Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAACAccredited-2022
'B^{++}'Grade (CGPA2.96)

Name of the Faculty: Science and Technology

(As per New Education Policy 2020)

Syllabus: ENTREPRENEURSHIP

Name of the Course: B.Sc. I (Sem.–I and II)

(Syllabus to be Implemented from June - 2024)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Structure as per NEP-2020
B. Sc. I (Entrepreneurship)

Level	Sem.	Faculty			OE/GE	(SEC/ VSC)	(AEC), IKS, VEC	CC	Total Credits	Cumulative Credits
		Major		Minor						
		DSC	DSE	Minor						
4.5	I	2+2				2	2 - L1-1 2 - IKS, 2 - VEC1	2	22	44 **UG Certificate**
		2+2								
		2+2								
	II	2+2			2	2	2 – L1-2 2- VEC 2	2	22	
		2+2								
		2+2								

SEM -I

S. No.	Course Type	Course Code	Paper Title	Credit
1.	Major	DSC 1 - 1	ENTREPRENEURSHIP- I (FUNDAMENTALS OF MANAGEMENT)	2
2.	Major	DSC 2 - 1	To be selected from the Basket of Major Subjects provided in this syllabus only	2
3.	Major	DSC 3 - 1	To be selected from the Basket of Major Subjects provided in this syllabus only	2
4.	Practical based on DSC 1 - 1, DSC 2 - 1 & DSC 3 - 1	DSC 1 - 1 P DSC 2 - 1 P DSC 3 - 1 P	Practical Lab – I	6
5.	DSE	--	--	--
6.	Minor	--	--	--
7.	GE/OE	--	--	--
8.	SEC 1	SEC 1	Employability Skills	2
9.	AEC	L1-1	English	2
10.				
11.	IKS	IKS		2
12.	VEC 1	VEC 1	Constitution of India	2
13.	CC1	CC1	Community Engagement & Services	2
			Total	**22**
SEM - II				
13	Major	DSC 1-2	ENTREPRENEURSHIP – II (MACROECONOMICS)	2
14	Major	DSC 2-2	To be selected from the Basket of Major Subjects provided in this syllabus only	2
15	Major	DSC 3-2	To be selected from the Basket of Major Subjects provided in this syllabus only	2
14.	Practical based on DSC 1-2, DSC 2-2 and DSC 3-2	DSC 1 - 2 P DSC 2 - 2 P DSC 3 - 2 P	Practical Lab - II	6
15	DSE	--	--	-

16	Minor	--	--	--
17.	GE1 /OE1	GE1 /OE1	To be selected from the Basket of OE-I/GE-I	2
18.	SEC 2	SEC 2	Entrepreneurial Best Practices	2
19.	AEC	L1-2	English	2
20.	VEC 2	VEC 2	Environmental Studies	2
21.	CC 2	CC 2	Community Engagement & Services	2
			Total	**22**

Abbreviations:

Ability Enhancement Courses: AEC	On Job Training: OJT
Co-curricular Courses: CC	Research Methodology: RM
Community Engagement & Service: CEP	Research Project: RP
Field projects: FP	Skill Enhancement Courses: SEC
Generic/ Open Electives: OE	Value Education Courses: VEC
Indian Knowledge System: IKS	Vocational Skill and Skill Enhancement Courses: VSEC
	Vocational Skill Courses: VSC

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

Final Structure as per NEP-2020

4- Year Multidisciplinary UG Program with DSC as a Major, 4 -Year BachelorofScience(Honors)

Level/ Difficulty	Sem.	Faculty			Generic/ Open Elective GE/ OE	Vocational and Skill Enhancement Courses (SEC/VSC)	Ability Enhancement Course (AEC), IKS, VEC	Field Project/ RP/CC/Internship/ Apprenticeship/ Community Engagement & Services	Credits	Cumulative Credits
		Major		Minor						
		DSC	DSE							
4.5 100-200	I	DSC 1 - 1 (2 + 2) ENTREPRENEURSHIP- I (FUNDAMENTALS OF MANAGEMENT)				SEC 1 (2) Employability Skills	L1-1(2) English IKS (2) VEC1 (2) (Constitution of India)	CC1 (2) Community Engagement & Services	22	**44** **One Year Certificate (44)**
		DSC 2 - 1 (2 + 2) To be selected from the Basket of Major Subjects provided in this syllabus only								
		DSC 3 – 1 (2 + 2) To be selected from the Basket of Major Subjects provided in this syllabus only								
	II	DSC 1-2 (2 + 2) ENTREPRENEURSHIP – II (MACROECONOMICS)			GE1/ OE1(2) To be selected from the Basket of OE-I/GE-I	SEC 2 (2) Entrepreneurial Best Practices	L1-2(2) English VEC 2 (2) (Environmental Studies)	CC 2 Community Engagement & Services	22	
		DSC 2-2 (2 + 2) To be selected from the Basket of Major Subjects provided in this syllabus only								
		DSC 3-2 (2 + 2) To be selected from the Basket of Major Subjects provided in this syllabus only								

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

SYLLABUS FOR B.Sc.-I (Entrepreneurship)

CHOICE BASED CREDIT SYSTEM (CBCS) SYLLABUS AS PER NEP 2020

Structure of the Course:

- Structure of B.Sc. course in faculty of science and technology as 2 semesters for certificate course, 4 semesters for diploma, 6 semesters for B.Sc. degree and 8 semesters for B.Sc. (Hons.).
- B.Sc.-I comprises of total two semesters. Each theory paper consists of 30 marks for University examination and 20 marks for internal examination.
- Practical examination will be conducted at the end of each semester.
- Each practical paper is of 30 marks for university practical examination and 20 marks for internal practical examination.
- The titles and marks distribution for each paper are as under.

Sem	Paper No.	Title of Paper	Total Lectures	Examination			Total Credit
				Univ. Exam	Internal Exam	Total Marks	
Sem I	**Major**						
	DSC 1 - 1	ENTREPRENEURSHIP- I (FUNDAMENTALS OF MANAGEMENT)	30	30	20	50	02
	DSC 2 - 1	To be selected from the Basket of Major Subjects provided in this syllabus only	30	30	20	50	02
	DSC 3 - 1	To be selected from the Basket of Major Subjects provided in this syllabus only	30	30	20	50	02
	DSC 1 - 1 P	Practical Lab – I	04 hr /Week/ batch	30	20	50	02
	DSC 2 - 1 P	Practical Lab – I	04 hr /Week/ batch	30	20	50	02
	DSC 3 - 1 P	Practical Lab – I	04 hr /Week/	30	20	50	02

			batch				
	DSE	--	--	--	--	--	--
	Minor						
	Minor	--	--	--	--	--	--
	GE/OE	--	--	--	--	--	--
	SEC 1	Employability Skills	30	30	20	50	02
	L1-1	English	30	30	20	50	02
	IKS		30	30	20	50	02
	VEC 1	Constitution of India	30	30	20	50	02
	CC1	Community Engagement & Services	30	30	20	50	02
	Total credits						**22**
Sem II	**Major**						
	DSC 1-2	ENTREPRENEURSHIP – II (MACROECONOMICS)	30	30	20	50	02
	DSC 2-2	To be selected from the Basket of Major Subjects provided in this syllabus only	30	30	20	50	02
	DSC 3-2	To be selected from the Basket of Major Subjects provided in this syllabus only	30	30	20	50	02
	DSC 1 - 2 P	Practical Lab – II	04 hr /Week/ batch	30	20	50	02
	DSC 2 - 2 P	Practical Lab – II	04 hr /Week/ batch	30	20	50	02
	DSC 3 - 2 P	Practical Lab – II	04 hr /Week/ batch	30	20	50	02
	DSE	--	--	--	--	--	--
	Minor						
	Minor	--	--	--	--	--	--
	GE1 /OE1	To be selected from the Basket of OE-I/GE-I	30	30	20	50	02
	SEC 2	Entrepreneurial Best Practices	30	30	20	50	02
	L1-2	English	30	30	20	50	02
	VEC 2	Environmental Studies	30	30	20	50	02
	CC 2	Community Engagement & Services	30	30	20	50	02
	Total credits						**22**

University Examination

1. Theory Paper DSC 1-1 : 30Marks
2. Theory Paper DSC 2-1 : 30Marks
3. Theory Paper DSC 3-1 : 30Marks
4. Theory Paper DSC 1-2 : 30Marks
5. Theory Paper DSC 2-2 : 30Marks
6. Theory Paper DSC 3-2 : 30Marks

Duration of practical examination is **one day / practical paper**.

Semester I Practical Paper (Major)	**Semester II Practical Paper (Major)**
(Practical based on DSC 1 - 1, DSC 2 - 1 & DSC 3 - 1) i.e. DSC 1 - 1P, DSC 2 - 1P & DSC 3 - 1P **30 Marks for each Practical paper**	**(**Practical based on DSC 1-2, DSC 2-2 and DSC 3-2) i.e. DSC 1 - 2P, DSC 2 - 2P & DSC 3 - 2P **30 Marks for each Practical paper**

- **Continuous Internal Assessment:**
  1) Each theory paper has **20 marks** internal examination.
  2) Each Practical paper has **20 marks** internal examination.

Note:

· FP/RP/CC/Internship/Apprenticeship/Community Engagement and Services is applicable as per the distribution of students.

Program Outcomes (POs):

PO 1. Students will have a firm foundation in the fundamentals and applications of Entrepreneurship as well as biological sciences and scientific theories including those in Entrepreneurship, Chemistry, Microbiology and Biotechnology etc.

PO 2. Students will be able to design and carry out scientific experiments as well as accurately record and analyze the data of such experiments.

PO 3. Students will develop skill in problem solving, critical thinking and analytical reasoning as applied to scientific problems.

PO 4. Students will be able to explore new areas of research in allied fields of sciences and technology.

PO 5. Students will appreciate the central role of Entrepreneurship in our society

PO 6. Students will be able to explain how entrepreneur is an integral part for addressing social, economic, and environmental problems.

PO 7. Students will be able to function as a member of an interdisciplinary problem-solving team.

Program Specific Outcomes (PSOs):

PSO1: Apply the basic knowledge of chemistry, microbiology and biotechnology to perform various tasks assigned at the workplace.

