa/clustalo 8. https://www.ncbi.nlm.nih.gov/tools/primer-blast/ **9.** https://nc3.neb.com/NEBcutter/

12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** **(Refer format of Question paper Below)**
13	**Continuous Evaluation through: (Refer format of Question paper Below)**	

AC – 20/05/2025
Item No. – 5.45 (N) Sem-III 2(a)

As Per NEP 2020

University of Mumbai

Syllabus for Marathi - AEC	
Board of Studies in Marathi	
UG Second Year Programme	
Semester	**III**
Title of Paper	**लेखन कौशल्ये -२ (महाजालावरील लेखन)**
Credits	**2**
From the Academic Year	**2025-26**

Syllabus
B.A. (Marathi AEC)
(Semester - III)

Title of Paper : लेखन कौशल्ये - २ (महाजालावरील लेखन)

Sr. No.	Heading	Particulars
1.	**अभ्यासक्रमाचे वर्णन : (Description of the Course)**	राष्ट्रीय शैक्षणिक धोरण - २०२० विद्यार्थ्यांच्या सर्वांगीण विकासावर (Wholistic Development) भर देते. या धोरणात सर्वांगीण विकासाचा भाग म्हणून **क्षमता वर्धन अभ्यासक्रम (Ability Enhancement Course)** या स्तंभांतर्गत भाषिक कौशल्य अभ्यासक्रमाचा समावेश करण्यात आला आहे. कला, वाणिज्य व विज्ञान या विद्याशाखांमध्ये अध्ययन करणाऱ्या विद्यार्थ्यांना तिसऱ्या सत्रामध्ये 'आधुनिक भारतीय भाषां'चे अध्ययन अनिवार्य करण्यात आले आहे. सदर **क्षमता वर्धन अभ्यासक्रमा**चे स्वरूप प्रामुख्याने भाषाकेंद्री असावे, असेही राष्ट्रीय शैक्षणिक धोरणात नमूद करण्यात आले आहे. विद्यार्थ्यांना विविध प्रकारच्या भाषिक कौशल्यांचा तपशीलवार परिचय करून देणे, तसेच ती कौशल्ये आत्मसात करण्याची संधी विद्यार्थ्यांना उपलब्ध करून देणे, ही या अभ्यासक्रमाची महत्त्वाची उद्दिष्टे आहेत. ही उद्दिष्टे लक्षात घेऊन **'लेखन कौशल्ये - २ (महाजालावरील लेखन)' (श्रेयांकने २)** या अभ्यासपत्रिकेची आखणी करण्यात आली आहे. आंतरमहाजाल हे एकविसाव्या शतकातील अत्यंत प्रभावी साधन आहे. जगभरातील संगणक एकमेकांशी जोडले जाऊन त्यांचे जाळे तयार झाले आहे. विविध सामाजिक माध्यमस्थळांवर स्वतःचे खाते (अकाउंट) तयार करणे आणि त्यावर मराठी भाषा व देवनागरी लिपीतून लिहिणे, ही समकालीन संपर्क व्यवहारातील आवश्यक बाब झाली आहे. यास अनुसरून आपल्या अभिव्यक्तीला व्यासपीठ मिळवून देणारी अनुदिनी (ब्लॉग) तयार करणे, विकिपीडियावर भोवतालातील भाषा, साहित्य, संस्कृतीशी निगडित माहितीपर व विश्लेषणात्मक नोंदी लिहिणे, सामाजिक माध्यमस्थळांवरील आपल्या खात्यावर सातत्याने अभ्यासपूर्ण लेखन करणे, स्वक्षमतेशी निगडित समाजगट / आभासी कट्टे (कम्युनिटी ग्रुप) तयार करणे, या बाबींसाठी आवश्यक सामाजिक माध्यमस्थळ साक्षरता आणि मराठी भाषा व देवनागरी लिपीतून लिहिण्याची क्षमता **'लेखन कौशल्ये - २ (महाजालावरील लेखन)' (श्रेयांकने २)** या अभ्यासपत्रिकेच्या अध्ययनातून विद्यार्थ्यामध्ये निर्माण होईल.

2.	**Vertical**	Ability Enhancement Course
3.	**Type**	Theory
4.	**Credit**	2 Credits (1 Credit = 15 Hours for Theory or 30 Hours of Practical Work in a Semester)
5.	**Hours Allotted**	30 Hours (AEC या स्तंभांतर्गत शिकविल्या जाणाऱ्या अभ्यासपत्रिकांच्या कार्यभारासंबंधी मुंबई विद्यापीठाच्या दिनांक २३ जुलै, २०२४ च्या NO.AAMS_UGS/ICC/2024-25/19 या परिपत्रकाचा आधार घ्यावा.)
6.	**Marks Allotted**	50 Marks
7.	**अभ्यासक्रम उद्दिष्टे (Course Objectives) :** १. महाजालावरील लेखन कौशल्याचे स्वरूप समजावून सांगणे. २. महाजालावर प्रभावी लेखन करण्यासाठी आवश्यक असणाऱ्या तंत्रांचा परिचय करून देणे. ३. नेहमीच्या पठडीतील लेखन व महाजालावरील लेखन यांमधील साम्य-भेद स्पष्ट करणे. ४. विविध सामाजिक माध्यमस्थळांवर लेखन करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित करणे.	
8.	**अभ्यासक्रम निष्पत्ती (Course Outcomes) :** १. विद्यार्थ्यांना महाजालावरील लेखन कौशल्याचे स्वरूप समजेल. २. विद्यार्थ्यांना महाजालावर प्रभावी लेखन करण्यासाठी आवश्यक तंत्रांचा परिचय होईल. ३. विद्यार्थ्यांना नेहमीच्या पठडीतील लेखन व महाजालावरील लेखन यांमधील साम्य-भेद स्पष्ट होईल. ४. विद्यार्थ्यांमध्ये विविध सामाजिक माध्यमस्थळांवर लेखन करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित होतील.	
9.	**अभ्यासघटक (Module) :**	
	घटक - १ : सामाजिक माध्यमस्थळांवर मराठी भाषा व देवनागरीतून लेखन (भाग - १)	
	अ) अनुदिनी (ब्लॉग) लेखन आ) विकिपीडियावरील लेखन (६० मिनिटांच्या १५ तासिका, श्रेयांकन १) (सूचना : विद्यार्थ्यांमध्ये उपरोक्त सामाजिक माध्यमस्थळांवर लेखन करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित होतील या दृष्टीने शिक्षकांनी सराव करून घ्यावा.)	

	घटक -२ : सामाजिक माध्यमस्थळांवर मराठी भाषा व देवनागरीतून लेखन (भाग - २)	
	अ) फेसबुक, इन्स्टाग्राम, एक्स यांवरील लेखन आ) समाज गट (कम्युनिटी ग्रुप), आभासी कट्टे यांवरील लेखन (६० मिनिटांच्या १५ तासिका, श्रेयांकन-१) (सूचना : विद्यार्थ्यांमध्ये उपरोक्त सामाजिक माध्यमस्थळांवर लेखन करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित होतील या दृष्टीने शिक्षकांनी सराव करून घ्यावा.)	
10.	**पाठ्य ग्रंथ (Text books) :** N. A.	
11.	**संदर्भ ग्रंथ (Reference Books) :** १. *मराठी व्याकरण आणि लेखन*, विनायक गंधे व मीरा जोशी, निराली प्रकाशन, पुणे, २०१२. २. *उपयोजित मराठी*, (संपा.) केतकी मोडक व अन्य, पद्मगंधा प्रकाशन, पुणे, २०१२. ३. *मराठी भाषिक कौशल्य विकास,* (संपा.) पृथ्वीराज तौर, अथर्व पब्लिकेशन्स, धुळे, २०१८. ४. व्यावहारिक मराठी, ल. रा. नसिराबादकर, भाषा विकास संशोधन संस्था, कोल्हापूर, २०२३. ५. *Aayushi International Interdisciplinary Research Journal* (ISSN 2349-638x) Peer Reviewed Journal www.aiirjournal.com	
12.	**Internal Continuous Assessment : 40%**	**External, Semester End Examination : 60% Individual Passing in Internal and External Examination**
13.	**अंतर्गत सातत्यपूर्ण मूल्यांकन (Internal Continuous Assessment) : २० गुण** **अंतर्गत मूल्यांकनाचे स्वरूप (Format of Internal Assessment) :** चाचणी परीक्षा / मौखिक परीक्षा / प्रकल्पलेखन / नियतकार्य (Assignment) / सादरीकरण / प्रश्नमंजूषा यांपैकी कोणत्याही पद्धतींचा अवलंब करून अंतर्गत मूल्यमापन करता येईल. (प्रत्यक्ष उपस्थिती किंवा ऑनलाईन)	

14.	**बहिर्गत परीक्षा (External Examination) : ३० गुण (वेळ : एक तास)** **बहिर्गत परीक्षेच्या प्रश्नपत्रिकेचे स्वरूप (Format of Question Paper) :** १. प्रत्येकी **१५** गुणांचे एकूण **तीन** प्रश्न विचारावेत. त्यांपैकी विद्यार्थ्यांनी कोणतेही **दोन** प्रश्न सोडवावेत. २. पहिले **दोन** प्रश्न दीर्घोत्तरी स्वरूपाचे असावेत. दोन्ही घटकांवर आधारित **१५** गुणांचे अंतर्गत पर्याय असलेले **दोन** प्रश्न विचारावेत. ३. **तिसरा** प्रश्न हा घटक क्रमांक एक व दोनवर आधारित **१५** गुणांचा वस्तुनिष्ठ स्वरूपाचा असावा. प्रत्येक घटकावर दहा याप्रमाणे एकूण **वीस** प्रश्न विचारावेत. विद्यार्थ्यांनी कोणतेही **पंधरा** प्रश्न सोडवावेत.

Sd /-	**Sd/-**	**Sd/-**	**Sd/-**
Sign of the BOS Chairman **Prof. Dr. Satish Kamat** **Board of Studies in Marathi**	**Sign of the Offg. Associate Dean** **Dr. Suchitra Naik** **Faculty of Humanities**	**Sign of the Offg. Associate Dean** **Prof. Manisha Karne** **Faculty of Humanities**	**Sign of the Offg. Dean** **Prof. Anil Singh** **Faculty of Humanities**

AC-20/05/2025
Item No- 5.1(N) (2)

As Per NEP 2020

University of Mumbai

Syllabus for Basket of AEC Vertical 5	
Faculty of- HUMANITIES	
Board of Studies in HINDI	
Second Year Programme	
Semester	**III**
Title of Paper	**Credits**
I) हिंदी भाषा : व्यावहारिक प्रयोग	**2**
From the Academic Year	**2025-26**

Title of Paper- हिंदी भाषा:व्यावहारिक प्रयोग

Sr. No.	Heading	Particulars
1	**Description of the course:**	भाषा का जीवन में सदैव महत्व रहा है। जीवन और भाषा का चोली-दामन का संबंध है। जब हमारी भाषा मधुर और सार्थक होती है तो श्रोता पर विशिष्ट प्रभाव पड़ता है। भाषा का यदि सही और सार्थक रूप से प्रयोग किया जाए तो मनुष्य जीवन में कहीं भी असफल नहीं हो सकता है। इसी भाषा के माध्यम से हम सभी को अपनी ओर आकर्षित भी करते हैं। वर्तमान युग में रोज़गार में बहुत से क्षेत्र भाषा से जुड़े हुए हैं, जिसके माध्यम से विद्यार्थी इनका लाभ ग्रहण कर सकते हैं। भाषाई क्षमता हमारे विचारों की संवाहक होती है। आज डिजिटल युग में अभिव्यक्ति के कई माध्यमों का प्रसार हुआ है, इन माध्यमों में भाषा ही सशक्त तत्व है जो आपकी अभिव्यक्ति को पूरे जगत को अवगत कराती है। भाषा का महत्व हर समय, हर माध्यम में रहा है, परंतु भाषा का सार्थक रूप का प्रयोग आज बहुत आवश्यक है। आज हिंदी अंतरराष्ट्रीय स्तर पर प्रयोग में लाई जा रही है, तकनीक, सूचना प्रौद्योगिकी सोशल मीडिया, राजनीति की भाषा हिंदी बन चुकी है। जीवन में कई क्षेत्रों में व्यावहारिक स्तर पर हमें अपनी भाषा के लिखित स्वरूप के कार्यों को करना होता हैऔर ऐसे में कार्य-दक्षता महत्व रखती है। हिंदी भाषा में व्यावहारिक प्रयोग को केंद्र में रखकर और इन्हीं पहलुओं को ध्यान में रखते हुए इस पाठ्यक्रम का गठन किया गया है। हम हिंदी भाषा को सही और शुद्ध रूप में प्रयोग कर अभिव्यक्ति को सफल बनाएं और बिना व्याकरण के यह संभव नहीं है। इस दृष्टि से पाठ्यक्रम सर्वाधिक लाभकारी सिद्ध होगा।
2	**Vertical:**	AEC
3	**Type:**	Theory
4	**Credit**:	2 credits (1 credit = 15 Hours for Theory)
5	**Hours Allotted:**	30 Hours
6	**Marks Allotted**:	50 Marks
7	**Course Objectives:** 1. विद्यार्थियों को राजभाषा हिंदी का विधिवत ज्ञान प्रदान करना।	