PSO2: Undertake research activities and use modern scientific tools to analyze various topics in the research area.

PSO3: Use subject knowledge and ICT skills to be an effective team member in his/her field.

PSO4: Exhibit professional work ethics and norms of scientific development.

PSO5: Understand and contribute to solve basic societal issues based on principles of scientific knowledge he/she has gained.

PSO6: Practice the art of analytical reasoning to become lifelong learner.

SEMESTER-I

Paper No.	Title of Paper	Total Lectures	Examination			Total Credit
			Univ. Exam	Internal Exam	Total Marks	
Major						
DSC 1 - 1	ENTREPRENEURSHIP- I (FUNDAMENTALS OF MANAGEMENT)	30	30	20	50	02
DSC 1 - 1 P	Practical Lab – I	04 hr /Week/ batch	30	20	50	02
DSC 2 - 1	To be selected from the Basket of Major Subjects provided in this syllabus only	30	30	20	50	02
DSC 2 - 1 P	Practical Lab – I	04 hr /Week/ batch	30	20	50	02
DSC 3 - 1	To be selected from the Basket of Major Subjects provided in this syllabus only	30	30	20	50	02
DSC 3 - 1 P	Practical Lab – I	04 hr /Week/ batch	30	20	50	02
DSE	--	--	--	--	--	--
Minor						
Minor	--	--	--	--	--	--
GE/OE	--	--	--	--	--	--
SEC 1	Employability Skills	30	30	20	50	02
L1-1	English	30	30	20	50	02
IKS		30	30	20	50	02
VEC 1	Constitution of India	30	30	20	50	02
CC1	Community Engagement & Services	30	30	20	50	02
Total credits						**22**

SEMESTER-I

Semester I

Title of the paper - DSC 1 – 1:

ENTREPRENEURSHIP- I (FUNDAMENTALS OF MANAGEMENT)

Course Credits	No. of Hours per Week	Total No. of Teaching Hours	Total marks
2 Credits	2 Hours	30 Hours	50 (30 UA + 20 CA)

Learning Objectives:

1. To learn basic concepts and principles of management practices required to run an organization.
2. To develop knowledge and skills regarding functions of Management

Course Outcomes (Cos)

CO1: Learners will absorb various management concepts such as planning, organizing, implementing, staffing, coordinating, controlling, motivating.

CO2: Learners will recognize the human skills and conceptual skills as per industry requirements about basic management skills.

CO3: Learners will diagnose various styles and qualities of efficient leadership, Coordination, Controlling, Green Management and Corporate Social Responsibility.

Unit I	**Introduction to Management**	**15**
	● Management: Meaning, Concept, Importance and Functions ● Nature of Management: Management is an Art, Science and Profession ● Levels of Management ● 14 Principles of Management ● Management vs Administration	
Unit II	**Functions of Management**	**15**
	● Planning: Meaning and Features and Types ● Organizing: Meaning, Principles and Process ● Decision making: Meaning Types and Process ● Directing: Concept, Techniques and Principles ● Controlling: Meaning, Process and Limitations	

Reference Books

1. James H. Donnelly, (1990) Fundamentals of Management, Pearson Education, 7th Edition.
2. Koontz and Heinz Weihrich (2017), Essentials of Management: An International and Leadership Perspective, McGraw Hill Education, 10th Edition.
3. Mitra J.K. (2018). Principles of Management. Oxford University Press
4. Dr. Mangesh P. Waghmare (2019) Principles of Management, Nirhali Prakashan Pune.
5. Rajkumar. S and Nagarajan. G (2021) Management Principles and Applications, Jayvee International Publications, Bangalore.
6. Drucker, P. F. (1999). Management Challenges for the 21st Century. Harper Collins Publishers Inc Harold.
7. J.S. Chandan (2002) Management Concepts and Strategies Vikas Publishing House, Pvt. Ltd New Delhi.

Semester I

PRACTICALS RELATED TO DSC 1-1 P

ENTREPRENEURSHIP PRACTICAL - I (FUNDAMENTALS OF MANAGEMENT)

Course Credits	No. of Hours per Week/Batch	Total No. of Teaching Hours	Total marks
2 Credits	**4 Hours**	**--**	**50 (30 UA + 20 CA)**

Sr. No.	Practical/Assignment/Exercise/Activity
1	Conduct the survey on controlling techniques used in local firms.
2	Conduct survey on application of 14 principles of management in local business.
3	Collect the organizational structure of any 5 new startups in Solapur
4	Conduct survey on decision making process of any local business
5	To study the leadership strategies of top-level managers working in local industries.
6	Visit and write report on the organizational structure of any successful local business
7	Interview of any top-level manager of reputed local successful business firm.
8	Industrial Visit & prepare a report of vision, mission, and objectives of any local reputed business.
9	To make mini project/survey on any relevant topic of the course

MAJOR SUBJECTS BASKET FOR DSC 2-1 and DSC 3-1

B.Sc. I Semester I (Entrepreneurship) as per NEP 2020 wef. 2024-25

(Any Two to be Selected) Sr. No.	Course Type	Paper Title	Credit
1.	Major	Chemistry- I (Physical and Inorganic Chemistry)	2
2.	Major	Basics in Microbiology	2
3.	Major	Animal diversity-I (Non-Chordates)	2
4.	Major	Botany: Algae, Fungi and Archegoniate	2

Semester I

Title of the paper: Chemistry- I (Physical and Inorganic Chemistry)

Credit: 02, Theory: 30 Periods, Marks: 50

	Course Objectives:
•	To achieve knowledge of the gaseous states such as ideal and non-ideal gases, isotherm, and liquefaction of gases.
•	To acquire knowledge about rates of chemical reactions and distinguishing the reaction of a different order and their characteristics.
•	To proper understanding of covalent bonding using VBT and MOT approach.
•	To acquire knowledge of quantum mechanics, shapes of orbitals and periodic properties.

Unit 1:	
A	**Gaseous State** **(07)**
1.1	Ideal and Nonideal gases, Deviation from ideal behaviour.(Only Boyle's law),Causes of deviation from ideal behaviour, van der Waal's equation, explanation of real gas behaviour by van der Waal's equation.
1.2	Critical Phenomena: PV-Isotherms of real gases (Andrew's isotherms), continuity of state, Relationship between critical constants and van der Waal's constants.
1.3	Liquefaction of gases, Joule-Thomson effect.
1.4	Numerical Problems
B	**Chemical Kinetics** **(08)**
2.1	Chemical Kinetics and it's scope, Rate of reaction, Definition and units of rate constant. Factors affecting rate of reaction, Concentration, pressure, temperature and catalyst: with example of Ammonia synthesis by Haber's Process.
2.2	Order and Molecularity of reaction.
2.3	First order reaction: Derivation of Rate constant, Characteristics of first order reaction, Example: Decomposition of N_2O_5
2.4	Second order reaction: Derivation of rate constant for equal and unequal concentration of the reactants. Characteristics of Second order reaction, Example: Reaction between $K_2S_2O_8$ and KI
2.5	Pseudo-uni-molecular reaction, Example: Hydrolysis of methyl acetate in presence of an acid.

2.6	Numerical Problems
Unit 2:	
A	**Covalent bonding: Valence Bond Theory (VBT) approach (07)**
3.1	Types of chemical bonds
3.2	Valence Bond Theory: Heitler–London Theory and Pauling-Slater Theory: Merits and Demerits
3.3	Need of Hybridization with respect to $BeCl_2$, BF_3, $SiCl_4$
3.4	Types of hybridization and shapes of simple inorganic molecules: PCl_5, SF_6
3.5	Valence Shell Electron Pair Repulsion (VSEPR) Theory w.r.t. NH_3, H_2O
B	**Covalent bonding: Molecular Orbital Theory (MOT) approach (08)**
4.1	Atomic and Molecular orbitals.
4.2	L.C.A.O. Principle
4.3	Bonding, Antibonding and Nonbonding Molecular orbitals.
4.4	Conditions for successful overlap
4.5	Different types of overlap (s-s, s-p_x, p_x-p_x and p_y-p_y or p_z-p_z)
4.6	Energy level sequence of molecular orbitals for n=1and n =2
4.7	M.O. Diagrams for: a) Homonuclear diatomic molecule. H_2,Li_2,Be_2,C_2,N_2 and O_2 b) Heteronuclear diatomic molecules CO and NO w.r.t. bond order, stability and magnetic properties.
	Course Outcomes:
CO1:	Get a better understanding of gaseous state.
CO2:	Understand the significance of rates of chemical reactions.
CO3:	Explain the deviations of gases from ideality
CO4:	Describe the hybridization concept
CO5:	Construct the MO diagrams for simple molecules
CO6:	Understand different types of orbitals
	Reference books:
1.	Chemical Kinetics by K.J. Laidler, Tata McGraw Hill Publishing Co. New Delhi.
2.	Physical Chemistry: S. Glasstone.
3.	Physical Chemistry: W.J. Moore (Orient Longman)
4.	Principles of Physical Chemistry: Maron Prutton
5.	University Chemistry: B. H. Mahan (Addision-Weseley Publ. Co.)
6.	Physical Chemistry Through problems: Dogra and Dogra (Wiley Eastern Ltd.,)
7.	Physical Chemistry: G. M. Barrow(Tata McGraw Hill)
8.	Essentials of Physical Chemistry: B.S. Bahl & G.D.Tuli (S. Chand)

9.	Principles of Physical Chemistry: B.R. Puri, L.R. Sharma and M.S. Patania, S.L.N. Chand & Co.1987
10.	Kinetics and Reaction Mechanisms by Frost and Pearson, Wiley, New York.
11.	University General Chemistry: C N R. Rao (McMillan)
12.	Advanced Inorganic Chemistry-Cotton and Wilkinson
13.	Inorganic Chemistry-J.E. Huheey
14.	Concepts and models of Inorganic Chemistry-Douglas & Mc-Daniel
15.	Principles of Inorganic Chemistry-Puri, Sharma
16.	New Concise Inorganic Chemistry-(ELBS)-J.D.Lee
17.	Textbook of Inorganic Chemistry- P.L.Soni
18.	Advanced Inorganic Chemistry-Satyaprakash, Tuli, Basu
19.	Theoretical Principles of Inorganic Chemistry-G. S. Manku
20.	Principles of Inorganic Chemistry-Puri, Sharma & Kalia
21.	Inorganic chemistry: Principles of structure and reactivity–J.E. Huheey
22.	Advanced Inorganic Chemistry, Vol.I– Gurudeep Raj
23.	A New Guide to Modern ValencyT heory- G. J.Brown