	2. विद्यार्थियों को राजभाषा हिंदी के व्याकरण से परिचय करवाना। 3. विद्यार्थियों को संज्ञा आदि का ज्ञान प्रदान करना। 4. विद्यार्थियों को कारकों, वाक्य रचना एवं भाषिक चिह्नों आदि का ज्ञान प्रदान करना।
8	**Course Outcomes:** 1. विद्यार्थियों को राजभाषा हिंदी का ज्ञान प्राप्त होगा, एवं दक्षता प्राप्त होगी। 2. विद्यार्थियों को राजभाषा हिंदी के व्याकरणिक प्रयोग की जानकारी प्राप्त होगी। 3. विद्यार्थियों को हिंदी-संज्ञा आदि का ज्ञान प्राप्त होने के साथ भाषा के शुद्ध, व्यावहारिक रूप का ज्ञान होगा। 4. विद्यार्थियों को कारकों, वाक्य रचना एवं भाषिक चिह्नों आदि का ज्ञान प्राप्त होगा।
9	Modules (Per credit one module can be created)
	इकाई-1 व्याख्यान-15 क्रेडिट-01
	1. हिंदी भाषा : सामान्य परिचय
	2. राजभाषा हिंदी : संवैधानिक महत्त्व
	3. वर्णमाला : स्वर एवं व्यंजन
	4. शब्द भेद : सामान्य परिचय (संज्ञा आदि)
	इकाई-2 व्याख्यान-15 क्रेडिट-01
	1. वाक्य : सामान्य परिचय
	2. वर्तनी : शुद्धता का प्रयोग एवं सावधानियाँ
	3. कारक एवं विराम चिह्न
	4. पत्र लेखन : (बधाई, निमंत्रण, सुझाव, शिकायत, आभार, आवेदन, RTI लेखन)
10	**संदर्भ ग्रंथ-** 1. बाबूराम सक्सेना- सामान्य भाषा विज्ञान, हिंदी साहित्य सम्मेलन, प्रयाग 2. कामताप्रसाद गुरु- हिंदी व्याकरण, लोकभारती प्रकाशन, इलाहाबाद 3. आचार्य देवेंद्र नाथ शर्मा- भाषा विज्ञान की भूमिका, राधाकृष्ण प्रकाशन, दिल्ली 4. भाषा विज्ञान एवं भाषाशास्त्र- कपिलदेव द्विवेदी, विश्वविद्यालय प्रकाशन, वाराणसी 5. भोलानाथ तिवारी- भाषा विज्ञान, किताब महल, इलाहाबाद

11	**Internal Continuous Assessment : 40%**	**External : Semester End Examination : 60%**
12	**Continuous Evaluation through:** ● रचनात्मक कार्य/प्रकल्प इत्यादि- 10 अंक ● प्रस्तुति/परिसंवाद सहभागिता इत्यादि- 05 अंक ● अकादमिक, व्यावसायिक एवं कौशल संवर्धन गतिविधियाँ- 05 अंक **कुल 20 अंक**	**लिखित परीक्षा** **अंक : 30** **समयावधि : 01 घंटा**

13	**Format of Question Paper:** for the semester end examination **अंक : 30**	**लिखित परीक्षा** **समयावधि : 01 घंटा**
	निर्देश- 1. दोनों इकाइयों से प्रश्न पूछे जाएं। 2. तीन प्रश्न पूछे जाएं, किन्हीं दो प्रश्नों के उत्तर अपेक्षित हैं।	15x2 = **30 अंक** कुलयोग- **30 अंक**

Sd/-	**Sd/-**	**Sd/-**	**Sd/-**
Sign of the BOS Chairman **Prof. Dr. Santosh Motwani** **Board of Studies in Hindi**	**Sign of the Offg. Associate Dean** **Dr. Suchitra Naik** **Faculty of Humanities**	**Sign of the Offg. Associate Dean** **Prof. Manisha Karne** **Faculty of Humanities**	**Sign of the Offg. Dean** **Prof. Anil Singh** **Faculty of Humanities**

AC – 04-12-2024
Item No. – 6.39

As Per NEP 2020

University of Mumbai

Guidelines for Field Project (FP)

for Under Graduate Students as per NEP 2020

(With effect from the academic year 2024-25)

Index

1. Introduction:

One of the main objectives of NEP 2020 is to improve employability of students at the same time to nurture better understanding of socio-economic context. With introduction of NEP 2020, the higher education programs in India are gearing up to combine theoretical learning with practical application. NEP 2020 report emphasizes on giving exposure to students to understand development related issues in urban and rural areas. Field project work will provide students opportunity to visit and observe situation in rural and urban contexts, students are expected to observe and study actual field situations in socio economic contexts while doing their field work. It will improve opportunities to understand interconnect between theoretical knowledge and practical applications. Field project is expected to enhance their sensitivity to socio economic issues and improve their ability of problem solving as well as designing innovative solutions to the existing and emerging problems. Field project component will broaden the possibilities of deeper learning and enhancing research acumen of students. Field project broadens opportunities of social responsibility, environmental sustainability, nation building and peace.

2. Objectives

Field project program in general sets out to achieve objectives such as:

1. Align classroom learnings with awareness about socio-economic conditions.
2. Provide students with exposure to socio economic conditions and align their experiences with contemporary problems.
3. Integrating theoretical and practical modes blended learning under the guidance of their faculty.
4. Enhance research skills including knowledge discovery, analytical tools, methodologies, and ethical conduct.
5. Facilitate problem-solving, decision-making, teamwork, and collaboration.
6. Foster ability to work in team, develop social awareness and nurture human values among students.
7. Encourage collaboration between Higher Education Institutes (HEIs), social organization, Government and non-government institutes for better implementation of Field project.

3. Outcomes:

After the completion of the FP program, the student will be able to;

1. Apply concepts learned in classrooms to real-world socioeconomic conditions enhancing their understanding and skills.
2. Show insights into the challenges, opportunities and culture of socioeconomic diversity, preparing them for future role as responsible citizens.
3. Demonstrate evidence of research aptitude and skills of critical thinking, analytical skills, and ethical research conduct in field work.
4. Display problem-solving abilities in making informed decisions in complex scenarios through practical situations.
5. Work in teams and collaborate to achieve common goals in the work field environments through collaborative efforts.
6. Show integrity in their dealings with their work and the people that they interact with by upholding professional; principles and ethical standards.

4. Indicative list of areas for FP:

The areas of field work can be decided by the head of the institution in consultation with the faculty in respective subjects.

5. Role and responsibilities

Head of the Department (HOD):

1. Allotment of guides for the students for field project should be done by Head of the Department/Director/Principal of the institute as the case may apply.
2. While allocating the students under more than one guide- the principle of fairness in distribution should be followed.
3. In case the number of in- house guides are not adequate then students can be allotted to competent external experts.
4. To ensure that FP program aligns with departmental and academic objectives.
5. To provide resources and assistance to ensure effective supervision.

FP Coordinator:

1. To oversee the quality and effectiveness of the FP program.
2. To establish mechanisms for evaluating the program and making improvements.
3. To act as a liaison between the department, students, faculty mentors and FP supervisors

(Host institute/ organization).

StudentCoordinators:

To help the FP coordinator in pre-, during and post-FP activities.

Faculty Mentor:

1. To give Guidelines for Students to meet the guide periodically to discuss the field project.
2. To assist in identifying FP opportunities.
3. To monitor student progress and provide guidance.
4. To review and approve FP plans and to take regular feedback on student's engagement.
5. To collect and review progress reports.
6. To evaluate FP documentation including reports, presentations, or other required deliverables (if applicable).

6. Process of FP implementation:

Flow chart

1. Formation of FP Committee
2. Appointment of Coordinators
3. Field project orientation by the FP committee
4. Allotment of students as per guidelines
5. Execution of FP
6. Evaluation
7. Student Feedback

Mechanism for the implementation of FP:

1. To facilitate effective implementation of the FP program, Colleges/Departments/Institutes are encouraged to establish FP committee responsible for overseeing its smooth functioning. It will consist of the following: Head of the department, FP Coordinator, Faculty Mentors and one/two student coordinators.
2. One teaching faculty member and one/two students from each undergraduate department will be nominated to serve as coordinators for the FP program. These coordinators will play

a crucial role in coordinating and implementing the program within their respective departments.

3. The teacher coordinator will take the lead in preparing an action plan for the implementation of the FP program.
4. To streamline the administrative process, the Department/Centre will provide necessary formats to students for documentation related to the program.
5. Each Department/Centre must ensure collaborations with 8-10 relevant organizations, industries, or research institutes. These collaborations will serve as crucial avenues for facilitating FP opportunities for students.
6. Effective communication is key to the success of the FP program. Regular communication with heads and coordinator of the department/centre/Institute and maintaining proper records is essential. This faculty mentor and individual student will also be responsible for maintaining relevant documents related to the program.
7. Before the commencement of the FP program, an orientation session will be conducted by the Head of Department. This session will serve to familiarize students with the purpose, process, and code of conduct associated with the program.
8. To ensure effective mentoring and support, an equal number of students will be allocated to each faculty member of the department. These faculty members will act as FP mentors and will be responsible for monitoring and evaluating the progress of the allotted students.
9. Throughout the FP period, students will maintain activity reports as per the provided format and get it validated by the supervisor.
10. Upon completion of the FP program, students must submit a completion certificate duly signed by the faculty supervisor.

7.<u>Credits and duration</u>:

1. FP will carry weightage of two credits.
2. Each student is required to complete minimum of 2-3 field visits.
3. The FP program is to be completed during Semester II. According to the guidelines outlined in the National Education Policy (NEP), undergraduate students are expected to fulfill this requirement either within the second semester of their UG program or during the semester break following the second semester.

8.<u>Project (Dissertation) Report:</u>

Students are required to submit a report of the field project at the end of the semester in following

suggested format.

All projects should be typed on ***A4 sheets, Font Size 12, Times New Roman, one and a half spacing on executive bond paper.*** The project report shall have appropriate chapter scheme and be presented in minimum of 20 pages.

Report should be arranged in the following manner.

TitlePage

- Title of the Report (Font size 14)
- Name of the Student
- Roll number/Seat number
- Program Title
- Name of the Mentor
- Month of Submission

Certificate by the Institute

Certificate by Mentor

Student's Declaration

Acknowledgement

Abstract

A brief summary of the field visit, key observations, and main conclusions (200-300 words)

Table of contents

- Include headings and subheadings with page numbers.

List of Figures and Tables

- List all figures and tables included in the report with corresponding page numbers.

Chapter1: Introduction

- Purpose of the visit: Outline the objectives and expected outcome of the field visit.
- Background Information: Provide context about the site(s)visited, including historical and cultural significance.
- Scope of the Report: Define the boundaries of what the report will cover.

Chapter2: Literature Review

- Review relevant literature on the site(s) visited, focusing on previous studies, historical accounts, and critical analyses of the literary significance.

Chapter 3: Methodology

- Describe the approach and tools used for data collection during the visit (e.g., observational methods, interviews, archival research).
- Discuss the rationale behind the chosen methods.

Chapter 4: Field Work Descriptions, Observations and Analysis

- Provide detailed descriptions of each site visited/ Field work carried out.
- Include observations related to fieldwork: work's-relevance to topic selected.
- Use photographs, diagrams, and sketches, etc. to support the descriptions.
- Analyze the data collected in relation to the study objectives.

Chapter 5: Conclusion and Recommendations

- Discuss how the findings from the visit contribute to the understanding of subject area.
- Summarize the key findings and their significance.
- Offer recommendations based on the research findings for further study or preservation efforts.

References

- List all sources cited in the report in a consistent format.

Appendices

- Include additional data, interview transcripts, notes, or documents that are relevant to the report but not integral to its main text.

9. Evaluation Pattern

Evaluation during the FP program involves two key components: External Evaluation (40%) and Internal Evaluation (60%).

(i) Internal Evaluation by Guide (Marks 20)

Criteria	Marks
Field visit completion, Attendance and interaction	10
Overall Report quality	10
Total	**20**

(ii) External Evaluation (Marks 30)

Criteria	Marks
Objectives, Literature Review, Methodology, Data Analysis, Conclusion andRecommendations	15
Overall Project Report Structure and Style	5
Presentation Skills & Communication	10
Total	**30**

Appendix I

GUIDE INTERACTION DIARY FORM

I, the undersigned Ms /Mr._____Roll No. _____ studying in the _____ Year of _____Full-time Course is doing my project work under the guidance of Dr./Ms./Mr. _____, wish to state that I have met my Internal guide on the following dates mentioned below for Project Guidance:-

Sr.No.	Date	Signature of the Internal Guide

_____ _____

Signature of the Candidate Signature of Internal Guide

IMPORTANT: It is expected that student will be meeting their guide at least five times for the project work interaction. The candidate should retain the above stated 'Project Guide Interaction Certificate Form' and submit the same with required signatures of the guide while submitting the Project to the Institute.

THE PROJECT REPORT WILL NOT BE ACCEPTED WITHOUT THE DULY FILLED PROJECT GUIDE INTERACTION CERTIFICATE.