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Semester I

Title of the paper: Chemistry- I (Physical and Inorganic Chemistry) Practical

Credit: 02, Practical: 60 Periods, Marks: 50

	Course Objectives:
●	To develop practical skills in basic and conceptual Physical Chemistry.
●	To gain practical knowledge by applying the experimental methods to correlate with the theory.
●	To prepare students to determine rates of chemical reactions.
●	To develop students to learn measuring skills in practical.
●	To apply the analytical techniques and graphical analysis to the experimental data
	List of Experiments
Sr. No.	**Name of the Practical**
	Physical Chemistry (Any two from Chemical Kinetics,)
1.	Study of specific reaction rate of hydrolysis of methyl acetate in presence of HCl.
2.	Study of specific reaction rate of hydrolysis of methyl acetate in presence of H_2SO_4

3.	Study of reaction between $K_2S_2O_8$ and KI(Equal Concentrations)
4.	Determination of equivalent weight of Mg by Eudiometer.
5.	Determination of heat of ionization of weak acid.
	Inorganic Chemistry **Inorganic Quantitative Analysis:** Volumetric Analysis (Any two)
1.	To prepare a standard solution of Oxalic acid and determine the strength of Sodium hydroxide solution in terms of normality and Kg/dm^3
2.	To prepare a standard solution of Oxalic acid and determine the strength of Potassium permanganate solution in terms of normality and Kg/dm^3
3.	To prepare standard solution of Potassium dichromate and determine strength of Ferrous Ammonium Sulphate solution in terms of normality and Kg/dm^3 (Use internal indicator)
	Inorganic preparation:
1.	Preparation of ferrous ammonium sulphate
2.	Preparation of sodium cuprous thiosulphate
	Course Outcomes:
	On successful completion of this practical course student will be able to:
●	handle various instruments.
●	correlate theoretical concepts with experiments.
●	develop awareness of minimizing errors.
●	develop basic skills of measurements
●	understand the theoretical principles of basic Practical chemistry.
	Reference Books:
1.	Practical book of Physical Chemistry: Nadkarni, Kothari & Lawande.
2.	Experimental Physical Chemistry: A.Findlay.
3.	Systematic Experimental Physical Chemistry: S.W. Rajbhoj, Chondhekar (Anjali Pub.)
4.	Experiments in Physical Chemistry: R.C. Das and B. Behra.(Tata Mc.Graw Hill)
5.	Advanced Practical Physical Chemistry: J.B. Yadav (Goel Publishing House)
6.	Practical Physical Chemistry: B.D. Khosala (R.Chand & Sons.)
7.	Experiments in Chemistry: D.V. Jahagirdar
8.	Vogel's Text Book of Quantitative Chemical Analysis (Longman ELBS Edition)

Semester I

Title of the paper: Basics in Microbiology

Credit: 02, Theory: 30 Periods, Marks: 50

Learning Objectives:

1) Students will know the historical contributions of scientists for the development of subject

2) To create awareness in learners about the scope of the subject in modern era.

Course Outcome:

1) Students will know the evolution of the microbiology subject.

2) Students will understand the applied branches of microbiology and scope of microbiology.

3) Students will be able to understand diversity amongst microorganisms.

4) Understand beneficial and harmful effects of microorganisms in different fields of Microbiology

Unit No.	Content of Unit	Lectures Allotted
I	**History, Scope and Branches of Microbiology** A. **Historical Background:** a) Contribution of Robert Hooke, Antony Van Leuwenhoek, Ernst Ruska **b)** Theory of spontaneous generation: Francisco Redii, John Needham, Friedrich Schroder and Van Dusch, Louis Pasteur (Swan neck flask experiment) and John Tyndall. **c)** Golden era of Microbiology (1857-1914) - i) Germ theory of fermentation ii) Germ theory of disease **d)** Contribution of Martinus Beijerinck, Sergei Winogradsky, Joseph Lister and Dmitri Ivanovski, Edward Jenner, Eli Metchnikoff, Salman Waksman, Alexander Fleming. In development of applied microbiology. B. **a) Branches of Microbiology:** (Water, Air, Agriculture, Food and Dairy, Environmental, Medical, Industrial, Geomicrobiology, Space Microbiology) **b) National Institutes related to Microbiology in India–**NIV, NARI, NCCS, CCMB, Serum Institute of India, Vasantdada Sugar Institute, National Research center on Pomegranate (NRCP). IMTECH (Institute of Microbial Technology, Chandigarh), Agharkar Research Institute, Pune, NIN Hydrabad.	**15**

II	**Microbial Diversity** **A) Concept of prokaryotic and eukaryotic cell** **B) General Characteristics of Microorganisms** i) Bacteria (Size, Shape and Arrangement) ii) *Mycoplasma* iii) *Rickettsia* iv) Actinomycetes v) Algae vi) Fungi vii) Viruses **C) Structure and Functions of Bacterial Cell:** i) Cell wall - Gram-positive and Gram-negative bacteria, sphaeroplast and protoplast ii) Composition and functions of Cell membrane, Mesosome, Capsule, slime layer, Flagella and Pili iii) Cytoplasm-Ribosome and nucleoid **D) Bacterial Taxonomy** - a) Basic principles of Nomenclature b) Criteria for bacterial classification and identification– Morphological, Cultural and Biochemical Characteristics.	**15 L**

Semester I

Title of the paper: Basics in Microbiology Practical's

Credit: 02, Practical: 60 Periods, Marks: 50

Contact hrs: 4 hrs per week

1. Good microbiology laboratory practices and Biosafety
2. Principle, working and applications of Common laboratory instruments -

a) Autoclave

b) Hot Air Oven

3. Principle, working and applications of Common laboratory instruments -

a) Incubator

b) Colony Counter

4. Principle, working and applications of Common laboratory instruments -

a) PH Meter

b) Laminar Air flow

c) Water Bath

5. Handling and Care of compound Microscope
6. Monochrome staining
7. Negative staining
8. Gram staining
9. Special Staining Procedures - Cell Wall (Chance's Method)

10. Special staining Procedures - Capsule (Maneval's Method)

11. Preparation of Saline and culture media a) Peptone Water b) Nutrient Broth c) Nutrient agar d) MacConkey's agar e) Starch Agar f) Milk agar g) Sabouraud's agar

12. Study of inoculation techniques – Broth, Slant, Stab, Spot.

13. Study of inoculation techniques –Spread and Streak.

14. Study of inoculation techniques –Pour plate.

15. Study of morphology of fungi by Mounting method –

(a) *Aspergillus* (b) *Rhizopus* (c) *Penicillium* (d) *Mucor*

Semester I

Title of the paper: Animal diversity-I (Non-Chordates)

Credit: 02, Theory: 30 Periods, Marks: 50

	Course Objectives:	**Contact Hrs.**
•	Different groups of invertebrate animals are studied in this course including Protozoa, Porifera, coelenterate, Plathyhelminthes, Aschelminthes, Annelida, Arthropoda, Mollusca and Echinodermata.	
•	To study the general characters and classification upto order.	
•	Some special features, organs, pathogenecity, life history and significance are studied here.	
Unit 1:	**Kingdom Protista:**	**15**
	General characters of Kingdom Protista	
	Classification up to classes of; Kingdom Protista	
	Nutrition in paramecium.	
	Phylum Porifera	
	General characters of phylum Porifera	
	classification up to classes of phylum Porifera	
	Canal system in sycon and its importance	
	Phylum Cnidaria	
	General characters of phylum Cnidaria	
	Classification up to classes phylum Cnidaria	
	Reproduction in hydra	
	Phylum Platyhelminthes and Nemathelminthes	
	General characters of phylum Platyhelminthes	
	Classification up to classes of phylum Platyhelminthes	

	Life history of *Taenia solium*	
	General characters of phylum Nemathelminthes	
	Classification up to classes of phylum Nemathelminthes	
	Life cycle and parasitic adaptations in *Ascaris lumbricoid*	
Unit 2	**Phylum Annelida**	15
	General characters of phylum Annelida	
	Classification up to classes of phylum Annelida	
	Economic importance of leech	
	Phylum Arthropoda	
	General characters of phylum Arthropoda.	
	Classification up to classes of phylum Arthropoda.	
	Economic importance of insects.	
	Phylum Mollusca	
	General characters of phylum Mollusca	
	Classification up to classes of phylum Mollusca	
	Economic importance of molluscs	
	Phylum Echinodermata	
	General characters of Phylum Echinodermata	
	Classification up to classes of Phylum Echinodermata	
	Water-vascular system in Asteroidea	

Semester I

Title of the paper: Animal diversity-I (Non-Chordates) Practical's

Credit: 02, Practical: 60 Periods, Marks: 50

1. Study of the following specimens (General characters and classification)
CD/Model/Chart/Slides/Virtual

- *Amoeba, Euglena, Plasmodium, Paramecium*
- Sycon, Hyalonema, and Euplectella
- Obelia, Physalia, Aurelia, Metridium
- Taenia, Planaria, Fasciola
- Aphrodite, Nereis, Pheretima, Hirudinaria
- Peripatus, Palaemon, Crab, Limulus, Scolopendra, Julus, Periplaneta
- Chiton, Dentalium, Pila, Unio, Sepia, Octopus
- Pentaceros, Ophiura, Echinus, Cucumaria and Antedon,

2. Study of the following permanent slides/lab. Specimens:

(a) T. S. and L. S. of *Sycon*,
(b) *Taenia*-Scolex, mature & gravid proglottid
(c) Whole mount of male and female *Ascaris*

3. Collection, observation and identification of Zooplanktons / Parasites
4. **Field visit:** for the study of invertebrate diversity and submission of report in semester examination.