Appendix II

Main Page Format of Project Report

Title of the Project

Name of the Student

(Name of Academic Course and Academic Year Details)

Example: Masters in Management Studies

Under the Guidance of

Name of Guide

Name of the Department/College/Institute

Academic Year – 2024-25

Appendix III

Name of the Department/College/Institute

Certificate

I hereby certify that Mr./Ms. _____, Student of _____Institute studying in _____, has completed a project titled _____ in the area of _____specialization for the academic year 2024-2025. To the best of my knowledge the work of the student is original and the information included in the project is correct.

Internal Guide Head of the Department Principal

Annexure IV

Declaration

I, Mr./Ms. _____ Student of _____Institute studying in _____, hereby declare that I have completed the field project entitled _____ during the academic year 2024-2025.

The report work is original and the information/data included in the report is true emerging from the primary and/ secondary data gathered and analyzed as part of this project.

Due credit is extended on the work of Literature/Secondary Survey by endorsing it in the Bibliography as per prescribed format.

Signature of the Student with Date

Name of Student

Annexure V

Student Feedback on FP

(To be filled by Students after FP completion)

Student Name:

Seat No. /Roll No.:

Email:

Department:

Name of the Mentor:

Title/Heading of Field Project:

Brief description of FP carried out:

Dates of FP:

Was your internship experience related to your major area of study?

- Yes, to a large degree
- Yes, to a slight degree
- No, not related at all

Indicate the degree to which you agree or disagree with the following statements.

This experience has:	**Strongly Agree**	**Agree**	**No opinion**	**Disagree**	**Strongly Disagree**
Given me the opportunity to explore a career field					
Allowed me to apply classroom theory to practice					
Helped me develop my decision-making and problem-solving skills					
Expanded my knowledge about the work world before permanent employment					
Helped me develop my written and oral communication skills					
Provided a chance to use leadership skills (influence others, develop ideas with others, stimulate decision-making and action)					
Expanded my sensitivity to the ethical implications of the work involved					

Made it possible for me to be more confident in new situations					
Given me a chance to improve my interpersonal skills					
Helped me learn to handle responsibility and use my time wisely					
Helped me discover new aspects of myself that I didn't know existed before					
Helped me develop new interests and abilities					
Helped me clarify my career goals					
Allowed me to acquire information and/ or use equipment not available at my Institute					
Allowed me to realize socio-economic issues in the society					

● In the Institute FP program, faculty members are expected to be mentors for students. Do you feel that your faculty mentor served such a function? Why or why not?

● How well were you able to accomplish the initial goals, tasks and new skills that were set down in your learning contract? In what ways were you able to take a new direction or expand beyond your contract? Why were some goals not accomplished adequately?

● In what areas did you most develop and improve?

● What has been the most significant accomplishment or satisfying moment of your FP?

● What did you dislike about the FP?

● Considering your overall experience, how would you rate this FP? (Circle one). – Satisfactory/ Good/ Excellent

● Give suggestions as to how your FP experience could have been improved. (Could you have handled added responsibility? Would you have liked more discussions with your professor concerning your FP? Was closer supervision needed? Was more of an orientation required?)

Signature of Student

Name

Date:

Under the Guidance of

Hon'ble Vice Chancellor	Hon'ble Pro-Vice Chancellor
Prof. Dr. Ravindra Kulkarni	**(Prin.) Dr. Ajay Bhamare**

FP Guidelines Draft Committee

Prof. Shivram S. Garje — Convener
Off. Dean (Science and Technology)

Prof. Smita Shukla — Member
Director, Alkesh Dinesh Mody Institute of Finance and Management Studies

Prof. Manisha A. Karne — Member
Director, Department of Economics

Prof. Priya Vaidya — Member
Head, Department of Philosophy

Dr. Suchitra Naik — Member
Principal, K.G. Joshi College of Arts & N.G. Bedekar College of Commerce

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AC – 15/07/2025

Item No. – 5.3

As Per NEP 2020

University of Mumbai

Syllabus for Co- Curricular (CC)

Vertical - 6

Board of Studies in Extension Work	
UG Second Year Program – Co- Curricular Course	
Semester	**III**
Title of Paper	**Extension Work**
Credits	**2**
From the Academic Year	**2025-26**

Introduction

The National Education Policy (NEP) 2020 is a comprehensive framework introduced by the Government of India to revamp the country's education system. It has replaced the previous National Policy on Education, which has aim to ensure universal access to quality education from preschool to higher education, including vocational education. NEP 2020 emphasizes a more holistic, multidisciplinary, and flexible curriculum which lay emphasis on conceptual understanding rather than rote learning allowing students to choose subjects across disciplines without strict boundaries.

The National Education Policy (NEP) 2020 of India addresses the role of higher education institutions in fostering community engagement and extension work. It highlights the social responsibility of higher education institutions towards their communities. It encourages institutions to engage with local communities, address societal challenges, and contribute to sustainable development. The policy promotes the implementation of outreach programs by higher education institutions to disseminate knowledge, provide services, and support community development. These programs may include literacy campaigns, career development programs, social issues awareness programs, health and hygiene initiatives, skill development workshops, and technology-oriented activities. The policy suggests integrating extension work into the curriculum of higher education programs. This allows learners to gain practical experience, develop leadership skills, and contribute to community development while pursuing their studies. It recognizes incentives to encourage active engagement in community service and extension activities.

Overall, NEP 2020 recognizes the significant role of higher education institutions in promoting community engagement, social responsibility, and sustainable development through extension work. By integrating extension activities into their mission and operations, institutions can contribute to building inclusive and resilient societies.

Extension work in the context of education refers to the activities and programs conducted by educational institutions to engage with communities, address societal needs, and promote social development.

<u>Aim of Extension Work under NEP</u>:

- Extension work aims to identify and address the specific needs and challenges faced by communities. NEP 2020 encourages higher education institutions to engage with local

communities and contribute to their development by offering programs and services that address social needs, such as literacy programs, health awareness campaigns, and vocational training.

- Extension work aims to empower communities by providing them with the knowledge, skills, and resources they need to address their own requirements and improve their quality of life.

Key objectives of Extension Work under NEP:

- To ensure equal access to quality education and educational opportunities to aspirants.
- To support the government initiatives in achieving universal foundational literacy and numeracy as per sustainable development program.
- To organize remedial programs to address the learning breaches among the youth and provide unending education opportunities.
- To offer more holistic, multidisciplinary, and flexible curricular activities with an emphasis on conceptual understanding and personality development.
- To offer a wide range of activities & promote critical thinking, creativity, and innovation.
- To provide aspirants with multiple pathways for skill development and employment.
- To implement outreach programs to disseminate knowledge, provide services, and support community development.

Extension Work Activities:

Extension Work activities introduced by DLLE are a crucial aspect of the educational environment, offering multifaceted benefits that extend beyond academic learning. Many extension activities focus on social issues, sustainability, and environmental conservation. These activities educate the communities on sustainable practices which promote inclusivity and social justice. These activities focus especially on training women in various skills, including entrepreneurship and digital literacy through various vocational skill-oriented projects offered by the department. These activities have significantly contributed to skill development among community members, leading to improved employment opportunities and personality development. Learners participate in extension work activities as part of their curriculum, to gain practical experience and to contribute to community development. Thus, engaging in extension work fosters a sense of social responsibility and civic engagement among the learners and facilitators.

Given below are the activities / programs to be conducted by the colleges as a part of Extension Work as enlisted topics. The learner will focus on enlisted topics and participate in following activities during Semester III in this academic year.

ACTIVITIES FOR SEMESTER III = 2 Credits

Sr. No.	Unit	No. of Lectures
1.	Organising & Participation in Training Session Every learner should attend the orientation / training session organised by their college for orientation of annual extension work program. Attendance is compulsory. **In this session the learners will be oriented about the activities to be conducted during the semester followed by question-and-answer session.** The learner must read resource material and guideline carefully and plan his / her activities for the semester during academic year.	2 Lectures
2.	Participation in Project /Activities (as given below) **In this session learners will be oriented about any 5 Topics selected by college (preferably which are not taken in Semester 1 and 2) for awareness under Extension Work. The college may select more than 5 topics if the enrolment of learners is more than 200. The learners will participate in activities based on these topics selected by college.)** 1. Election Literacy 2. Nasha Mukti 3. My Career. 4. Physical Education and Yoga. 5. Discipline and Civic Sense. 6. Sustainable Health Practices & Precautions. 7. Care for Senior Citizens 8. Palliative Care for patients. 9. Child Care 10. Stress Management 11. Positive Thinking.	22 Lectures including guidance for practice session, preparations and actual conduct of program.

	12. Communal Harmony 13. Book Reading Practices 14. Journalism and Media 15. Sustainable Natural Resources 16. Career Opportunities in NEP 2020 17. Indian Scientists and Their Contributions 18. Women Entrepreneurs & Leadership in India 19. Digital India and Technological Innovations 20. Stop Food Waste **Learners will be oriented and motivated to participate in minimum four activities given below based on above topics:** 1. Seminar /conferences, discussion sessions, debate, rallies 2. Competitions (essay/creative writing, elocution, poster/ video/ rangoli making etc. – Minimum 2 competitions) 3. Extension Work group activities of other groups in the college. 4. Prepare your PPT, design your posters / charts. 5. Survey / short term academic courses / innovative programs. 6. Field visit / field work / case studies / developing innovative engineering models / projects 7. Participation in Street Plays 8. Event / hospitality / human resource management program /assignment 9. Novel formulation development (pharmacy), 10. Self-medication survey (pharmacy), **Learners are required to prepare <u>short videos (duration 3-4 minutes)</u> of the activity where the college will organize such competition.** **The learners will be oriented about various career development opportunities in University of Mumbai, and schemes of student development by the Government.** **<u>Learners will be oriented and given an opportunity for:</u>** - Script writing / Direction for street play.	

	- Composing / Singing (Songs, Powada) - Playing Musical Instrument during the event. - Participation in various college and university level competitions. - Participate in Cultural Performance / Organising Committee for Festival / Programs / Event Management.	
3	<u>Participation Video / Stage Performance / Assignment / Report Writing and submission</u> - Present your report / video during the college program. - All learners enrolled in Extension Work can make activity video or stage performance (3-4 minutes duration) creating awareness about any social issues / topics enlisted here followed by assignment / report writing as per format. - **College will organise a program in the hall / classroom for all learners and give them an opportunity** to present their assignment / report with PPT / video presentation followed by question answer session / test / interview by the college.	6 Lectures including guidance for practice session, preparations and actual conduct of program.

Evaluation Pattern

<u>Internal Assessment</u>

Sr. No.	Assessment Criteria	Maximum Marks
1	Attendance, punctuality, completion of hours, participation in programs, presentations and feedback.	10
2	Proficiency in required skill sets, overall performance, submission of written report / assignments and expected development.	10
	Total	20 Marks

External Assessment

(Based on Extension Work guidelines and five enlisted topics chosen by the college.)

Question Paper Pattern

Time: 1.00 Hours **Total Marks 30**

Instructions: 1. All questions are compulsory.

2. Figures to the right indicate maximum marks.

Q.1. Rewrite the following statement by choosing correct alternative given below. - 06 Marks (6 statements. One mark each)

Q.2. Write short Notes On (Any Two out of Four) - 06 Marks

Q.3. Answer the following questions. (Any Three out of Five) - 18 Marks

References:

- Agricultural Extension: Principles and Methods" by "Ray V. Herren (2008)
- Agricultural Extension by G. S. R. Murthy (2010)
- Agricultural Extension in Developing Countries by R. W. Snapp (2012)
- 'Community Development: Theory and Practice' by Margaret Ledwith (2020)
- Extension Communication and Management by B. M. Panda (2016)
- Extension Education: Principles and Practice by Dahama and Bhatnagar (2017)
- Guidelines for Extension Work published by Department of Lifelong Learning and Extension, University of Mumbai.
- Introduction to Agricultural Extension by S. S. Acharya (2015)
- 'Innovation in India: Combining Economic Growth with Inclusive Development' edited by Sunil Mani and Henny Romijn.
- 'Participatory Extension Approaches for Sustainable Development' by Chambers and Guijt (2019)
- 'Rural Development and Extension Education' by Singh and Swanson (2018)
- 'Social Work and Community Development' by Pawar and Cox (2019)

Sd/-	**Sd/-**	**Sd/-**	**Sd/-**
Sign of the BOS Coordinator, Dr. Kunal Jadhav, Board of Studies in Extension work	**Sign of the Offg. Associate Dean, Dr. Suchitra Naik Faculty of Humanities**	**Sign of the Offg. Associate Dean, Dr. Manisha Karne Faculty of Humanities**	**Sign of the Offg. Dean, Prof. Dr. Anil Singh Faculty of Humanities**

Sem. - IV

Course I

Title of the paper: Biochemistry

Sr.No.	Heading	Particulars
1	**Description the course: Including but Not limited to:**	The course provides a comprehensive explanation of enzyme kinetics and the catabolic pathways of carbohydrates and lipids. Students will explore the principles governing enzyme activity and regulation, alongside detailed study of the metabolic processes that break down carbohydrates and lipids for energy production.
2	**Vertical :**	Major
3	**Type :**	Theory
4	**Credits :**	2 credits
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** CO 1: To explain the classification system for enzymes based on the reactions they catalyze. CO 2: To explain and interpret model to describe enzyme kinetics and describe the various mechanisms that regulate enzyme activity CO 3: Illustrate the major pathway of carbohydrate metabolism glycolysis, citric acid cycle role of key enzymes and energetics and oxidative phosphorylation in energy production. CO4 :To describe the digestion, absorption, and transport of lipids in the human body and explain the pathways of lipid metabolism, including beta-oxidation, fatty acid synthesis	
8	**Course Outcomes (OC):** Learner will be able to: OC 1: Have a deeper insight in to the fundamentals of enzyme properties, nomenclatures, and classification OC 2: Understand the kinetics of enzyme catalysed reactions and enzyme inhibitions and regulatory processes. OC 3: Understand key pathways in carbohydrate and Lipid metabolism and the energetics OC 4: Describe the role of the citric acid cycle and oxidative phosphorylation in energy production and their connection to carbohydrate and lipid metabolism.	
9	**Modules:-** **Module 1: Enzymology**	

	● **Understanding the basic terminology in enzymology:** Enzyme, Apoenzyme, Holoenzyme, Prosthetic group, Active site, Turnover number, Specific activity, Katal, IU, Coenzyme and Cofactor (3 Lectures**)** ● Classification, Nomenclature of Enzymes **(**2 Lectures**)** ● **Enzyme specificity:** (4 Lectures) Concept of active site, ES complex, transition state Effect of pH, Temperature, Substrate Concentration on Enzyme Activity, ● **Enzyme Kinetics** - Michaelis-Menten Equation, Line weaver Burk plot for mono substrate reaction, Concept and Significance of V_{max} and K_m (4 Lectures) ● **Types of Enzyme Inhibitions**- Competitive, Uncompetitive, Non-Competitive (2 Lectures)
	Module 2: Carbohydrate and Lipid Metabolism
	<u>Carbohydrate Metabolism:</u> ● Glycolytic Pathway and energetics - EMP pathway and its regulation, Pyruvate oxidation, role of PDH enzyme, Pasteur effect (3 Lectures) ● Anaerobic fate of Pyruvate- Alcoholic and Homolactic fermentation (1 Lectures) ● Citric Acid cycle and energetics, Amphibolic nature of TCA cycle and its regulation (3 Lectures) ● ETC - Structure of Mitochondria, Complexes of ETC and oxidative phosphorylation ,Inhibitors of ETC (4 Lectures) **<u>Lipid Metabolism:</u>** ● Mobilization and transport of fatty acids (1 Lecture) ● Beta,alpha and Omega Oxidation of saturated fatty acid (3 lectures)
10	**Text Books:** **1.**Outlines of Biochemistry: 5th Edition, (2009), Erice Conn & Paul Stumpf; John Wiley and Sons, USA 2. Lehninger, Principles of Biochemistry. 5th Edition (2008), David Nelson & Michael Cox, W.H. Freeman and company, NY.
11	**Reference Books:** 1. Principles of Biochemistry, 4th edition (1997), Jeffory Zubey, McGraw-Hill College, USA 2. Fundamentals of Biochemistry. 3rd Edition (2008), Donald Voet& Judith Voet, John Wiley and Sons, Inc. USA 3. Biochemistry: 7th Edition, (2012), Jeremy Berg, Lubert Stryer, W.H.Freeman and company, NY

12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** (Refer format of Question paper)
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	

Course II
Title of the paper: Medical Biotechnology

Sr.No.	Heading	Particulars
1	**Description the course: Including but not limited to:**	The course provides insights into host-pathogen interaction, disease outcome and epidemiological principles. The students will get detailed knowledge of isolations of pathogens from clinical samples and susceptibility testing.
2	**Vertical:**	Major
3	**Type:**	Theory
4	**Credits:**	2 credits
5	**Hours Allotted:**	30 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives (CO):** CO 1: To gain insight into various modes of transmission, virulence factors of pathogens and factors associated with hosts which are associated with disease outcome. CO 2: To understand principles of epidemiology and its role in control, treatment and prophylaxis of disease. CO 3: To provide knowledge on the handling, isolating and identifying various pathogens. CO 4: To suggest suitable antibiotics for therapy by doing susceptibility tests.	
8	**Course Outcomes (OC):** Learner will be able to: OC 1. Describe the role of host factors, virulence factors and various modes of transmission in the outcome of disease. OC 2. Understand principles of epidemiological sciences in studying the underlying mechanisms of spread of disease and controls required thereof to combat the spread of pathogens OC 3. Learner will know how to isolate and Identify pathogens of the respiratory tract, gastrointestinal tract, urinary tract, skin and nosocomial infections. OC4: Learner will know how to perform Antimicrobial Susceptibility Testing and suggest suitable drugs for treatment.	
9	**Module 1: General Bacteriology and Bacteria as Human pathogen, Host parasite interactions**	

	Host Parasite Relationship: Koch's Postulates. (1 lecture) Normal Flora of human body & various pathogens associated with each part. Concept of Microbiome, Germ-free animals (2 lecture) Origin of Pathogens & Acquisition of Infection- Vectors, sources of infection, various routes of transmission (3 lecture) Factors Affecting the Course of Infection and Disease: (1 lecture) Mechanisms of Infection and Virulence Factors (Adhesion factors, Capsule, Enzymes, Toxins). (2 lectures) Various stages of clinical infections. (1 lecture) Patterns of Infection; Types of Infections; Signs and Symptoms. (2 lecture) Introduction to Epidemiology and Epidemiological Markers. (1 lecture) Opportunistic pathogens, Nosocomial infections. (2 lectures)
	Module 2: Infectious diseases
	Introduction: Various pathogens associated with various systems (skin, Respiratory tract, Gastrointestinal tract, Genitourinary tract, central nervous system) and diseases caused by them (disease caused and pathogen responsible) (1 Lecture) Following to be covered for the pathogen mentioned: Pathogenesis, symptoms and laboratory diagnosis, epidemiology, prophylaxis and treatment. **Skin infections -** *S. aureus* **(**2 lectures) **Urinary tract infections:** *E. coli, Proteus sp.* (2 lectures) **Respiratory Tract Infections:** *M. tuberculosis* (2 lectures) **Gastrointestinal tract infections:** Enteric fever- Salmonella (2 lectures) **Sexually transmitted disease:** Syphilis (2 lectures) **Nosocomial infection**s: *Pseudomonas aeruginosa* (1 lecture) **Fungal disease:** Candidiasis (1 lecture)
10	**Text Books** 1. Ananthanarayan and Panicker's, Textbook of Microbiology, 9th edition 2. Jawetz, Melnick and Adelberg's Medical Microbiology, 26th Edition, Lange publication 3. Microbiology–6th Edition (2006), Pelczar M.J., Chan E.C.S., Krieg N.R., The McGraw Hill Companies Inc. NY 4. Prescott's Microbiology, 8th edition (2010), Joanne M Willey, Joanne Willey, Linda Sherwood, 5. Foundations in Microbiology by K.P.Talaro, B.Chess, McGrawHill Education, 10th Edition 6. Microbiology An Introduction, 10th Edition Gerard J.Tortora, Erdell R.Funke, Christine L. Case.
11	**Reference Books** 1. Mim's Medical microbiology Richard V Goering, Hazel M Dockrell, Mark Zuckerman, Peter L Chiodini, Ivan M Roitt Fifth edition, Elsevier.

	2. Koneman's Color Atlas and Textbook of Diagnostic Microbiology by Gary W. Procop, Deirdre L. Church, Geraldine S. Hall (z-lib.org)	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** **(Refer format of Question paper Below)**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc. (at least 3)	

Course III

Title of the paper : Practicals in Biochemistry

Sr.No.	Heading	Particulars
1	**Description the course : Including but Not limited to:**	The present course provides students practical based skills in the study of enzymes and the biochemical processes of carbohydrate and lipid metabolism. The course is designed to complement theoretical knowledge by offering students the opportunity to perform laboratory experiments that investigate enzyme activity,extraction, detection kinetics, and the regulation of metabolic pathways using techniques like chromatography,colorimeter.
2	**Vertical :**	**Major**
3	**Type :**	**Practicals**
4	**Credits :**	**2 credits**
5	**Hours Allotted :**	**60 Hours**
6	**Marks Allotted:**	**50 Marks**
7	**Course Objectives(CO):** CO 1: To develop proficiency in using laboratory techniques such as chromatography ,colorimetric for enzymology and metabolism studies CO 2: To analyze carbohydrate levels in samples using colorimetric assays CO3:To evaluate the effect of pH,temperature, inhibitors on Enzyme activity and Kinetics.	
8	**Course Outcomes (OC):** Learner will be able to: OC 1: Demonstrate the ability to perform and analyze enzyme-catalyzed reactions, including the determination of enzyme activity OC 2: Interpret enzyme kinetics and determine V max and Km for an enzyme OC 3: Detect and quantitate Biomolecules	

9	Practicals: 1. Estimation of Reducing sugar by DNSA method 2. Extraction of enzyme plant/Animal and detection of its activity (e.g Amylase/ Proteolytic) 3. Study of the effect of pH on **β** amylase activity 4. Study of the effect of Temperature on **β** amylase activity 5. Study of the effect of Inhibitors on **β** amylase activity 6. Study of Effect of Substrate Concentration on enzyme activity and determination of Vmax and Km 7. Isolation of Mitochondria and Demonstration of ETC using a Marker Enzyme. 8. Separation of fatty acids by TLC. 9. Meat tenderization using papain. 10. Study of titration curve of amino acids. 11. Activity of Salivary Amylase on Starch 12. Immobilization of enzymes by entrapment method. 13. Assignment- The application of enzymes in the production of active pharmaceutical ingredients (APIs), drug synthesis, and how they help improve efficiency and sustainability in the pharmaceutical industry. 14. Assignment- Cancer cell metabolism-key altered enzymes.	
10	**Text Books** 1. Biochemical methods, 4th edition, S.Sadasivam and A.Manickam, New Age International Publishers.	
11	**Reference Book:** 1. An Introduction to Practical Biochemistry, 3rd edition, David Plummer, TATA McGrawHill Edition. 2. Experimental Biochemistry: A Student Companion (2005), Beedu Shashidhar Rao and Vijay Deshpande, New Delhi: I.K. International. Introductory Practical Biochemistry, S.K. Sawhney and Randhir Singh, Narosa Publishing House.	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60% (Refer format of Question paper Below)**
13	**Continuous Evaluation through: (Refer format of Question paper Below)**	

Course IV

Title of the paper: Practicals in Medical Biotechnology

Sr.No.	Heading	Particulars
1	**Description the course : Including but Not limited to:**	The course provides practical knowledge of isolation of pathogens from clinical samples and antibacterial susceptibility testing.
2	**Vertical :**	Major
3	**Type :**	Practical
4	**Credits :**	2 credits
5	**Hours Allotted :**	60 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** 1. To understand and detect virulence factors of pathogens. 2. To isolate various pathogens from clinical samples with the help of suitable selective and differential media and biochemicals. 3.	
8	**Course Outcomes (OC):** Learner will be able to 1.Select suitable media and biochemicals for isolation of pathogens from clinical samples. 2. Detection of virulence factors of pathogens. 3. Isolate & identify pathogens.	
	Practicals 1.Study of composition and use of important differential media for identification of bacteria: EMB Agar, McConkey agar, Mannitol salt agar, Deoxycholate citrate agar,,Wilson and Blair's Agar 2.Isolation and Identification of *S.aureus using* selective and differential media S.aureus-Isolation,Biochemicals - Catalase,Coagulase Test 3.Isolation of *E.coli* using selective and differential media and Identification of *E.coli*. E.coli-Isolation, Biochemical test-Sugar Fermentations,IMViC 4.Isolation and identification of *Salmonella using selective* and differential media Salmonella- Isolation, Biochemical test-Sugar Fermentations, TSI Slant. 6.Isolation of *Pseudomonas* and identification of using selective and differential media-Pseudomonas - Isolation, Urease test, Oxidase Test, TSI Slant.	