Semester I

Title of the paper- Botany: Algae, Fungi and Archegoniate

Credit: 02, Theory: 30 Periods, Marks: 50

Objectives and Outcomes

Unit 1: Algae and Fungi

1.1 Introduction

Objective: To get the knowledge about the Introduction, characters, classification, and economic importance of algae

Outcome: Students will be able to understand characters, classification, economic importance of algae

1.2 Chlorophyta

Objective: To get the knowledge about the general Characters of Chlorophyta division, occurrence, classification, Thallus organization & reproduction of *Spirogyra*

Outcome: Students will be able to understand about the division Chlorophyta along with its one example of *Spirogyra* in detail.

1.3 Phaeophyta

Objective: To get the knowledge about the general Characters of Phaeophyta division, occurrence, classification, Thallus organization & reproduction of *Sargassum*

Outcome: The students will be able to understand in detail about the division Phaeophyta along with its one example of *Sargassum* in detail.

1.4 Objective: To get the knowledge about the characters, classification of fungi

Outcome: Students will be able to understand characters, classification of fungi

1.5 Zygomycotina

Objective: To understand about general characters of Zygomycotina, occurrence, classification, Thallus organization & life cycle of *Mucor*.

Outcome: The students will be able to understand the general characters division of Zygomycotina with detail study of *Mucor*

1.6 Economic importance of fungi

Objective: To understand economic importance of fungi

Outcome: Students will be able to understand the economic importance of fungi and its importance in day-to-day life.

Unit 2: Archegoniate

2.1 Introduction of Archegoniate

Objective: To get Knowledge about Introduction & general characters of Archegoniate
Outcome: Students will be able to get a detail idea about Archegoniate

2.2 Bryophytes

Objective: To get the knowledge about the Bryophytes, its general characters, classification and life cycle along with suitable example ***Riccia***

Outcome: Students will be able to understand the Bryophytes and life cycle of ***Riccia*** with its economic importance.

2.3 Pteridophyta

Objective: To get knowledge about the general characters of Pteridophytes, classification and life cycle along with suitable examples ***Selaginella***.

Outcome: The students will be able to understand about the Pteridophytes and life cycle of ***Selaginella*** with its economic importance.

2.4 Gymnosperms

Objective: To get the knowledge about the general characters of Gymnosperms, classification and life cycle along with suitable examples ***Cycas***

Outcome: The students will be able to understand about the Gymnosperms and life cycle of ***Cycas*** with its economic importance.

2.5 Economic importance of Gymnosperm

Objective: To understand economic importance of **Gymnosperm**

Outcome: Students will be able to understand the economic importance of **Gymnosperm**

Unit-1:	**ALGAE & FUNGI**	**15 L**
1.1	Introduction, General Characters, And Classification of Algae (As Per Smith-1955) up to Class. Economic importance of algae	(3 L)
1.2	Chlorophyta: General Characters Study of ***Spirogyra*** - Occurrence, Classification, Thallus structure and Reproduction (Excluding Developmental Stages)	(3 L)
1.3	Phaeophyta: General Characters Study of ***Sargassum*** - Occurrence, Classification, Thallus structure and Reproduction (Excluding Developmental Stages)	(3 L)
1.4	General Characters, Classification of Fungi up to Class (As per Ainsworth)	(2 L)
1.5	Zygomycotina: General Characters Study of ***Mucor***: Occurrence, Classification, Thallus Organization, Life Cycle (Excluding Developmental Stages)	(3 L)
1.6	Economic Importance of Fungi	(1 L)
Unit 2	**ARCHEGONIATE**	**15 L**
2.1	Introduction, General Characters of archegoniate	(2 L)
2.2	**Bryophytes:** General Characters, and Classification (As Per G. M. Smith) Study of ***Riccia***- Occurrence, Classification, Thallus Structure (External and Internal) and Reproduction (Excluding Development). Economic Importance of Bryophytes	(4 L)

2.3	**Pteridophytes** General Characters and Classification Up to Class (As Per G. M. Smith) Study of ***Selaginella***: Occurrence, Classification, Morphology of Sporophyte, Anatomy (Stem) and Reproduction (Excluding Development). Economic Importance of Pteridophyte	(4 L)
2.4	**Gymnosperms:** General Characters and Classification (As Per Sporne) Study of ***Cycas:*** Occurrence, Classification, Morphology (Sporophyte, Coralloid Root), Anatomy of Leaflet and Reproduction.	(4 L)
2.5	Economic Importance of Gymnosperm	(1 L)

R**eferences Book**

1. Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.
2. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West Press, Delhi.

3.Sahoo, D. (2000). Farming the ocean: seaweeds cultivation and utilization. Aravali International, New Delhi.

4. Campbell, N.A., Reece J.B., Urry L.A., Cain M.L., Wasserman S.A. Minorsky P.V., Jackson R.B. (2008). Biology, Pearson Benjamin Cummings, USA. 8th edition.

5. Vashistha, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. S. Chand. Delhi, India.
6. Bhatnagar, S.P. & Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
7. Parihar, N.S. (1991). An introduction to Embryophyta: Vol. I. Bryophyta. Central Book Depot. Allahabad
8.Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi.
9. Vander-Poorteri 2009 Introduction to Bryophytes. COP.
10. Agrios, G.N. 1997 Plant Pathology, 4th edition, Academic Press, U.K.
11. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley & Sons (Asia) Singapore. 4th edition.
12. Webster, J. and Weber, R. (2007). Introduction to Fungi, Cambridge University Press, Cambridge. 3rd edition. 9. Sethi, I.K. and Walia, S.K. (2011). Textbook of Fungi and Their Allies, Macmillan Publishers India Ltd
13. Sharma, P.D. (2011). Plant Pathology, Rastogi Publication, Meerut, India.
14. Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition
15. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West Press, Delhi.

Semester I

Title of the paper: Botany: Algae, Fungi and Archegoniate Practicals

Credit: 02, Practical: 60 Periods, Marks: 50

1	Study of dissecting and compound microscopes.
2	Identification of Algae (***Nostoc, Ulva)***
3	Identification of Fungi (***Yeast, Penicillium***)
4	Study of ***Spirogyra.***
5	Study of ***Sargassum***
6	Study of ***Mucor***
7	Identification of Bryophytes (***Marchantia, Anthocerous)***
8	Identification of Pteridophytes (***Equisetum, Adiantum***)
9	Identification of Gymnosperms (***Araucaria, Thuja***)
10	Study of ***Riccia.***
11	Study of ***Selaginella***- Morphology of sporophyte and anatomy of stem,
12	Study of ***Selaginella***- Reproductive structure: Strobilus, Microsporangium, Megsporangium
13	Study of ***Cycas***- Morphology of sporophyte and anatomy of leaflet.
14	Study of ***Cycas***- Reproductive structure: male cone, microsporophyll, microspore and megasporophyll, L. S. of ovule (permanent slide).
15	Submission (Algae/ Fungi/ Archigoniate)

Semester I

Title of the paper – SEC 1: EMPLOYABILITY SKILLS

Course Credits	No. of Hours per Week	Total No. of Teaching Hours	Total marks
2 Credits	**2 Hours**	**30 Hours**	**50 (30 UA + 20 CA)**

Learning Objectives –

1. Directives and specifications of working in a professional environment.
2. Acquire respectful and polite workplace etiquettes.
3. The objective of the course is to train the students with the essential skills required for enhancing employability prospects in the Job Market.

Course Outcomes (Cos)

CO1: Students will understand the soft skills and its applications in terms of behavioral skills, technical skills and Etiquettes.

CO2: Students will be able to learn all professional skills necessary for the sake of employability and Gain employability skills.

CO3: Procure successful career. Being an aware, respectful, and well-cultivated employee.

Unit I	Self-Awareness and Time Management	15
	● Self-Awareness: - Introduction, Importance of knowing yourself, ● Process of knowing yourself	

	• SWOT analysis grid • Johari Windows • Time Management: - Introduction, Time Management Matrix • Steps to successful time management • Difficulties in time management, Time wasters and Time savers.	
Unit II	**Self-Etiquettes and Goal Settings**	**15**
	• Etiquettes: - Introduction, benefits of etiquette, • Classification of etiquette. • Goal Setting: - Difference between wishes, dreams & goals • Types of goals, benefits & areas of goals, • SMART goals. Exercise on goal setting.	

Reference Books:

1. Soft Skills: Know Yourself and Know the World, Dr. K Alex, S. Chand & Company Pvt. Ltd., New Delhi
2. Managing Soft Skills for Personality Development, B.N. Ghosh, McGraw Hill Education (India) Pvt. Ltd. New Delhi
3. Skills for All – Dr. R.B. Rao & Dr. S. Subbarao –Satyam Publishers & Distributors, Jaipur
4. Essential Communication Skills, Shalini Agarwal, Ane Books Pvt. Ltd.

Semester I **Title of the paper: AEC- L1-1 (English)**			
Course Credits	No. of Hours per Week	Total No. of Teaching Hours	Total marks
2 Credits	2 Hours	30 Hours	50 (30 UA + 20 CA)

Semester I **Title of the paper: IKS (Indian Knowledge System)**			
Course Credits	No. of Hours per Week	Total No. of Teaching Hours	Total marks
2 Credits	2 Hours	30 Hours	50 (30 UA + 20 CA)

Semester I **Title of the paper: VEC-1 - Constitution of India**			
Course Credits	No. of Hours per Week	Total No. of Teaching Hours	Total marks
2 Credits	2 Hours	30 Hours	50 (30 UA + 20 CA)

Semester I **Title of the paper: CC-1 (Cocurricular)**			
Course Credits	**No. of Hours per Week**	**Total No. of Teaching Hours**	**Total marks**
2 Credits	**2 Hours**	**30 Hours**	**50 (30 UA + 20 CA)**
Health and wellness, Yoga education, Sports and Fitness, Cultural activities, NSS/NCC, Fine/Applied/ Visual/Performing Arts etc.			

SEMESTER-II

Paper No.	Title of Paper	Total Lectures	Examination			Total Credit
			Univ. Exam	Internal Exam	Total Marks	
Major						
DSC 1-2	ENTREPRENEURSHIP – II (MACROECONOMICS)	30	30	20	50	02
DSC 1 - 2 P	Practical Lab – II	04 hr /Week/ batch	30	20	50	02
DSC 2-2	To be selected from the Basket of Major Subjects provided in this syllabus only	30	30	20	50	02
DSC 2 - 2 P	Practical Lab – II	04 hr /Week/ batch	30	20	50	02
DSC 3-2	To be selected from the Basket of Major Subjects provided in this syllabus only	30	30	20	50	02
DSC 3 - 2 P	Practical Lab – II	04 hr /Week/ batch	30	20	50	02
DSE	--	--	--	--	--	--
Minor						
Minor	--	--	--	--	--	--
GE1 /OE1	To be selected from the Basket of OE-I/GE-I	30	30	20	50	02
SEC 2	Entrepreneurial Best Practices	30	30	20	50	02
L1-2	English	30	30	20	50	02
VEC 2	Environmental Studies	30	30	20	50	02
CC 2	Community Engagement & Services	30	30	20	50	02
Total credits						**22**

Semester II

Title of the paper: DSC 1-2: ENTREPRENEURSHIP – II (MACROECONOMICS)

Course Credits	No. of Hours per Week	Total No. of Teaching Hours	Total marks
2 Credits	2 Hours	30 Hours	50 (30 UA + 20 CA)

Learning Objectives –

1. Students will become familiar with measures of economic performance, learn to use these indicators to evaluate current economic conditions, and understand how markets function in a capitalistic society.
2. Students will learn the major perspectives on what determines performance of the overall economy and will learn to analyze impacts on the economy.
3. Students will learn the key approaches to macroeconomic policy. They will develop skills to analyze impacts of policy actions and to evaluate the advantages and disadvantages of different policies.

Course Outcomes (Cos)

CO1: Effectively express general economic concepts and the ability to think critically in written/oral form.

CO2: Locate and use information related to economics.

CO3: Demonstrate ability to integrate knowledge and ideas in a coherent and meaningful manner.

Unit I	**Introduction to Macro Economics**	**15**
	● Introduction to macroeconomics, Basic economics concepts ● Opportunity cost and the Production Possibilities Curve ● Comparative advantage and the gains from trade ● Demand Supply market Management: Meaning, Concept, Importance and Functions	
Unit II	**Economic Indicators and the Business Cycle**	**15**
	● Introduction to macroeconomics, Basic economics concepts, ● Gross Domestic Product, Limitations of GDP ● Real Vs. Nominal GDP ● Unemployment, Inflation ● Cost of Inflation ● Business Cycle	

Reference Books:

1. James H. Donnelly, (1990) Fundamentals of Management, Pearson Education, 7th Edition.
2. Koontz and Heinz Weihrich (2017), Essentials of Management: An International and Leadership Perspective, McGraw Hill Education, 10th Edition.
3. Mitra J.K. (2018). Principles of Management. Oxford University Press
4. Dr. Mangesh P. Waghmare (2019) Principles of Management, NirhaliPrakashan Pune.
5. Rajkumar. S and Nagarajan. G (2021) Management Principles and Applications, Jayvee International Publications, Bangalore.
6. Drucker, P. F. (1999). Management Challenges for the 21st Century. Harper Collins Publishers Inc Harold.
7. J.S. Chandan (2002) Management Concepts and Strategies Vikas Publishing House, Pvt. Ltd New Delhi.

Semester II

PRACTICALSA RELATED TO - DSC 1.2 P
ENTREPRENEURSHIP PRACTICAL – II (MACROECONOMICS)

Course Credits	No. of Hours per Week/Batch	Total No. of Teaching Hours	Total marks
2 Credits	**4 Hours**	**--**	**50 (30 UA + 20 CA**

1	To make project on demand supply pattern of agriculture market of Solapur
2	To study business cycle of any textile product of local industry.
3	To make survey on causes and effects of unemployment in Solapur.
4	To study the consumers behavior of textiles industry in Solapur
5	Attend local trade exhibition and study the consumer behaviour.
6	Interview of any local entrepreneur regarding unemployment and its effects.
7	To make mini project on any relevant topic of the subject

B.Sc. I Semester II (Entrepreneurship) as per NEP 2020 w.e.f. 2024-25
MAJOR SUBJECTS BASKET FOR DSC 2-2 and DSC 3-2

(Any Two to be Selected) Sr. No.	Course Type	Paper Title	Credit
1.	Major	Chemistry-II (Organic and Analytical Chemistry)	2
2.	Major	Applied Microbiology	2
3.	Major	Animal Diversity- II (Chordates)	2
4.	Major	Botany: Plant Ecology & Taxonomy of Angiosperm	2

Semester II

Title of the paper: Chemistry-II (Organic and Analytical Chemistry)

Credit: 02, Theory: 30 Periods, Marks: 50

	Course Objectives:
•	To study nature of bonding in organic molecules.
•	To inculcate the detailed basics of reaction mechanism and various intermediates
•	To study the different types of electronic effects.
•	To understand the stereochemistry of organic compounds.
•	To inculcate imagination and critical thinking of 3 D structures of organic compounds.
•	To study the unsaturated and alicyclic compounds.
•	To study the concept of aromaticity, its applications and reactions.
•	To know the important physical properties of liquids like viscosity, surface tension and refractive index.

•	To gain knowledge of ionic bonding and ionic solids.
•	To proper understanding of covalent bonding using VBT and MOT approach.
Unit 1:	
A	**Fundamentals of organic reaction mechanism (05)**
1.1	Introduction of reaction mechanism.
1.2	Types of arrow notations: Single headed curved arrow, Half headed curved arrow and double headed arrow.
1.3	Types of bonds breaking: Homolytic and Heterolytic
1.4	Types of reagents: Electrophilic and Nucleophilic
1.5	Types and sub-types of following organic reactions with definition and at least one example of each. a) Substitution b) Addition c) Elimination d) Rearrangement. (Mechanism is not expected)
1.6	Reactive Intermediates: Carbocations, Carbanions, Carbon free radicals, Carbenes, Nitrenes (Definition with suitable example, formation, structure, and relative stability)
B	**Structure and Bonding (05)**
2.1	Hybridization: sp^3, $sp^2$and sp w.r.t. methane, ethylene and acetylene respectively
2.2	Bond length, Bond angle and Bond energy with factors affecting these properties w.r.t.sp^3, $sp^2$and sp hybridization.
2.3	Resonance effect w.r.t. phenol and nitrobenzene
2.4	Inductive effect,+I and –I
2.5	Strength of carboxylic acid w.r.t. inductive effect: Examples-a) Formic and acetic acid,
2.6	Hyperconjugation w.r.t. toluene
2.7	Steric effect w.r.t. mesitoic acid
C	**Stereochemistry of organic compounds (05)**
3.1	Types of stereo-isomerism: Optical isomerism, Geometrical isomerism and Conformational isomerism
3.2	Optical activity
3.3	Essential conditions for Optical activity i. Elements of symmetry ii. Chiral center w.r.t. lactic acid
3.4	Optical isomerism in lactic acid and tartaric acid
3.5	Enantiomers and diastereoisomers w.r.t. 2,3-dihydroxybutanoic acid
3.6	Racemic modification.
Unit 2:	
A	**Physical properties of liquids (10)**
4.1	Introduction, additive and constitutive properties
4.2	Viscosity, coefficient of viscosity, determination of viscosity by Ostwald's Viscometer
4.3	Surface tension: -Determination of surface tension by Drop–Weight method

4.4	Refractive index, Snell's law
4.5	Specific and molecular refractivity, Abbe's refractometer: Critical angle Principle, construction, working and advantages
B	**Ionic Solids (05)**
5.1	Ionic Bonding: a) Formation of ionic bond, Energetics of ionic bonding: Ionisation potential, Electron affinity and Lattice energy. b) Characteristics of ionic compounds. c) Born-Haber Cycle for Alkali metal halide (NaCl) d) Fajan's rules
5.2	Radius ratio and crystal structure. a) Definition: Radius ratio (r^+/r^-), Coordination number, Stoichiometry and unit cell. b) Concept and calculation of radius ratio (r^+/r^-) for ionic solid with octahedral geometry. c) Radius ratio effect on geometry d) Crystal structure of NaCl and CsCl unit cell, radius ratio, coordination number and stoichiometry.
C	**Qualitative and Quantitative Analysis (06)**
6.1	Qualitative analysis of Carbon, Hydrogen, Nitrogen & Sulphur
6.2	Quantitative analysis of- - Carbon and hydrogen by Combustion method - Nitrogen by Kjeldahl's method - Halogen and Sulphur by Carius method.
6.3	Determination of molecular weight of an acid by titration method.
6.4	Empirical formula and molecular formula determination.
6.5	Numerical Problems
	Learning Outcomes:
•	CO1: Understand the basics of bonding and able to draw correct structure of any organic molecule and comment on its stability.
•	CO2: Able to predict the reactivity of organic molecules by the help of electronic effects.
•	CO3: Understand the basics of bonding and able to draw correct structure of any organic molecule and comment on its stability.
•	CO4: Understand the basic physical properties
•	CO5: To acquaint with instruments like refractometer, stalagmometer and viscometer
•	CO6: Explain ionic bonding and different parameters of crystal structure.
	Reference books:
1.	Organic Chemistry: Hendrickson, Cram, Hammond.
2.	Organic Chemistry: Morrison and Boyd
3.	Organic Chemistry: Volume I and III. L. Finar

4.	Organic Chemistry: Pine
5	Advanced Organic Chemistry: Sachinkumar Ghosh
6	Advanced Organic Chemistry: B.S. Bahl and Arun Bahl
7	A Guide book to Mechanism in Organic Chemistry: Peter Sykes
8	Stereochemistry of Organic Chemistry: Kalsi,
9	Stereochemistry of Carbon Compounds: Eliel
10	Textbook of Organic Chemistry: P. L. Sony
11	Practical Organic Chemistry: A.I. Vogel
12	Advanced Organic Chemistry: Reactions, Mechanism and Structure: Jerry March
13	Organic Chemistry: M.R. Jain
14	Organic Chemistry: J.M. Shaigel
15	Svehla, G. Vogel's Qualitative Inorganic Analysis, Pearson Education,2012.
16	Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson,2009.
17	Harris, D.C. Quantitative Chemical Analysis, W.H. Freeman.
18	Dean, J.A. Analytical Chemistry Notebook, McGraw Hill.
19	Day, R.A. & Underwood, A.L. Quantitative Analysis, Prentice Hall of India
20	Gurudeep R Chatwal, Sham K Anand, Instrumental Methods of Chemical Analysis, Himalaya Publishing House.
21	Barrow, G.M. Physical Chemistry Tata McGraw Hill (2007).