	7. Isolation of *Proteus* and identification of using selective and differential media-Pseudomonas - Isolation, Urease test, TSI Slant 8. Acid fast staining Mycobacterium Permanent slide. 9. To demonstrate Germ tube (Demonstration) 10. Detection of Virulence factors – (a) Lecithinase(b) Hemolysin (c) Coagulase (d)Streptokinase	
10	**Text Books** 1. Ananthanarayan and Panicker's, Textbook of Microbiology, 9th edition. 2. Koneman's Color Atlas and Textbook of Diagnostic Microbiology by Gary W. Procop, Deirdre L. Church, Geraldine S. Hall (z-lib.org)	
11	**Reference Books- -**	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** **(Refer format of Question paper Below)**
13	**Continuous Evaluation through:** **(Refer format of Question paper below)**	

Sem. - IV

Syllabus
B.Sc. (Second year)
(Sem.- IV)

Title of Paper Microbial growth and Cultivation

Sr. No.	Heading	Particulars
1	**Description of the course :** **Including but Not limited to :**	The Cultivation and Growth of Microorganisms course teaches the principles and techniques for growing microbes in the lab. It covers microbial nutritional needs and the use of various media types for cultivation and inoculation techniques.The course explains microbial growth phases and factors affecting growth, such as temperature, pH, and oxygen. Hands-on training includes measuring growth through turbidity and direct microscopic counts. Emphasis is placed on aseptic techniques and contamination control. Students use selective and differential media to isolate specific microbes. The course connects theory with lab practice for understanding microbial behavior. It builds essential skills for clinical, industrial, and research microbiology. Overall, it lays a strong foundation for advanced microbiological work
2	**Vertical :**	Minor
3	**Type :**	Theory / Practical
4	**Credit**:	2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted**:	50 Marks/100 Marks
7	**Course Objectives**: CO1. To apply the knowledge to cultivate and enumerate microorganisms CO2. To differentiate between various groups of microorganisms based on their nutritional types and characteristics. CO3.To explain the significance of different cultivation methods CO4. To describe the preservation methods of microorganisms. CO5 To gain knowledge about techniques used in the measurement of growth. CO6. To discuss the influence of environmental factors on growth.	

8	**Course Outcomes**: On completion of this course, the learner will be able to: OC1. Enlist the cultivation methods for different microorganisms OC2. Comprehend experiments to study the effect of environmental factors influencing growth. OC3. Discuss the nutritional types of microorganisms OC4. Apply the cultivation methods based on the types of microorganisms OC5. Analyze various methods used in the measurement of growth

Course code	**Minor Course**	**Credits 2 (30 L/hr)**
Module 1	**Cultivation of Microorganisms**	**15 Lectures**
1.1	Nutritional requirements – Carbon, Oxygen, Hydrogen, Nitrogen, Phosphorus, Sulfur and growth factors.	3
1.2	Nutritional types of microorganisms	1
1.3	Types of Culture media 1.3.1 Synthetic and Complex- Allen /Chu/ M9 and Nutrient broth 1.3.2 Differential - MacConkey's agar 1.3.3 Enriched - SIBA 1.3.4 Selective- Salt mannitol agar 1.3.5 Enrichment - Ashby's mannitol broth	7
1.4	Isolation of microorganisms and pure culture Techniques.	2
1.5	Preservation of microorganisms (Periodic transfer, soil stock)	2
Module 2	**Microbial Growth**	**15 Lectures**
2.1	Definition of growth, Phases of growth	3
2.2	Measurement of growth 2.2.1 Direct microscopic count 2.2.2 Viable count 2.2.3 Turbidity measurements	7
2.3	Influence of environmental factors on growth- Temperature, pH, Solute concentration, Oxygen availability.	5
10	**Text Books:** 1. Microbiology TMH 5th Edition by Michael J.Pelczar Jr., E.C.S. Chan ,Noel R. Krieg 2. Prescott ,Harley.Klein-Microbiology, 5th & 6th edition, International edition 2002 & 2006, McGraw Hill.	
11	**Reference Books:** 1. Michael T.Madigan & J.M.Martin,Brock ,Biology of Microorganisms 11th Ed. International edition ,2006, Pearson Prentice Hall.	

12	**Internal Continuous Assessment: 40%**	**External, Semester End Examination 60% Individual Passing in Internal and External Examination**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	As per paper pattern*
14	**Paper Pattern for 30 marks :** **30 Marks per paper Semester End Theory Examination:** **Duration - These examinations shall be of one hour duration**	

Question	Option	Marks	Questions Based on
Q1A	Attempt any two out of four (5 marks each)	10	Based on Module 1
Q1B	Attempt any five out of ten objective (MCQ type only) questions (1 marks each)	5	Based on Module 1
Q2A	Attempt any two out of four (5 marks each)	10	Based on Module 2
Q2B	Attempt any five out of ten objective (MCQ type only) questions (1 marks each)	5	Based on Module 2
	Total	**30**	

Title of Paper :**Basic Techniques in Microbiology**

	Minor Course practicals **Basic Techniques in Microbiology**	**2 Credits** **(60 L/hr)**
1.	Media preparation and sterilization (Nutrient broth and agar, Sabouraud's broth and agar)	**4**
2.	Preparation of butts, slants and plates	**4**
3.	Staining - monochrome, gram staining	**6**
4.	Monitoring of surfaces, swabbing of wall, floor, handles, mobiles, etc.	**4**
5.	Inoculation of media (Isolation,spot, broth, slants and butts)	**8**
6.	Principles and application of types of media i. General purpose media (Nutrient agar- *Escherichia coli* , *Bacillus subtilis* ,one pigment producer) ii. Differential and Selective (MacConkey's agar, Salt mannitol agar)	**8**
7.	Concepts and techniques of Preservation of cultures i. Periodic transfer ii Soil stock	**4**
8.	Total count by Direct microscopic method using Haemocytometer/ Petroff Hausser/ Neubauer chamber	6
9.	Enumeration of bacteria using standard Brown's opacity tubes/Nephelometer tubes	4
10.	Effect of pH on growth	4
11.	Effect of temperature on growth	**4**
12.	Effect of salt concentration on growth	**4**

Internal Continuous Assessment: 40%	**External, Semester End Examination 60% Individual Passing in Internal and External Examination**
Continuous Evaluation through: Minor experiment /Viva/ Assignment/ objective question test (15 Marks), Overall performance (5 Marks) = 20 Marks	As per the pattern given below* 2 hours each day (2 days)
*Pattern of the end-semester practical examination Experiments (15 marks Major + 5 marks Viva/Spots + 5 marks Quiz and 5 Marks for Journal = 30 Marks)	

Sd/-
Sign of BoS Coordinator
Dr. Aparna Dubhashi
BoS in Microbiology

Sd/-
Sign of the Offg. Associate Dean
Dr. Madhav R. Rajwade
Faculty of Science & Technology

Sd/-
Sign of the Offg. Dean
Prof. Shivram S. Garje
Faculty of Science & Technology

Name of the Course: Environmental Management & Sustainable Development -II

Sr. No.	Heading	Particulars
1	Description the course : Including but Not limited to :	This introductory course explores the interconnectedness of our environment and the challenges it faces. Designed for students from all faculties, it equips you with a foundational understanding of: • Ecosystems and biodiversity: Explore the intricate web of life on Earth and the importance of species diversity. • Human impact: Analyse how human activities affect natural resources, climate, and pollution. • Sustainability: Discover principles for living in harmony with the environment and meeting our needs without compromising future generations. Regardless of major, environmental awareness is crucial. This course empowers learner to: • Become an informed citizen: Make responsible choices and advocate for environmental protection. • Understand complex environmental issues: Gain a holistic view of challenges like climate change and pollution. Explore solutions and career paths: Discover potential careers in environmental management, conservation, or sustainable development.
2	Vertical :	**Open Elective**
3	Type :	Theory / ~~Practical~~
4	Credit:	2 credits / (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	Hours Allotted :	30 Hours
6	Marks Allotted:	50 Marks
7	**Course Objectives:** 1. To create and disseminate knowledge to the students about environmental problems at local, regional and global scale. 2. To introduce about ecosystems, biodiversity and to make aware for the need of	

	conservation. 3. To sensitize students towards environmental concerns, issues, and impacts of human population. 4. To prepare students for successful career in environmental departments, research institutes, industries, consultancy, and NGOs, etc.
8	**Course Outcomes:** 1. Use principles of Environmental Science for explaining sustainable development and its related ethical concerns 2. Display scientific perspective for issues confronting our present day environment. 3. Analyze the national and global environmental issues relating air, water, soil, and land use, biodiversity, and pollution. 4. Explain the Role of an individual in relation to human population and environmental pollution. 5. Recognize the importance of collective efforts for environmental sustainability as reflected in various treaties, conventions and laws
9	**Modules:-**
	Unit I: Environmental Pollution and Health (8 lectures)
	Understanding pollution: Production processes and generation of wastes; Assimilative capacity of the environment; Definition of pollution; Point sources and non-point sources of pollution. Air pollution: Sources of air pollution; Primary and secondary pollutants; Criteria pollutants- carbon monoxide, lead, nitrogen oxides, ground-level ozone, particulate matter and Sulphur dioxide; Other important air pollutants- Volatile Organic compounds (VOCs), Peroxyacetyl Nitrate (PAN), Polycyclic aromatic hydrocarbons (PAHs) and Persistent organic pollutants (POPs); Indoor air pollution; Adverse health impacts of air pollutants; National Ambient Air Quality Standards. Water pollution: Sources of water pollution; River, lake and marine pollution, groundwater pollution; water quality parameters and standards; adverse health impacts of water pollution on human and aquatic life. Soil pollution and solid waste: Soil pollutants and their sources; Solid and hazardous waste; Impact on human health. Noise pollution: Definition of noise; Unit of measurement of noise pollution; Sources of noise pollution; Noise standards; adverse impacts of noise on human health. Thermal and Radioactive pollution: Sources and impact on human health and ecosystems.
	Unit II: Environmental Management (7 lectures)
	Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g) and other derived environmental rights; Introduction to environmental legislations on the forest, wildlife and pollution control. Environmental management system: ISO 14001 Life cycle analysis; Cost-benefit analysis Pollution control and management; Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Ecomark scheme. Introduction to Millennium Development Goals, Sustainable Development Goals, & Mission Life.

	Unit III: **Environmental Treaties and Conventions (8 lectures)**
	1) Major International Environmental Agreements: Stockholm Conference on Human Environment,1972, Ramsar Convention on Wetlands, 1971, Montreal Protocol, 1987, Basel Convention (1989), Earth Summit at Rio de Janeiro,1992, Kyoto Protocol, 1997, Earth Summit at Johannesburg, 2002. 2) Major Indian Environmental Legislations: The Wild Life (Protection) Act, 1972; The Water (Prevention and Control of Pollution) Act, 1974; The Forest (Conservation) Act, 1980; The Air (Prevention and Control of Pollution) Act, 1981; The Environment (Protection) Act, 1986; The Biological Diversity Act, 2002
	Unit IV: **Case Studies and Field Survey (7 lectures)**
	The students are expected to be engaged in some of the following or similar identified activities: • Discussion on one national and one international case study related to the environment and sustainable development. • Field visits to identify local/regional environmental issues, make observations including data collection and prepare a brief report. • One student one tree initiative. • Documentation of campus biodiversity. • Campus environmental management activities such as solid waste disposal, water management, and sewage treatment.
10	**Text Books** 1. Ahluwalia, V. K. (2015). Environmental Pollution, and Health. The Energy and Resources Institute (TERI). 2. Central Pollution Control Board Web page for various pollution standards. https://cpcb.nic.in/standards/ 3. Masters, G. M., & Ela, W. P. (2008). Introduction to environmental engineering and science (No. 60457). Englewood Cliffs, NJ: Prentice Hall. 4. Jørgensen, Sven Marques, Erik João Carlos and Nielsen, Søren Nors (2016) Integrated Environmental Management, A transdisciplinary Approach. CRC Press. 5. Barrow, C. J. (1999). Environmental management: Principles and practice. Routledge. 6. Theodore, M. K. and Theodore, Louis (2021) Introduction to Environmental Management, 2nd Edition. CRC Press. 7. Richard A. Marcantonio, Marc Lame (2022). Environmental Management: Concepts and Practical Skills. Cambridge University Press. 8. UNEP (2007) Multilateral Environmental Agreement Negotiator's Handbook, University of Joensuu, ISBN 978-952-458-992-5 9. Ministry of Environment, Forest and Climate Change (2019) A Handbook on International Environment Conventions & Programmes. https://moef.gov.in/wp-content/uploads/2020/02/convention-V-16-CURVE-web.pdf 10. Ministry of Environment, Forest and Climate Change (2019) A Handbook on International Environment Conventions & Programmes. https://moef.gov.in/wp-content/uploads/2020/02/convention-V-16-CURVE-web.pdf 11. India Code – Digital repository of all Central and State Acts: https://www.indiacode.nic.in/ 12. University Grants Commission, D.O.No.F. 14-5/2015(CPP-II) dated 2nd August1 2019.

12	**Internal Continuous Assessment: 40%**	**Semester End Examination : 60%**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, Field Visits, Case Studies, assignments, One Student one tree initiative etc. (at least 4)	
14	**Format of Question Paper:** for the final examination For OE: External - 30 Marks (2 Credits) Internal - 20 Marks Question Paper Format for 30 Marks Format of Question Paper: 30 Marks per paper Semester End Theory Examination: 1. Duration - These examinations shall be of one hour and 30 minutes duration. 2. Theory question paper pattern: There shall be 04 questions each of 10 marks out of which students will attempt ANY THREE	

Signature:
Prof. Kavita Laghate
Chairman of Board of Studies in Value Education

SEC

Title of the paper: Microbial Laboratory Techniques

Sr.No.	Heading	Particulars
1	**Description the course: Including but Not limited to:**	This course emphasizes microbial techniques to be performed under aseptic conditions. The students will learn to culture and handle bacteria, yeast and fungi.; to preserve cultures for further use; to extract enzymes from bacteria; to identify mutants; to extract important cell components; to make observations and interpret the results. These techniques will help the students to hone their skills in the field and enhance their job/ research opportunities.
2	**Vertical :**	SEC
3	**Type :**	Practical
4	**Credits :**	2 credits
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** CO1:Students get exposure to various microbiological techniques which are a prerequisite in various fields and in demand in industry. CO 2: Develop an understanding how microbiology is relevant to technological developments for industries related to food and fermentations. CO3: The students will acquire the necessary skills in Microbial Laboratory Techniques which will help them to get good placement in industry, research institutes or teaching.	
8	**Course Outcomes (OC): Major learning outcome of this course is that students study and identify microorganisms and develop a very good understanding of several microbiological techniques which are among the basic skills expected from a practicing microbiologist.** OC1: Learner will be able to learn various microbiological techniques and to maintain aseptic conditions and proper handling of glasswares, media, chemicals, etc. OC2: Learner will be able to acquire the necessary skills to enable suitable employment.	
9	**Modules:-** 1. Isolation of fungi from different sources. 2. Preservation of microbial cultures by various techniques. 3. Microbial examination of sterile and non sterile products.	