Semester II

Title of the paper: Chemistry-II (Organic and Analytical Chemistry) Practical

Credit: 02, Practical: 60 Periods, Marks: 50

	Course Objectives:
●	To know the steps involved in organic compound identification
●	To understand the type of organic compound
●	To know about chromatography
●	To understand the estimation process
	List of Experiments
Sr. No.	**Name of the Practical**
	Organic Chemistry Organic Qualitative Analysis.
1.	Identification of at least four organic compounds with reactions including at least one from acids, phenols, bases and neutrals from the list of the compounds given below-

	• Acids: Oxalic acid, Benzoic acid and Cinnamic acid • Phenols: β - Naphthol, Resorcinol. • Bases: Aniline, p - Toluidine. • Neutrals: Acetone, Ethyl acetate, Glucose, Chloroform, Chlorobenzene, m-dinitrobenzene, Thiourea.
	Note: A systematic study of an organic compound involves the following operations which should be taught in details with reactions in the detection of elements and functional group. 1) Preliminary tests and physical examination 2) Determination of physical constant 3) Detection of Elements 4) Determination of functional group 5) Comparison with literature 6) Confirmatory Test 7) Summary **8)** Result
	Organic Preparation: (Any one)
1.	i) Preparation of benzoic acid from benzamide. ii) Preparation of dibenzal acetone from benzaldehyde and acetone. (Wt. of crude product is expected. M.P.of the recrystallized product is not expected.)
	Analytical Chemistry • Determination of viscosity of given liquids A and B. (Density data of liquids, viscosity of water to be given.) [Any two liquids from, Acetone, CCl_4, Ethyl alcohol, Ethylene glycoland n-propyl alcohol] • Determination of refractive index and specific refraction of given liquids. [Any two liquids from,CCl_4, $CHCl_3$, benzene, xylene, toluene, ethyl alcohol]
1.	**Estimations:(any one)** i) Estimation of aniline ii) Estimation of acetamide iii) Estimation of Aspirin **Qualitative Analysis:** • Spot Tests: Detection of following cations using spot tests: Cu^{2+}, Co^{2+}, Ni^{2+}, Fe^{3+}, Zn^{2+}, Mg^{2+}, Al^{3+}, Pb^{2+}. • Chromatography: Separation and identification of cations by Paper Chromatographic technique from the following mixtures: • Ni^{2+}+Cu^{2+} • Ni^{2+}+Co^{2+} • Cu^{2+} +Co^{2+}
	Reference Books:
	Experiments in Chemistry: D.V. Jahagirdar
	Vogel's Text Book of Quantitative Chemical Analysis (Longman ELBS Edition)
	Basic Concepts in Analytical Chemistry (Wiley Eastern Ltd.) : S. M. Khopkar
	Handbook of Organic Qualitative Analysis: Clarke

	Comprehensive Practical Organic Chemistry- Quantitative Analysis by V.K. Ahluwalia, Sunita Dhingra, University Press. Distributor - Orient Longman Ltd.,
	Comprehensive Practical Organic Chemistry preparation and Quantitative Analysis.: V.K. Ahluwalia, Renu Agarwal, University Press. Distributor-Orient Longman Ltd.,
	A laboratory Hand-Book of organic Qualitative Analysis and separation: V. S. Kulkarni, Dastane Ramchandra and Co. Pune.

Semester II

Title of the paper: Applied Microbiology

Credit: 02, Theory: 30 Periods, Marks: 50

Learning Objectives:

1. Understand the microbial content of air, water, soil and milk.
2. Study the health effects associated with air, water, soil borne microorganisms.
3. Understand the fundamental of microbiology and their importance in environmental process.
4. Study the methods and techniques used for milk, soil, air and water microbial monitoring and assessment.

Course Outcome: After completion of the course, students will be able to

1. Assess the types and role of microorganisms present in milk, air and water and sewage.
2. Analyse microbiological quality of milk, air and water.
3. Practice hygiene at individual and community level.
4. Evaluate food and milk safety and incorporate in daily life

Unit No.	Content of Unit	Lectures Allotted
I	**Air, Water and sewage Microbiology** **A. Air Microbiology** a) Composition of air. Sources of microorganisms in air b) Definitions of Droplet, droplet nuclei, aerosols, Smog c) microbial examination of air - Liquid impingement and Solid impaction **B. Water Microbiology:** a) Sources of Microorganisms in water b) fecal pollution of water and its indicator c) routine bacteriological analysis of water for detection and differentiation of coliforms– i) Qualitative (presumptive, confirmed and completed) and IMViC and Eijkman test ii) Quantitative Test –MPN d) Municipal water purification process: Sedimentation, Filtration and Disinfection **C. Sewage Microbiology**: a) Definition, Types and Microflora of sewage	**15 L**

II	**Milk and Medical Microbiology** **A) Milk microbiology** a) Definition and Composition of Milk b) Sources of contamination of milk c) Microbiological examination of Milk: -DMC, SPC, MBRT test d) Pasteurization –Definition and types of pasteurization, Phosphatase test. **B) Medical Microbiology** a. Definitions: - Infection, etiology, etiological agents, disease, pathogen, opportunistic pathogen, pathogenicity, incubation period, fomite, virulence, morbidity rate, mortality rate, carriers, host, epidemiology, prophylaxis. b. Types of diseases: - Epidemic, endemic, pandemic & sporadic Types of infections: Primary, Secondary, acute, chronic, re-infection, cross-infection, Mixed infection, congenital, local, systemic and generalized Mode of transmission of diseases: 1) Inoculation 2) Ingestion 3) Contact 4) Inhalation c. Preventive and control of Microbial Diseases	**15 L**

Semester II

Title of the paper: Applied Microbiology Practicals

Credit: 02, Practical: 60 Periods, Marks: 50

List of Practicals:

1) Determination of Quality of Milk by MBRT
2) Study of colony characteristics of bacterial isolates.
3) Study of bacterial motility by Hanging drop technique
4) Isolation and identification of *E. coli* from sewage/ water sample by four quadrant method using MacConkeys Agar.
5) Isolation and identification of *E. coli* from food sample by four quadrant method using MacConkeys Agar.
6) Isolation and identification of *Bacillus spp* from soil by four quadrant method using Nutrient Agar.
7) Enumeration of bacteria in Milk sample by DMC.
8) Determination of Total viable count of bacteria in Milk sample SPC
9) Study of coliforms by IMViC test.
10) Study of sugar fermentation - Glucose, Lactose.
11) Detection of Amylase activity
12) Detection of Caseinase activity
13) Isolation of S. aureus from skin on milk agar or by Mannitol Salt Agar
14) Study of Air Microflora
15) Study of efficiency of pasteurization by phosphatase test

Semester II

Title of the paper: Animal Diversity- II (Chordates)

Credit: 02, Theory: 30 Periods, Marks: 50

Unit Number	Title of the Unit	Contact Hours
1	**1) Protochordates:** General characters and classification of protochordata – Herdmania Balanoglossus, Amphioxus **2) Agnatha:** General features and classification upto order: Petromyzon, Myxine **3) Gnathostomata: Pisces** General features and classification upto orders: Chondrichthyes **4)** General features and classification upto orders: Osteichthyes Parental care in fishes	15
2	**5) Amphibia:** General features and classification upto orders of Anura, Apoda and Urodela, Parental care in Amphibia **6) Reptiles:** General features and classification upto orders:Squamata,Testudines, Crocodilia, Sphenodontia Venomous and non-venomous snakes: Poison apparatus Types of snake venom, symptoms and treatments of snakebite **7) Aves** General features and classification upto orders: Anseriformes (Duck) Columbiformes (Pegion) Cuculiformes (Cuckoo) Coraciiformes (Kingfisher) Falconiformes (Eagle) Psittaciformes (Parrot) Ciconiformes (Heron) Passeriformes (Sparrow) Fight adaptations in birds **8) Mammals** General features and classification upto orders: Insectivora (Mole) Chiroptera (Fat) Rodentia (Rat) Lagomorpha (Rabbit) Artiodactyla (Boar) Carnivora; (Cat) Proboscidea (Elephant) Cetacea (Whale) Adaptive radiation in mammals	15

Semester II

Title of the paper: Animal Diversity- II (Chordates) Practicals

Credit: 02, Practical: 60 Periods, Marks: 50

1. Study of the following specimens (General characters and classification) CD/ **Model/ Chart/ Slides/ Virtual**

- Balanoglossus, Herdmania, Branchiostoma
- Petromyzon, Sphyrna, Pristis, Torpedo, Labeo, Exocoetus, Anguilla
- Ichthyophis, Salamandra, Bufo, Hyla
- Chelone, Hemidactylus, Chamaeleon, Draco, Vipera, Naja, Crocodylus, Gavialis
- **Any six** common birds from different orders studied:
- Ornithorhynchus, Pteropus, Rattus, Loris, Funambulus

2. Key for Identification of venomous and non-venomous snakes: Cobra, Krait, Russel's viper, sea snake & Rat Snake.
3. Study of skeleton of frog: Skull, Atals, Typical vertebra, Pectoral girdle, Pelvic girdle.
4. Filed visit: study of vertebrate from any local ecosystem, visit to zoo, Museum, Aquaria, etc.
5. An '**Animal Album**' containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

Note -The practical's may be conducted by using specimens authorized by the wildlife and such other regulating authorities though it is strongly recommended that the same should be taught by using photographs/audio-visual aids/ simulations / models, etc. as recommended by the UGC and as envisaged in the regulations of the relevant monitoring bodies. No new specimens, however, shall be procured for the purpose of conducting practicals mentioned here-in-above

Semester II

Title of the paper: Botany - Plant Ecology and Taxonomy of Angiosperm

Credit: 02, Theory: 30 Periods, Marks: 50

Objectives and Outcomes

Unit 1: Plant Ecology

1.1 Objective: To get the knowledge about the introduction, basic concept, levels of organization

Outcome: The students will be able to understand about the basic concept, levels of organization

1.2 Objective: To get the knowledge about the Climatic Factors

Outcome: The students will be able to understand about the Climatic Factors- Light, Temperature, Humidity, Wind & Rainfall

1.3 Objective: To get the knowledge about the Edaphic Factors

Outcome: The students will be able to understand about the Edaphic Factor- soil, its origin, formation and components

1.4 Objective: To get the knowledge about the Ecological Adaptation- hydrophytes

Outcome: The students will be able to understand about the Morphological, anatomical, and Physiological adaptations in hydrophytes

1.5 Objective: To get the knowledge about the Ecological Adaptation- xerophytes

Outcome: The students will be able to understand about the Morphological, anatomical, and **Physiological** adaptations in xerophytes

1.6 Ecological **succession**

Objective: To get the knowledge about the Ecological succession

Outcome: The students will be able to understand about the Ecological succession

Unit2: Taxonomy of Angiosperm

2.1 Objective: To get knowledge about aim and principles of taxonomy

Outcome: The students will be able to understand about aim and principles of taxonomy

2.2 Objective: To get knowledge about general characters of angiosperms

Outcome: The students will be able to understand about general characters of angiosperms, primitive and advanced characters of flower

2.3 Objective: To understand different types of classification and its merit & demerits

Outcome: The students will be able to understand about different types of classification and its merit & demerits

2.4 Objective: To understand Principles of ICBN, Nomenclature of plants

Outcome: The students will be able to understand Principles of ICBN, Nomenclature of plants

2.5 **Objective**: To get knowledge about botanical gardens of India

Outcome: The students will be able to understand about culcutta botanical garden and Lead botanical garden Kolhapur

2.6 Study of Angiosperm families

Objective: To study morphological & reproductive characters of 4 families

Outcome: The students will be able to understand characters of family

Unit 1:	**Plant Ecology**	**15 L**
1.1	Introduction, Basic Concept., Levels of organization	(2 L)
1.2	Climatic Factors- Light, Temperature, Humidity, Wind & Rainfall.	(2 L)
1.3	Edaphic Factor: Origin, Formation & Components of soil.	(2 L)
1.4	**Ecological Adaptation:** Morphological, anatomical, and Physiological adaptations in hydrophytes	(3 L)
1.5	Morphological, anatomical, and Physiological adaptations in xerophytes	(3 L)
1.6	Ecological succession – Introduction, concept & process, Hydrosere and Xerosere	(3 L)
Unit 2:	**Taxonomy of Angiosperm**	15 L
2.1	Introduction, Aims and Principles of Taxonomy	(2 L)
2.2	General characters of angiosperms, primitive, and advanced characters of flower	(2 L)
2.3	Types of classification: Artificial, Natural and Phylogenetic, Salient features, outline of Bentham and Hooker system of classification, Merits, and demerits	(3 L)
2.4	Principles of ICBN , Nomenclature, Binomial nomenclature of plants	(2 L)

2.5	Botanical gardens of India- Sir J. C. Bose Botanical Garden, Calcutta & Lead Botanical Garden of Shivaji University Kolhapur	(2 L)
2.6	Study of Angiosperms families: systematic position, morphological & distinguishing characters with economic importance of following families: a) Caesalpiniaceae b) Solanaceae c) Nyctaginaceae d) Amaryllidaceae	(4 L)
	References. 1. Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition. 2. Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition. 3. Odum, E.P. Ecology. Oxford & F. B. h. Publishing Co. pvt. LTD -New Delhi. 4. Barbour, M.G., Burk, J.H. and Pitts, W.D. 1987. Terrestrial Plant Ecology. Benjamin Cummings Publication Co., California. 5. Kormondy, E.J. 1996. Concepts of Ecology, Prentice-Hall of India Pvt. Ltd., New Delhi. 6. Hill, M.K. 1997. Understanding Environmental Pollution. Cambridge University Press. 7. Mackenzie, A. et al. 1999. Instant Notes in Ecology. Viva Books Pvt. Ltd., New Delhi. 8. Ashok Bendre / Ashok Kumar Economic Botany Rastogi Publications Shivaji Road, Meerut 250002 India. 9. Prof. M.A. Khan – Environment, Biodiversity and Conservation S-B Nangia, A.P.H. Publishing Corporation, 5, Ansari Road, Daryaganj New Delhi – 110002. 10. B.P. Pandey – Modern Practical Botany Vol – I / II Chand & Company Ltd. Ramnagar New Delhi – 110055. 11. R.S. Shukla & P. S. Chandel. Plant Ecology. S. Chand & Company LTD. Ram Nagar, New Delhi.110055. 12. Pavas Divan – Environ Protection – Deep & Deep Publications D-I 124, Rajouri Garden, New Delhi – 110027. 13. P.S. Verma / V.K. Agrawal – Concept of Ecology, S. Chand & Lonpan Ltd. Ramnagar, New Delhi – 110055. 14. Eug Warming – Ecology of Plants, Ambey Publications Delhi (India) 15. Evgene P Odum – Ecology Oxford & IBH Publishing Co. Pvt. Ltd. Kolkata (Calcutta), New Delhi. 16. Ishwar Prakash. Desert Ecology. Scientific Publications, Ratandas Road, Jodhpur. -342001-India. 17. T.W. Woodhead. Plant Ecology. Sonali Publications. New Delhi.110002. 18. Eug. Warming. Ecology of Plant. Ambey Publications Delhi.	

19. Jonathan Silvertown. Introduction To Population Plant Ecology. Longman Singapore Publisher, LTD.
20. Morphology of Angiosperms, J M Coulter and C J Chamberlain, Pointer Publishers, Jaipur.
21. Taxonomy of Angiosperm R Pandey, S Chand and Co. Ltd, Ramnagar New Delhi.110055
22. An Introduction to Taxonomy of Angiosperms- Pritish Shukla, Shital P Mishra, Vikas Publishing House, Pvt. Ltd. Ghaziabad, UP.
23. A Textbook of Angiosperms-B P Pandey, S Chand, and Co Ltd. Ramnagar, New Delhi.110055
24. A Textbook of Botany - 'Angiosperm, V Singh C Pande, D K Jain, Rastogi Publication, Shivaji Road Meerut.250002
25. Taxonomy of Angiosperm, Neeru Mathur, Sonali Publications, New Delhi, 110002.
26. Angiosperms-G L Chopra, Pradeep Publications, Jalandhar, 144008.
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28. Singh, G. (2012). *Plant Systematics:* Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.
29. Jeffrey, C. (1982). An introduction to plant Taxonomy, Cambridge University Press, Cambridge.
30. Judd, W.S., Campbell, C.S., Kellog, E.A., Steven, P.F. (2002). Plant Systematics- A Phylogenetic approach. Sinauer Associates Inc., U.S.A. 2nd edition.
31. Maheshwari j. k. (1963). Flora of Delhi. CSIR, New Delhi.
32. Simpson, M.G. (2006). Plant Systematics. Elsevier Academic Press, San Diego, CA, U.S.A.
33. Singh, G. (2012). Plant Systematics: Theory and Practice. Oxford & IBH Pvt. Ltd., New Delhi. 3rd edition.
34. Gaikwad, S. P. & Garad, K. U. (2015). Flora of Solapur District, Laxmi Book Publication Solapur.

Semester II

Title of the paper: Botany: Plant Ecology & Taxonomy of Angiosperm Practical's

Credit: 02, Practical: 60 Periods, Marks: 50

List of Practicals:

1	Study of soil p^H by Universal indicator/p^H paper/p^H meter

2	Study of Water holding capacity of different soil
3	Study of meteorological instruments (any three)
4-5	Ecological adaptations of Hydrophytes (*Hydrilla*, *Eichhornia* and *Typha*).
6	Ecological adaptations of Xerophytes (*Nerium* and *Aloe*).
7	Study of typical flower
8	Study of types of placentation
9	Study of types of aestivations
10	Study of floral formula and floral diagram
11	Study of plant family Caesalpiniaceae
12	Study of plant Family Solanaceae
13	Study of Plant family Nyctaginaceae
14	Study of Plant family Amaryllidaceae
15	Excursion report.

SEMESTER - II
OE-I/GE-I: SUBJECTS BASKET
(Any One to be Selected)

Sr.No.	Course Type	Paper Title	Credit
1.	OE-I/GE-I	SALES MANAGEMENT	2
2.	OE-I/GE-I	BIOTECHNOLOGY FOR HUMAN WELFARE	2
3.	OE-I/GE-I	HEALTH AND MICROBIOLOGY	2
4.	OE-I/GE-I	ANY ELECTIVE SUBJECT OFFERED BY OTHER FACULTY	2

Semester II

OE-I/GE-I - SALES MANAGEMENT

Course Credits	No. of Hours per Week	Total No. of Teaching Hours	Total marks
2 Credits	2 Hours	30 Hours	50 (30 UA + 20 CA)

Learning Objectives –

1. The objective of this paper is to provide students' knowledge on sales and distribution strategies and their implications in managerial decision making.
2. To explain the concepts of sales management, personnel selling and sales task summarize history of sale stages.
3. Students can learn to develop a plan for organizing, staffing and training a sales force. Identify the key factors in establishing and maintaining high morale in the sales force.