	4. Replica plate technique to isolate drug resistant mutants. 5. Gradient plate technique to isolate drug/dye resistant mutants.. 6. MPN estimation - [Presumptive, Confirmed and Completed] of bacteria in liquid culture/water. 7. Slide culture of Streptomyces. 8. Microbial methods of determination of Penicillin/ Streptomycin. 9. Enrichment and isolation of Rhizobium species on Yeast mannitol agar (YMA) 10. Single cell protein Biomass production at flask level (Yeast/ Spirulina) 11. Estimation of invertase enzyme activity by immobilization of yeast. 12. Pigment production from any one fungus 13. Workshop/ seminar with industrial collaboration on interactions with Entrepreneurs in Microbial Biotechnology and startups.	
10	**Text Books** 1. Alexopoulus, C.J., Mims,C.W. and Blackwell, M, Introductory Mycology. John Wiley, New York. 2. Microbiology - A Laboratory Manual - James Cappuccino and Natalie Sherman. 3. A Textbook of Pharmaceutical Microbiology Paperback (2018) by Pulak Mujumder, Sameer Rajan Sahoo Everest Publishing 4. Practical Microbiology by R C Dubey and D K Maheshwari.2002. Chand Publications. 5. BlackJ.G.Microbiology-Principles Explorations.JohnWiley&SonsInc NewYork,(2002). 6. Tom Besty,D.C Jim Koegh.Microbiology Demystified McGRAW-HILL. 7. Madigan,Martinko, Bender,Buckley,Stahl.Brock Biology of Microorganisms. Pearson. 8. H.D. Kumar and H.N. Singh.A Textbook on Algae (Macmillan international college edition)	
11	**Reference Books** 1. Mehrotra, R.S. and K.R.Aneja An Introduction to Mycology. New Age International A. V. S. S. .Sambamurty. A Textbook of Algae. I.K. International Publishing House Pvt. Limited, 2010. 2. Richard H. Baltz. Julian E Davies and Arnold L.Demain Manual of Industrial Microbiology and Biotechnology. 3rd edition, ASM Press (2010).	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60% (Refer format of Question paper Below)**
13	**Continuous Evaluation through: (Refer format of Question paper Below)**	

AC–20/05/2025

Item No.– 5.45 (N)

Sem-IV 5(a)

As Per NEP 2020

University of Mumbai

Syllabus for Basket of AEC	
Board of Studies in English	
UG First YearB.sc Programme	
Semester	**IV**
Title of Paper	**Credits**
Introduction to Communication **Skills in English II**	**2**
From the Academic Year	**2025-2026**

Sr. No.	Heading	Particulars
1	**Description of the course: Including but Not limited to:**	**Introduction to Communication Skills in English II** Effective academic communication skills are essential for success in scholarly pursuits. In the academic realm, proficiency extends beyond verbal articulation to encompass precise and coherent written expression. Students are not only required to engage in thoughtful discussions and articulate complex ideas verbally but must also demonstrate their understanding through well-crafted written assignments, and presentations. Academic communication involves the mastery of scholarly conventions, such as adherence to academic writing styles, and the ability to engage in dialogue with peers and scholars. It encompasses the skillful navigation of academic discourse, fostering an environment where ideas are shared, challenged, and refined. Developing strong academic communication skills empower individuals to contribute meaningfully to intellectual conversations, enriching both their academic journey and the broader scholarly community. This course with its 30:20 pattern will also help in accomplishing this goal. The course is aimed at honing their cognitive, analytical, linguistic and creative skills. It is hoped that by the end of the academic year, the learners will have developed confidence in using the English language both for oral and written communication as well as develop interest in enhancing these skills later on.
2	**Vertical:**	AEC (Ability Enhancement Course)
3	**Type:**	Theory
4	**Credit**:	2 credits (1credit=15Hours for Theory in a semester)
5	**Hours Allotted:**	30 Hours
6	**Marks Allotted**:	50 Marks
7	**Course Objectives:** 1. To cultivate a comprehensive understanding of English Usage in Communication 2. To enhance reading proficiency with a diverse range of written texts with different genres and styles of written communication. 3. To help learners with better comprehension of a variety of oral texts by inculcating listening skills through practical exercises. 4. To train learners in group discussion and interview skills 5. To provide practical experience in formal and creative writing.	

8	**Course Outcomes**: At the end of the course the learner is able to: • Demonstrate an understanding of English Usage in Communication • Exhibit the ability to Read a variety of written text using subskills such as analyzing and interpreting text. • Show competence in comprehending a variety of oral texts. • Actively participate in group discussion, and research and prepare for the interview effectively • Display advanced formal (email writing, report writing) and creative writing skills.
9	**Modules**: -
	Module1:(15 Lectures)
	A) English Usage in Communication • Appropriacy in the Use of English • Distinction between American English and British English • Indianism and Indian English • Elevator Pitch • Modes and Types of Interview **B) Enhancing Reading Competencies:** • Augmenting active vocabulary • Understanding relations between parts of a text • Understanding concepts and arguments, • Developing skills in analysis and interpretation • Rewriting a passage from a defined perspective • Reading critically (presenting a reasoned argument that evaluates and analyses what you have read) A variety of passages of 200-250 words may be taken such as extracts from academic texts literary texts, magazines, newspapers, reports, documents. The passages should have complex text type, function and lexis. The learners may be encouraged to gather meaning contextually or by referring to offline and online sources such as dictionary, thesaurus, and encyclopedia. **C) Listening Skills** • Predicting content and guessing meaning • Making inferences from the audio-visual text • Listening for opinion/argument/counter-arguments etc.

	• Taking notes A variety of relevant audio/visual texts as samples may be drawn from various sources. Listening skills in English should be developed through various activities along with the practice done while teaching in the class.
	Module2: (15 Lectures)
	A. Group Discussion • Formal and informal discussion • Elements of group discussion • Using appropriate language: Initiating, seeking and giving opinions, suggesting, responding to a suggestion, agreeing, disagreeing, interrupting, requesting, clarifying, summing up • Types of discussion: Giving and sharing opinions of a given topic, making decisions, problem solving (case study) **B. Interview Skills** • Attending an Interview (Job/Entrance): Researching the organization, reviewing career-profile and your bio-data, preparing for standard questions, Responding to questions • Analyzing Interviews Students can be tested on forming actual interview frameworks including questions. Teachers must form the groups and conduct actual interviews involving full strength of students. **C. Writing Skills:** • Emails: applying for admission, accepting and joining (academic institution), Cancelling admission, registering a complaint • Report Writing: Activity/Event report, Academic Report • Creative Writing: Personal Essay, Memoir, Short Speech on the given occasion/ event, Story writing
10	**Text Books: N.A.**
11	**References:** • Bellare, Nirmala. *Reading & Study Strategies*. Books. 1 and 2. Oxford University Press, 1997, 1998 • Bellare, Nirmala. *Easy Steps to Summary Writing and Note-Making.* Amazon Kindle Edition, 2020 • Comfort, Jeremy, et al. *Speaking Effectively: Developing Speaking Skills for Business English*. Cambridge University Press, 1994.

- Das, Bikram K., et. al. *An Introduction to Professional English and Soft Skills.* Cambridge University Press India Pvt. Ltd., 2010
- Das, Yadjnaseni & R. Saha (eds.) *English for Careers*. Pearson Education India, 2012.
- Dimond-Bayir, Stephanie. *Unlock Level 2 Listening and Speaking Skills* Student's Book and Online Workbook: Listening and Speaking Skills Student's Book+ Online Workbook. Cambridge University Press, 2014.
- Doff, Adrian and Christopher Jones. *Language in Use* (Intermediate and Upper Intermediate). CUP, 2004.
- Glendinning, Eric H. and Beverley Holmstrom. Second edition. *Study Reading: A Course in Reading Skills for Academic Purposes*. CUP, 2004
- Goodale, Malcolm. P*rofessional Presentations Video Pack: A Video Based Course*. Cambridge University Press, 1998.
- Grellet, F. *Developing Reading Skills.* Cambridge: Cambridge University Press, 1981
- Grussendorf, Marion. *English for Presentations.* Oxford University Press, 2007.
- Hamp- Lyons, Liz and Ben Heasiey. Second edition. *Study Writing: A Course in Writing Skills for Academic Purposes*. CUP, 2006
- Labade, Sachin, Katre Deepa et al. *Communication Skills in English*. Orient Blackswan, Pvt Ltd, 2021.
- Lewis, N. *How to Read Better & Faster*. New Delhi, Goyal Publishers & Distributors Pvt. Ltd, 2006.
- McCarthy, Michael and Felicity O'Dell. English *Vocabulary in Use*. Cambridge: Cambridge University Press, 2001.
- Mohan, RC Sharma Krishna. *Business Correspondence and Report Writing*. Third edition. Tata McGraw-Hill Education, 2002.
- Murphy, Raymond, et al. *Grammar in use: Intermediate*. Cambridge University Press, 2000
- Raman, Meenakshi, and Singh, Prakash. *Business Communication*. India, Oxford University Press, 2006.
- Richards, Jack C., and Chuck Sandy. *Passages* Level 2 Student's Book. Cambridge University Press, 2014.
- Sadanand, Kamlesh & S. Punitha. *Spoken English: A Foundation Course*. (Part 1 & 2). Orient Blackswan. 2009.
- Sasikumar, V., et al. *A Course in Listening & Speaking I*. 2005. Cambridge University Press India Pvt. Ltd. (under the Foundation Books Imprint), 2010
- Savage, Alice, et al *Effective Academic Writing*. Oxford: OUP, 2005
- Sethi, J. *Standard English and Indian usage: Vocabulary and grammar*. PHI Learning Pvt. Ltd., 2011.
- Taylor, Grant. *English Conversation Practice*. 1967. Tata McGraw-Hill, 2013
- Turton, Nigel D. *A B C of Common Grammatical Errors*. 1995. Macmillan India Ltd., 1996
- Vas, Gratian. *English Grammar for Everyone*. Mumbai, Shree Book Centre, 2015
- Watson, T. *Reading Comprehension Skills and Strategies*: Level 6. Saddleback Educational Publishing, 2002

Web link Resources:

1. A rendezvous with Simi Garewal: Ratan Tata: https://www.youtube.com/watch?v=ozetTgOHu78&t=510sHere Ratan Tata discusses his personal life, his expectations, his experience as a CEO of Tata and sons.

2. A rendezvous with Simi Garewal: Kiran Bedi: https://youtu.be/vX2NyKvEAXQ In this video, Kiran Bedi shares her daring adventures, her field, her passion for career with Simi Garewal.

3. In Conversation: Rajiv Mehrotra with J.R.D.Tata: https://youtu.be/68otfg601HI J. R. D. Tata discloses his dream of India, his experiences with Pandit Nehru, Mahatma Gandhi, Sardar Patel and his contribution to modern India.

4. The Tharoor Guide To Indian English: https://youtu.be/NsyI9LIXbFM Shashi Tharoor talks of new words like “defenstrate”, “brinjol”; talks about Indian English, ethnicity and so on.

5. Dr. A.P.J Abdul Kalam on Discovery, invention and innovation:https://youtu.be/9CKCfiX3uO0 Dr. Kalam addresses IIT Delhi students.

6. Malala Yousafzai’s speech on the occasion of her Nobel Peace Prize (2014) on education:https://youtu.be/c2DHzlkUI6s

7. Kailash Satyarthi’s speech on the occasion of Nobel Peace Prize(2014) on the innocence of children; he gives voice to voiceless in his speech:https://youtu.be/wt0LSCEuc_M

8. Speech by Mr. Ratan Tata: https://youtu.be/m7-tKX7aZXM

9. “I Have a Dream” speech by Martin Luther King Jr. HD (subtitled) https://www.youtube.com/watch?v=vP4iY1TtS3s “I Have a Dream" is a public speech that was delivered by American civil rights activist Martin Luther King Jr. during the March on Washington for Jobs and Freedom on August 28, 1963, in which he called for civil and economic rights and an end to racism in the United States.

10. Speech by Emma Watson on Gender Equality :https://youtu.be/nIwU-9ZTTJc 11. Imaginative science video: Could humans live in underwater cities? https://youtu.be/GUGtU7Ii1yk

12. A conversation about household appliances: https://youtu.be/rAPl0fSborU 13. Video on psychology: Why do we dream? https://youtu.be/2W85Dwxx218

14. Video on space: Solar system 101: https://youtu.be/libKVRa01L8

15. Video on evolution: How Apocalypses paved the way for Humans https://youtu.be/libKVRa01L8 16. Video on biology: Why Bats Aren't as Scary as You Think https://youtu.be/D6e_qh3YRPs

17. Video on social media: What is a social media influencer? https://youtu.be/39A3og7enz8

18. Tips on communication (TED Talk): The Secrets of Learning a New Languagehttps://youtu.be/o_XVt5rdpFY

	19. Expressing opinions: If Cinderella Were a Guy:https://youtu.be/p4OyCNctKXg 20. Telling stories without words: Partly Cloudy https://youtu.be/ix13P9NqBjo 21. Telling stories without words: Tree of Unity https://youtu.be/sAo41Gyl6hY 17 22. Bonding over the Radio: A special storytelling series by the much loved author Ruskin Bond: akashvaniair https://youtu.be/oxf60BlR2Q4 https://youtu.be/ISX7rUOJOms https://youtu.be/rrC_s0XPXKI https://youtu.be/FUML3q1ncF0 https://youtu.be/3by_ninqRzg 23. Video on the English language: Where did English come from? https://youtu.be/YEaSxhcns7Y 24. Video on biology: The science of skin colour: https://youtu.be/_r4c2NT4naQ 25. Video on advertising: The Science of Persuasion https://youtu.be/cFdCzN7RYbw 26. "The Happy Prince" Oscar Wilde Michael Mills Classic Animated Short 1974 https://www.youtube.com/watch?v=q3RZh1yaqxM Learners may be encouraged to watch animated stories such as this one and questions asked later on.	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%**
13	**Continuous Evaluation through:** • Performance in activities on Module 2 A & B during lectures: (10 marks) The class may be divided into batches to participate in Group Discussion and mock interview by creating formal schedule for the same before the semester End Examination. • Participation in classes during lectures: (05 marks) (Learners' response during the teaching and the tasks involving Listening skills (Module 1 C) will be assessed) • Overall attendance in lectures (05 marks) (Percentage of learners' attendance in class to be considered)	
14	**Format of Question Paper:** for the final examination Q.1. Short Notes on Module 1 A (2 out of 4) 10 Marks Q.2. Unseen Passage (200-250 words) (Module 1 B) 10 Marks Q. 3 Writing Skills on Module 2 C – Writing an email or a Report or Creative Writing 10 Marks	

Sd/- **Sign of BOS Chairman** **Dr. Sachin Labade** **Board of Studies in English**	**Sd/-** **Sign of the Offg. Associate Dean** **Dr. Suchitra Naik** **Faculty of Humanities**	**Sd/-** **Sign of the Offg. Associate Dean** **Dr. Manisha Karne** **Faculty of Humanities**	**Sd/-** **Sign of the Dean** **Prof. Dr. Anil Singh** **Faculty of Humanities**

9.1

University of Mumbai

Guidelines for Community Engagement Projects (CEP)
for Undergraduate Students As per NEP 2020

With effect from Academic Year 2025-2026

Index

1. Introduction:

The curriculum component of ‘community engagement projects’’ is specifically incorporated as an integral part of NEP 2020 curriculum to acquaint the students about the socio-economic issues and challenges of the local and extended community so that the theoretical learnings can be supported by actual life experiences. India is a diverse country with heterogeneous communities and in this context the objective of the course is to encourage students to create and implement solutions to the real-life community level issues.

This course intends to assist the students to connect and interact with heterogeneous communities for identifying issues they face and try to provide probable solutions to community level problems. This approach is important in order to broaden opportunities of social responsibility, environmental sustainability, nation building and peace.

Community Engagement Projects work will provide students an opportunity to visit and observe situations in rural and urban contexts. The students are expected to observe and study actual field situations in socio economic contexts while doing their community engagement project. The course will create opportunities for students to understand the interconnection between theoretical knowledge and practical applications. Community Engagement Projects is expected to enhance their sensitivity to socio economic issues and improve their ability of problem solving as well as designing innovative solutions to the existing and emerging problems. Community Engagement Projects’ component will also broaden the possibilities of deeper learning and enhancing research acumen of students. Community Engagement projects will not only make students aware about various societal issues but will also sensitize them towards various problems and challenges in the society and how these can be dealt with.

2. Objectives

Community Engagement projects in general sets out to achieve objectives such as:

1. Align classroom learnings with awareness about societal issues.
2. Provide students an exposure to societal issues and align their experiences with contemporary problems/ concerns
3. Integrating theoretical and practical aspects to create blended learning experience under the guidance of their faculty.
4. Enhance research skills including knowledge discovery, analytical tools, methodologies,

and ethical conduct.

5. Facilitate problem-solving, decision-making, teamwork, and collaboration.
6. Foster ability to work in teams, develop social awareness and nurturing of human values in students.
7. Create collaboration between Higher Education Institutes (HEIs), social organization, Government and non-government institutes for impactful Community Engagement Projects.

3. Outcomes:

After the completion of the CEP course, the student will be able to:

1. Tackle/ Understand the societal issues more efficiently and effectively.
2. Apply concepts learned in classrooms to real-world socio-economic conditions enhancing their understanding and skills.
3. Show insights into the challenges, opportunities and culture of socioeconomic diversity, preparing them for future roles as responsible citizens.
4. Demonstrate evidence of research aptitude and skills of critical thinking, analytical skills, and ethical research conduct in field work.
5. Display problem-solving abilities in making informed decisions in complex scenarios through practical situations.
6. Work in teams and collaborate to achieve common goals in the work field environments through collaborative efforts.
7. Show integrity in their dealings with their work and the people that they interact with by upholding professional; principles and ethical standards.

4. Indicative list of areas for CEP:

The areas of field work can be decided by the head of the institution in consultation with CEP committee, CEP Coordinators and the faculty in respective subjects.

Indicative (yet non-restrictive) areas for engagement can be:

1. Community projects on Mangrove conservation, tree plantation, and eco-awareness campaigns.
2. Engagement in guided biodiversity trails and sustainability education campaigns.
3. Assistance in slum-based education and nutrition programs for children.
4. Improve public spaces and civic hygiene through youth-led volunteering
5. Use digital skills to implement socially impactful tech projects

5. Role and responsibilities

Head of the Department/Director/Principal:

1. Allotment of guides for the students for Community Engagement Projects should be done by Head of the Department/Director/Principal of the institute/college, as the case may apply.
2. While allocating the students under more than one guide- the principle of fairness in distribution should be followed.
3. In case, the number of in- house guides are not adequate then students can be allotted to competent external experts.
4. To provide resources and assistance to ensure effective carrying out of CEP.

CEP Committee:

1. To oversee the quality and effectiveness of the implementation of the CEP course.
2. To ensure that the CEP course program aligns with departmental and program academic objectives.
3. To establish continuous evaluation mechanisms for evaluating the course and to make required process improvements from time to time.

CEP Coordinator:

1. To play crucial role in coordinating and implementing the CEP course within college/ department / institute.
2. To act as a liaison entity between the department, students, faculty mentors and CEP supervisors (Host institute/ organization)

Student Coordinators:

To help the CEP coordinators/ Faculty Mentors in pre-, during and post-CEP activities.

Faculty Mentor:

1. To assist in identifying CEP opportunities and approve CEP plans.
2. To continuously monitor student progress and extend guidance.
3. To receive and provide regular feedback on student's progress in CEP
4. To evaluate CEP documents including CEP reports, presentations, or other expected academic deliverables.

6. Process of CEP implementation:

Flow chart

1. Formation of CEP Committee
2. Appointment of CEP Coordinators and Faculty Mentor
3. Community Engagement Projects orientation by the CEP committee and CEP Coordinator/s
4. Allotment of students under Faculty mentors.
5. Execution of CEP
6. Evaluation
7. Feedback

Mechanism for the implementation of CEP:

1. To facilitate effective implementation of the CEP program, Colleges/Departments/Institutes are encouraged to establish a CEP committee responsible for overseeing its smooth functioning. It will consist of the following: Head of the department, CEP Coordinator, Faculty Mentors and one/two student coordinators.
2. One teaching faculty member and one/two students from each undergraduate department will be nominated to serve as coordinators for the CEP program. These coordinators will play a crucial role in coordinating and implementing the program within their respective departments.
3. The CEP Committee and CEP coordinator will take the lead in preparing an action plan for the implementation of the CEP program.
4. To streamline the administrative process, the CEP Committee / CEP Coordinator will provide necessary formats to students for documentation related to the program.
5. Each Department/Centre should establish collaborations with relevant NGOs, community organizations, research institutes, etc., for CEP. These collaborations will serve as crucial avenues for facilitating CEP opportunities for students.
6. Effective communication is key to the success of the CEP program. Regular communication with heads and coordinators of the department/centre/Institute and maintaining proper records is essential. The faculty mentor and individual student will be responsible for maintaining relevant documents related to the program.
7. Before the commencement of the CEP program, an orientation session will be conducted by

the members of CEP committee / CEP coordinator/s. This session will serve to familiarize students with the purpose, process, and code of conduct associated with the program.

8. To ensure effective mentoring and support, an equal number of students will be allocated to each faculty member of the department. These faculty members will act as CEP mentors and will be responsible for monitoring and evaluating the progress of the allotted students.
9. Throughout the CEP period, students will maintain activity reports as per the provided format and get it validated by the supervisor.
10. Upon completion of the CEP program, students must submit a completion certificate duly signed by the faculty supervisor.

7.Credits and duration:

1. CEP will carry weightage of two credits.
2. Each student will be expected to carry out a minimum of 2-3 extensive community interactions.
3. The CEP program should be completed in appropriate Semester as per the program structure. If required CEP can also be carried out during the semester break.

8.Community Engagement Project Report:

The students are required to submit a report of the Community Engagement Projects at the end of the semester in the following suggested format.

All projects should be typed on ***A4 sheets, Font Size 12, Times New Roman, one and a half spacing on executive bond paper.*** The project report shall have appropriate chapter scheme and be presented in a minimum of 20 pages (Approximately minimum of 4000 to 5000 words).

Report should be arranged in the following order

Title Page

- Title of the Report (Font size 14)
- Name of the Student
- Roll number/Seat number
- Program Title
- Name of the Mentor
- Month of Submission

Certificate by the Institute

Certificate by Mentor

Student's Declaration

Acknowledgement

Abstract

A brief summary of the community interactions, key observations, and main conclusions (200-300 words)

Table of contents

- Include headings and subheadings with page numbers.

List of Figures and Tables

- List all figures and tables included in the report with corresponding page numbers.

Chapter 1: Introduction

- Purpose of the visit: Outline the objectives and expected outcome of the community interactions.
- Background Information: Provide context about the community interactions and its significance.
- Scope of the Report: Define the boundaries of what the report will cover.

Chapter 2: Literature Review

- Review relevant literature on the site(s) visited, focusing on previous studies, historical accounts, and critical analyses of the literary significance.

Chapter 3: Methodology

- Describe the approach and tools used for data collection during the visit (e.g., observational methods, interviews, archival research).
- Discuss the rationale behind the chosen methods.

Chapter 4: Description of the community interactions, Observations and Analysis

- Provide detailed descriptions of community interactions and engagements carried out.
- Include observations related to fieldwork: work's-relevance to topic selected.

- Use photographs, diagrams, and sketches, etc. to support the descriptions.
- Analyze the data collected in relation to the study objectives.

Chapter 5: Conclusion and Recommendations

- Discuss how the findings from the visits contribute to the understanding of subject area.
- Summarize the key findings and their significance.
- Offer recommendations based on the research findings for further study or preservation efforts.

References

- List all sources cited in the report in a consistent format.

Appendices

- Include additional data, interview transcripts, notes, or documents that are relevant to the report but not integral to its main text.

9. Evaluation Pattern

Evaluation during the CEP program involves two key components: External Evaluation (40%) and Internal Evaluation (60%).

(i) Internal Evaluation by Guide (Marks 20)

Criteria	Marks
Attendance, Community interactions completion and interaction with supervisor	10
Overall Report quality	10
Total	**20**

(ii) External Evaluation (Marks 30)

Criteria	Marks
Objectives, Literature Review, Methodology, Data Analysis, Conclusion and Recommendations	15
Overall Project Report Structure and Style	5
Presentation Skills & Communication	10
Total	**30**

Appendix I

GUIDE INTERACTION DIARY FORM

I, the undersigned Ms. /Mr._____Roll No. _____, currently enrolled in the _____ Year of _____Full-time Program _____ at _____ institute/ college, am undertaking my Community Engagement Project work under the guidance of Dr./Ms./Mr. _____, and I hereby confirm that I have met my Internal guide on the following dates mentioned below for Project Guidance:-

Sr. No.	Date	Signature of the Internal Guide

_____ _____

Signature of the Candidate Signature of Internal Guide

IMPORTANT: It is expected that students will be meeting their guide at least five times for the CEP work interaction. The candidate should retain the above stated 'Project Guide Interaction Certificate Form' and submit the same with required signatures of the guide while submitting the Project to the Institute.