Course Outcomes (Cos)

CO1: Recognize and demonstrate the significant responsibilities of sales person as key individual
CO2: Understand the basic concepts and techniques of selling and their applications to managerial decision makings in the field
CO3: Describe and formulate strategies to effectively manage company's sales operations
CO4: Evaluate the role of Sales manager and his/ her responsibilities in recruiting, motivating, managing and leading sales team

Unit I	**Sales Management**	**15**
	● Definition, objectives of Sales Management ● Evolution of Sales Management ● Sales organization ● Sales Budget ● Sales Promotion	
Unit II	**Personal Selling**	**15**
	● Definition, objectives of Sales Management ● Introduction, Salesmanship Skills ● Personal Selling skills& techniques –Sales Call – types of calls-AIDA, ● Types of salesmanship ● Sales force Management – Recruitment, motivation & controlling	

Reference Books:

1. Still, R. R., Cudiff, E. W., Govoni. N. A. P. and Puri, S. Sales and Distribution Management, 6th edition, 2017, Pearson India Education Services.
2. Havaldar, K. K. and Cavale V. M., Sales and Distribution Management: Text and Cases, 3rd Edition, 2017, McGraw Hill Education (India) Private Limited.
3. Sales and Distribution Management- Dr. Matin Khan, Excel Books- First Edition

Semester II

OE-I/GE-I - BIOTECHNOLOGY FOR HUMAN WELFARE

Credit: 02, Theory: 30 Periods, Marks: 50

	Learning Objective:
	Students will be able to
●	To study the history of biotechnology.
●	To understand the scientific methods.
●	To study the application of biotechnology.
●	To know about role of biotechnology in various branches.
Unit 1:	**Introduction to Biotechnology (15)**
1.1	Definitions of biotechnology, History of Biotechnology, Scientific Foundation of Biotechnology, Commercialization of Biotechnology, Contribution of biotechnology, National institutes of biotechnology in India.
1.2	Biotechnological milestones- Green, White, Blue, Yellow, Grey revolution
1.3	**Environmental Biotechnology** – Solid waste management, vermicomposting, biofertilizer, Bioremediation.
Unit 2:	**Application of Biotechnology (15)**
2.1	**Biotechnology in healthcare** – Gene therapy (Ex vivo and in vivo) with any one example, recombinant vaccines, monoclonal antibody production and application.
2.2	**Animal tissue culture**- Definition, types of culture, types of culture media, transgenic animal (sheep and calves).
2.3	**Plant tissue culture**- Callus culture, cell suspension culture, protoplast culture, haploid culture. Micropropagation.
	Course Outcome:
	After completion of the course, the students will be able to:
●	Understand the Application of biotechnology in various field.
●	Understand the Importance of advance techniques to solve social problems.
●	Explain the working principles of various instruments.
●	Know the innovations done by biotechnologist.
●	Understand the opportunities for new innovations.
	References Books:
	1. Gene Cloning and DNA Analysis –An Introduction. T.A. Brown. Eighth Edition (2020). Wiley Blackwell.

2. Genetic Engineering. By Smita Rastogi and Neelam Pathak. Oxford University Press (2009).
3. Principles of Gene Manipulation & Genomics, 7th Edition (2006), Primrose and Twyman, Blackwell Publishing, USA.
4. Molecular Biology of the Gene, 7th Edition (2013), James D. Watson, Tania Baker, Stephen P. Bell, Alexander Gann, Michael Levine, Richard Lodwick, Pearson Education, Inc.
5. Genomes 3. T.A. Brown. Third Edition (2008). Garland Science Taylor and Francis Group, New York and London.
6. Razdan M.K. (2009) - Introduction to Plant Tissue culture (Oxford & IBH Publ, New Delhi).
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8. Jha TB & Ghosh B (2017) – Plant tissue culture: Basic and applied (Universities Press, Hyderabad) and latest editions.
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10. Methods In Plant Tissue culture – (2003) U Kumar Agrobios India 6. Plant cell culture Technology—MM Yeomen (2012) Blackwell.
11. Freshney R.I. Culture of Animal Cells: A Manual of Basic Techniques and Specialized Applications. 7 th Edition. Wiley Blackwell; USA: 2015
12. Principles and Practice of Animal Tissue Culture by Sudha Gangal, 2 nd Edition.
13. Shenoy M 2007 Animal cell culture Animal Biotechnology ch 1, p (New Delhi: Firewall)
14. Bhat S.M. Animal Cell Culture Concept and Application. Alpha Science International Limited; Oxford: 2011.
15. Walsh G. Biopharmaceuticals – Biochemistry and Biotechnology. 2nd ed. John Wiley and Sons; Chichester: 2003.
16. Satyanarayan U, Biotechnology, Arunabha Sen Books allied Publishers 8th edition

Semester II

OE-I/GE-I - HEALTH AND MICROBIOLOGY

Credit: 02, Theory: 30 Periods, Marks: 50

	Course Objectives:
●	To provide general information on microbial diseases.
●	To know the common diagnostic practices.
●	To aware common man about personal and social hygiene.

●	To gather information related to medicines available in medical store.
Unit 1:	**Information of Common Diseases (15)**
1.1	Mode of transmission, symptoms and precautions- Tuberculosis, Cholera, Typhoid, Pneumonia, Flu, Measles, AIDS, COVID, Malaria, Amoebiasis, Leptospirosis, Candidiasis, Ringworm, Mucormycosis. Diagnostic Tests- Hematology, Biochemistry (Blood & Urine), Dot-Blot ELISA, RT-PCR, Immunological (Widal test).
Unit 2:	**Control on Diseases (15)**
2.1	Role of personal and social hygiene in Disease control. **Vaccines**- Child vaccination schedule, Example and application of vaccines. **Antibiotics, Antiviral, Antiprotozoal & Antifungal agents**- Examples and applications. **Symptomatic drugs**- Types of symptoms and its drug.
	Course Outcomes:
	After completion of the course, the students will be able to:
●	Create awareness about maintaining hygiene.
●	Identify the diseases on the basis of symptoms.
●	Know role of diagnosis in disease control.
●	Collect information on general medicines
	Reference books:
	1. Medical Microbiology - Davis and Dulbecco 2. Medical laboratory technology – Ramnaik Sood 3. Diagnostic Microbiology – Bailey's and Scotts 4. Textbooks of medical microbiology-Anant Narayan 5. Immunolgy & Serology-Carpenter. 6. Pharmaceutical Microbiology – Huggo 7. Pharmacological Classification of Drugs with Doses and Preparations – KD Tripathi 8. Handbook of Medicine for Pharmacists – GP Mohanta and Praveen Kumar 9. Hygiene: A Manual of Personal and Public Health – Arthur Newsholme

Semester II

Title of the paper: SEC-2 - ENTREPRENEURIAL BEST PRACTICES

Course Credits	No. of Hours per Week	Total No. of Teaching Hours	Total marks
2 Credits	2 Hours	30 Hours	50 (30 UA + 20 CA)

Learning Objectives –

1. To provide conceptual exposure on converting idea to a successful entrepreneurial firm.
2. To identify significant changes and trends which create business opportunities and to analyze the environment for potential business opportunities.
3. To enable the students to understand the concept of Entrepreneurship and to learn the professional behavior expected of an entrepreneur.

Course Outcomes (COs)

CO1: The students will familiars with knowledge about business and project reports for starting a new venture on team based.
CO2: Students can be well equipped with the appropriate tools for analyzing the business risks and hurdles
CO3: Develop a solution through critical thinking to optimize sustainable goal

Unit I	**Entrepreneurial Skills Sets**	**15**
	● Developing Mission, Vision and Goals ● Building a Motivated Team ● Entrepreneurial Psychology, Driving Forces and Characteristics ● New Age Marketing and After Sales Services ● Trends in Entrepreneurship • Business Ethics and Best Practices	
Unit II	**Opportunities And Challenges for Entrepreneurship**	**15**
	● Identifying and Meeting the Gaps in Resources at Optimized Cost ● Building a Sustainable Revenue Model and Periodical Business Plan ● Start-up Models ● Funding Options for Start-up, including Crowd Funding ● Predicting, Calculating and Overcoming Financial Risks • Entrepreneurship And Technology	

References:

1. Entrepreneurial Skills - Nieuwenhuizen
2. Entrepreneurial ecosystem in India:
3. Taking stock and looking ahead – S.K Jha
4. Funding for start-ups in India: what shakes it? – S Ghosh
5. Lean start-up: Making the start-up more successful – Rasmussen, Tanev
6. Risk management and financing among start-ups – Pukala
7. Startup leadership: how savvy entrepreneurs turn their ideas into successful enterprises – D Lidow

Semester I **Title of the paper: AEC- L1-2 (English)**			
Course Credits	No. of Hours per Week	Total No. of Teaching Hours	Total marks
2 Credits	2 Hours	30 Hours	50 (30 UA + 20 CA)

Semester I **Title of the paper: VEC-2 – Environmental Studies**			
Course Credits	No. of Hours per Week	Total No. of Teaching Hours	Total marks
2 Credits	2 Hours	30 Hours	50 (30 UA + 20 CA)

Semester I **Title of the paper: CC-2 (Cocurricular)**			
Course Credits	No. of Hours per Week	Total No. of Teaching Hours	Total marks
2 Credits	2 Hours	30 Hours	50 (30 UA + 20 CA)
Health and wellness, Yoga education, Sports and Fitness, Cultural activities, NSS/NCC, Fine/Applied/ Visual/Performing Arts etc.			

Pattern of Examination
External Evaluation UA + Internal Evaluation CA
30 Marks + 20 Marks = 50 Marks

Passing Criteria –
1. Written Exam – 12 out of 30
2. Continuous Assessment (CA) – 08 out of 20

UA

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science &Technology.
Nature of Question Paper for CBCS Pattern
B. Sc. / B.C.A (Part- I) w.e.f. AY 2024-25

Time: Total Marks: 30

Instructions
1) All Questions are compulsory
2) Figure to right indicate full marks.

Q.1 Choose correct alternative. (MCQ) **06 Marks**

Q.2. Answer the following. (Any three) **6 (2+2+2)**
A)
B)
C)
D)
E)

Q.3. Answer the following (Any two). **6 (3+3)**
A)
B)
C)

Q.4. Answer the following (Any two). **6 (3+3)**
A)
B)
C)

Q.5. Answer the following (Any one). **6 Marks**
A)
B)

CA

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science &Technology.
Nature of Question Paper for CBCS Pattern
B. Sc. / B.C.A. (Part- I) w.e.f. AY 2024-25

Time: Total Marks: 20

Internal Evaluation System for 20 Marks
Choose any two of the following
Home Assignment / Unit Test / Tutorial /Seminar