THE PROJECT REPORT WILL NOT BE ACCEPTED WITHOUT THE DULY FILLED PROJECT GUIDE INTERACTION CERTIFICATE.

Appendix II

Main Page Format of Project Report

Title of the Project

Name of the Student

(Name of Academic Course and Academic Year Details)

Example: Masters in Management Studies

Under the Guidance of

Name of Guide

Name of the Department/College/Institute

Academic Year – 2025-26

Appendix III

Name of the Department/College/Institute

Certificate

I hereby certify that Mr./Ms. _____, Student of _____Institute/college studying in _____ program has completed a C. E. project titled _____ in the area of _____specialization for the academic year 2025-2026. To the best of my knowledge the work of the student is original and the information included in the project is correct.

Internal Guide Head of the Department Principal

Annexure IV

Declaration

I, Mr./Ms. _____ Student of _____Institute/college studying in _____program, hereby declare that I have completed the Community Engagement Project titled _____ during the academic year 2025-2026.

The report is original and the information/data included in the report is true emerging from the primary and/ secondary data gathered and analyzed as part of this Community Engagement project.

Due credit is extended on the work of Literature/Secondary Survey by endorsing it in the Bibliography as per prescribed format.

Signature of the Student with date

Name of Student

Annexure V

Student Feedback on CEP

(To be filled by Students after CEP completion)

Student Name:

Seat No. /Roll No.:

Email:

Department:

Name of the Mentor:

Title/Heading of Community Engagement Projects:

Brief description of CEP carried out:

Dates of CEP:

My internship experience was related to my major area of study/ academic program

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree

Indicate the degree to which you agree or disagree with the following statements.

This experience has:	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Has increased my sensitivity towards societal problems					
Given me the opportunity to explore a career field delete					
Allowed me to apply classroom theory to practice					
Helped me develop my decision-making and problem-solving skills					
Expanded my knowledge about the work world before permanent employment delete					
Helped me develop my written and oral					

communication skills					
Provided a chance to use leadership skills (influence others, develop ideas with others, stimulate decision-making and action)					
Expanded my sensitivity to the ethical implications of the work involved					
Made it possible for me to be more confident in new situations					
Given me a chance to improve my interpersonal skills					
Helped me learn to handle responsibility and use my time wisely					
Helped me discover new aspects of myself that I didn't know existed before					
Helped me develop new interests and abilities					
Helped me clarify my career goals					
Allowed me to acquire information and/ or use equipment not available at my Institute					
Allowed me to realize socio-economic issues in the society repeated					

●. The faculty mentor extended guidance and mentoring through-out the CEP process:

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree

● Were you able to accomplish the initial goals, tasks and new skills that were set down in CEP plan?

1. Strongly Agree
2. Agree
3. Disagree
4. Strongly Disagree

● Considering your overall experience, how would you rate this CEP? (Circle one):

Poor/ Satisfactory/ Good/ Excellent

● **Give suggestions as to how your CEP experience could have been improved."**

(Please mark ✓ for areas that were satisfactory and ✗ for areas that need improvement)

Aspect of CEP Experience

- Clear orientation and briefing at the start
- Relevance of project to academic learning
- Availability and support from internal guide
- Adequate field exposure and hands-on engagement
- Clarity in roles and responsibilities
- Time provided for the completion of project

Signature of Student

Name

Date:

Under the Guidance of

Hon'ble Vice Chancellor	Hon'ble Pro-Vice Chancellor
Prof. Dr. Ravindra Kulkarni	**(Prin.) Dr. Ajay Bhamare**

CEP Guidelines Draft Committee

Prof. Shivram S. Garje — Convener
Off. Dean (Science and Technology)

Prof. Smita Shukla — Member
Director, Alkesh Dinesh Mody Institute of Finance and Management Studies

Prof. Manisha A. Karne — Member
Off. Associate Dean (Humanities) and
Director, Mumbai School of Economics and Public Policy

Prof. Priya Vaidya — Member
Head, Department of Philosophy

Dr. Suchitra Naik — Member
Off. Associate Dean (Humanities) and
Principal, K.G. Joshi College of Arts & N.G. Bedekar College of Commerce

Prof. Vishwanath Patil — Member
I/c Director, National Centre for Nanoscience and Nanotechnology

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AC – 15/07/2025

Item No. – 5.3

As Per NEP 2020

University of Mumbai

Syllabus for Co- Curricular (CC)

Vertical - 6

Board of Studies in Extension Work	
UG Second Year Program – Co- Curricular Course	
Semester	**III**
Title of Paper	**Extension Work**
Credits	**2**
From the Academic Year	**2025-26**

Introduction

The National Education Policy (NEP) 2020 is a comprehensive framework introduced by the Government of India to revamp the country's education system. It has replaced the previous National Policy on Education, which has aim to ensure universal access to quality education from preschool to higher education, including vocational education. NEP 2020 emphasizes a more holistic, multidisciplinary, and flexible curriculum which lay emphasis on conceptual understanding rather than rote learning allowing students to choose subjects across disciplines without strict boundaries.

The National Education Policy (NEP) 2020 of India addresses the role of higher education institutions in fostering community engagement and extension work. It highlights the social responsibility of higher education institutions towards their communities. It encourages institutions to engage with local communities, address societal challenges, and contribute to sustainable development. The policy promotes the implementation of outreach programs by higher education institutions to disseminate knowledge, provide services, and support community development. These programs may include literacy campaigns, career development programs, social issues awareness programs, health and hygiene initiatives, skill development workshops, and technology-oriented activities. The policy suggests integrating extension work into the curriculum of higher education programs. This allows learners to gain practical experience, develop leadership skills, and contribute to community development while pursuing their studies. It recognizes incentives to encourage active engagement in community service and extension activities.

Overall, NEP 2020 recognizes the significant role of higher education institutions in promoting community engagement, social responsibility, and sustainable development through extension work. By integrating extension activities into their mission and operations, institutions can contribute to building inclusive and resilient societies.

Extension work in the context of education refers to the activities and programs conducted by educational institutions to engage with communities, address societal needs, and promote social development.

<u>Aim of Extension Work under NEP</u>:

- Extension work aims to identify and address the specific needs and challenges faced by communities. NEP 2020 encourages higher education institutions to engage with local

communities and contribute to their development by offering programs and services that address social needs, such as literacy programs, health awareness campaigns, and vocational training.

- Extension work aims to empower communities by providing them with the knowledge, skills, and resources they need to address their own requirements and improve their quality of life.

Key objectives of Extension Work under NEP:

- To ensure equal access to quality education and educational opportunities to aspirants.
- To support the government initiatives in achieving universal foundational literacy and numeracy as per sustainable development program.
- To organize remedial programs to address the learning breaches among the youth and provide unending education opportunities.
- To offer more holistic, multidisciplinary, and flexible curricular activities with an emphasis on conceptual understanding and personality development.
- To offer a wide range of activities & promote critical thinking, creativity, and innovation.
- To provide aspirants with multiple pathways for skill development and employment.
- To implement outreach programs to disseminate knowledge, provide services, and support community development.

Extension Work Activities:

Extension Work activities introduced by DLLE are a crucial aspect of the educational environment, offering multifaceted benefits that extend beyond academic learning. Many extension activities focus on social issues, sustainability, and environmental conservation. These activities educate the communities on sustainable practices which promote inclusivity and social justice. These activities focus especially on training women in various skills, including entrepreneurship and digital literacy through various vocational skill-oriented projects offered by the department. These activities have significantly contributed to skill development among community members, leading to improved employment opportunities and personality development. Learners participate in extension work activities as part of their curriculum, to gain practical experience and to contribute to community development. Thus, engaging in extension work fosters a sense of social responsibility and civic engagement among the learners and facilitators.

Given below are the activities / programs to be conducted by the colleges as a part of Extension Work as enlisted topics. The learner will focus on enlisted topics and participate in following activities during Semester III in this academic year.

ACTIVITIES FOR SEMESTER III = 2 Credits

Sr. No.	Unit	No. of Lectures
1.	Organising & Participation in Training Session Every learner should attend the orientation / training session organised by their college for orientation of annual extension work program. Attendance is compulsory. **In this session the learners will be oriented about the activities to be conducted during the semester followed by question-and-answer session.** The learner must read resource material and guideline carefully and plan his / her activities for the semester during academic year.	2 Lectures
2.	Participation in Project /Activities (as given below) **In this session learners will be oriented about any 5 Topics selected by college (preferably which are not taken in Semester 1 and 2) for awareness under Extension Work. The college may select more than 5 topics if the enrolment of learners is more than 200. The learners will participate in activities based on these topics selected by college.)** 1. Election Literacy 2. Nasha Mukti 3. My Career. 4. Physical Education and Yoga. 5. Discipline and Civic Sense. 6. Sustainable Health Practices & Precautions. 7. Care for Senior Citizens 8. Palliative Care for patients. 9. Child Care 10. Stress Management 11. Positive Thinking.	22 Lectures including guidance for practice session, preparations and actual conduct of program.

	12. Communal Harmony 13. Book Reading Practices 14. Journalism and Media 15. Sustainable Natural Resources 16. Career Opportunities in NEP 2020 17. Indian Scientists and Their Contributions 18. Women Entrepreneurs & Leadership in India 19. Digital India and Technological Innovations 20. Stop Food Waste **Learners will be oriented and motivated to participate in minimum four activities given below based on above topics:** 1. Seminar /conferences, discussion sessions, debate, rallies 2. Competitions (essay/creative writing, elocution, poster/ video/ rangoli making etc. – Minimum 2 competitions) 3. Extension Work group activities of other groups in the college. 4. Prepare your PPT, design your posters / charts. 5. Survey / short term academic courses / innovative programs. 6. Field visit / field work / case studies / developing innovative engineering models / projects 7. Participation in Street Plays 8. Event / hospitality / human resource management program /assignment 9. Novel formulation development (pharmacy), 10. Self-medication survey (pharmacy), **Learners are required to prepare <u>short videos (duration 3-4 minutes)</u> of the activity where the college will organize such competition.** **The learners will be oriented about various career development opportunities in University of Mumbai, and schemes of student development by the Government.** **<u>Learners will be oriented and given an opportunity for:</u>** - Script writing / Direction for street play.	

	- Composing / Singing (Songs, Powada) - Playing Musical Instrument during the event. - Participation in various college and university level competitions. - Participate in Cultural Performance / Organising Committee for Festival / Programs / Event Management.	
3	<u>Participation Video / Stage Performance / Assignment / Report Writing and submission</u> - Present your report / video during the college program. - All learners enrolled in Extension Work can make activity video or stage performance (3-4 minutes duration) creating awareness about any social issues / topics enlisted here followed by assignment / report writing as per format. - **College will organise a program in the hall / classroom for all learners and give them an opportunity** to present their assignment / report with PPT / video presentation followed by question answer session / test / interview by the college.	6 Lectures including guidance for practice session, preparations and actual conduct of program.

Evaluation Pattern

<u>Internal Assessment</u>

Sr. No.	Assessment Criteria	Maximum Marks
1	Attendance, punctuality, completion of hours, participation in programs, presentations and feedback.	10
2	Proficiency in required skill sets, overall performance, submission of written report / assignments and expected development.	10
	Total	20 Marks

External Assessment

(Based on Extension Work guidelines and five enlisted topics chosen by the college.)

Question Paper Pattern

Time: 1.00 Hours **Total Marks 30**

Instructions: 1. All questions are compulsory.

2. Figures to the right indicate maximum marks.

Q.1. Rewrite the following statement by choosing correct alternative given below. - 06 Marks (6 statements. One mark each)

Q.2. Write short Notes On (Any Two out of Four) - 06 Marks

Q.3. Answer the following questions. (Any Three out of Five) - 18 Marks

References:

- Agricultural Extension: Principles and Methods" by "Ray V. Herren (2008)
- Agricultural Extension by G. S. R. Murthy (2010)
- Agricultural Extension in Developing Countries by R. W. Snapp (2012)
- 'Community Development: Theory and Practice' by Margaret Ledwith (2020)
- Extension Communication and Management by B. M. Panda (2016)
- Extension Education: Principles and Practice by Dahama and Bhatnagar (2017)
- Guidelines for Extension Work published by Department of Lifelong Learning and Extension, University of Mumbai.
- Introduction to Agricultural Extension by S. S. Acharya (2015)
- 'Innovation in India: Combining Economic Growth with Inclusive Development' edited by Sunil Mani and Henny Romijn.
- 'Participatory Extension Approaches for Sustainable Development' by Chambers and Guijt (2019)
- 'Rural Development and Extension Education' by Singh and Swanson (2018)
- 'Social Work and Community Development' by Pawar and Cox (2019)

Sd/-	**Sd/-**	**Sd/-**	**Sd/-**
Sign of the BOS Coordinator, Dr. Kunal Jadhav, Board of Studies in Extension work	**Sign of the Offg. Associate Dean, Dr. Suchitra Naik Faculty of Humanities**	**Sign of the Offg. Associate Dean, Dr. Manisha Karne Faculty of Humanities**	**Sign of the Offg. Dean, Prof. Dr. Anil Singh Faculty of Humanities**