Punyashlok Ahilyadevi Holkar Solapur University, Solapur

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

Name of the Faculty: Science &Technology

(As per New Education Policy 2020)

Syllabus: Entrepreneurship

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

(Syllabus to be implemented from June 2024)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science & Technology
Nep 2020 Compliant Curriculum
B. Sc. (Entrepreneurship)
Program Preamble

The Bachelor of Science (BSc) in Entrepreneurship is a comprehensive and dynamic program designed to provide students with a deep understanding of the fundamental principles of Entrepreneurship, along with the practical skills required to apply this knowledge in various scientific and technological contexts. Aligned with the vision of the National Education Policy (NEP) 2020, the program offers a flexible, multidisciplinary, and learner-centric curriculum that encourages critical thinking, innovation, and holistic development. The BSc Entrepreneurship program spans four years, with each year offering a progressively advanced curriculum designed to build a strong foundation in Entrepreneurship while allowing for specialization and interdisciplinary learning. The curriculum is structured around several key components:

1. **Major Courses:** These core courses form the backbone of the program, providing in-depth knowledge and understanding of essential Entrepreneurship concepts, theories, and methodologies. Students will engage with topics from Chemistry, Microbiology, Botany, Zoology, Economics, Commerce and Management etc. ensuring a robust and comprehensive education in the multidisciplinary approach.
2. **Minor Courses:** Students have the opportunity to choose minor courses from related or distinct disciplines, promoting an interdisciplinary approach to learning. This flexibility allows students to complement their Entrepreneurship education with insights from fields such as chemistry, microbiology, zoology, Botany, Biotechnology, Business management for enhancing their versatility and broadening their career prospects.
3. **Open Electives/General Electives:** The program encourages intellectual exploration beyond the core discipline by offering a wide range of elective courses. These electives enable students to pursue their interests in diverse subjects, fostering creativity, critical thinking, and a well-rounded educational experience.
4. **Vocational and Skill Enhancement Courses:** Practical skills and technical proficiency are integral to the program, with vocational and skill enhancement courses providing hands-on experience in areas such as Water and soil analysis, Fertilizer and food analysis. These courses are designed to prepare students for immediate employment and equip them with the tools necessary for career advancement in various scientific and technological fields.
5. **Ability Enhancement Courses (AEC), Indian Knowledge System (IKS), and Value Education Courses (VEC):** In alignment with NEP 2020, the program integrates courses that emphasize the Indian Knowledge System, ethical values, and life skills. These courses foster a deep appreciation for India's rich cultural heritage, while also developing essential communication and ethical decision-making skills that are vital for personal and professional growth.
6. **Field Projects/Internships/Apprenticeships/Community Engagement Projects/On-Job Training:** To bridge the gap between theoretical knowledge and real-world applications, the program includes opportunities for field projects, internships, apprenticeships, and community engagement. These experiences provide students with practical insights, problem-solving abilities, and exposure to professional environments, enhancing their readiness for careers in Chemistry and related fields.
7. **Research Methodology and Research Projects:** Research is a critical component of the BSc Entrepreneurship program, with students acquiring skills in research methodology, data collection, analysis, and scientific inquiry. By engaging in independent research projects, students are encouraged to develop innovative solutions to complex scientific problems, preparing them for advanced studies and research-oriented careers.

Multiple Entry and Multiple Exit Options

In accordance with the NEP 2020, the BSc Entrepreneurship program incorporates a Multiple Entry and Multiple Exit framework, offering students the flexibility to enter or exit the program at various stages. This approach ensures that students can tailor their educational journey according to their personal and professional goals, with options to earn certificates, diplomas, or degrees based on the duration of study completed.

- **Year 1:**
  Upon completion of the first year, students may exit with a **Certificate in Entrepreneurship**.
- **Year 2:**
  After two years, students may choose to exit with a **Diploma in Entrepreneurship**.
- **Year 3:**
  Completion of the third year qualifies students for a **BSc Degree in Entrepreneurship**.
- **Year 4:**
  The fourth year offers an advanced curriculum with a focus on research, allowing students to graduate with an **Honors Degree in Entrepreneurship**.

Eligibility for B.Sc. Entrepreneurship: The candidate passing the higher secondary examination conducted by the Maharashtra State Board of Higher Secondary Education of CBSE with science stream, MCVC with science subject, D. Pharm, Diploma Engineering, Agricultural Diploma, Diary Diploma shall be allowed to enter the B.Sc. Part I course. OR An Examination of any other statutory university or an examining body recognized as equivalent thereto.

Repeater student will be allowed to take fresh admission to the same class with same subjects or different subjects.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science & Technology
Nep 2020 Compliant Curriculum

BSc (Entrepreneurship)
Program Outcomes (PO)

Students graduating from the Bachelor of Science in Entrepreneurship program will be able to:

Major Courses:

- **PO1**: Demonstrate in-depth knowledge and understanding of core concepts, theories, and methodologies in the chosen major discipline.
- **PO2**: Apply disciplinary knowledge to solve complex problems, analyze data, and make informed decisions in professional and research contexts.

Minor Courses:

- **PO3**: Acquire complementary knowledge and skills from a related or distinct discipline, enhancing interdisciplinary understanding and versatility.

Open Electives/General Electives:

- **PO4**: Explore diverse subjects beyond the core discipline, fostering a broad-based education and cultivating critical thinking and creativity.

Vocational and Skill Enhancement Courses:

- **PO5**: Gain hands-on experience and technical proficiency in specific vocational areas, preparing for immediate career opportunities.

Ability Enhancement Courses (AEC), Indian Knowledge System (IKS), and Value Education Courses (VEC):

- **PO6**: Understand and appreciate the rich heritage of the Indian Knowledge System, integrating traditional wisdom with modern education.
- **PO7**: Develop ability enhancement skills like communication and life skills along with ethical values, social responsibility, and a strong sense of citizenship, contributing positively to society.

Field Projects/Internship/Apprenticeship/Community Engagement Projects/ On Job Training/ Internship/Apprenticeship:

- **PO8**: Apply theoretical knowledge to real-world situations through field projects, internships, community engagement and On job Training for gaining practical experience and problem-solving skills.

Research Methodology and Research Project:

- **PO9**: Acquire research skills, including data collection, analysis, and interpretation, fostering a scientific approach to problem-solving to develop independent research projects handling capabilities.

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Students graduating from BSc (Entrepreneurship) will able to:
PSO1: Apply the basic knowledge of chemistry, microbiology and biotechnology to perform various tasks assigned at the workplace. **PSO2:** Use subject knowledge and ICT skills to be an effective team member in his/her field. **PSO3:** Understand and contribute to solve basic societal issues based on principles of scientific knowledge he/she has gained. **PSO4:** Exhibit professional work ethics and norms of scientific development.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

Three Majors in First Year structure as per NEP-2020 Approved in For AC Meeting on 18/04/2024

4- Year Multidisciplinary UG Program with DSC as a Major (4 -Year Bachelor of Science (Honors)/(Honors with Research)

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	DSC1-1 (2+2)#	--		GE1/ OE1(2)	SEC1 (2)	L1-1(2) IKS (2) VEC1(2) (Indian Constitution And Democracy)	--	22	**44 UG Certificate (44)**
		DSC2-1 (2+2)#	--							
		DSC3-1 (2+2)#	--							
	II	DSC1-2 (2+2)#	--		GE2/ OE2(2)	SEC 2 (2)	L1-2(2) VEC2(2) (Environmental Studies)	CC1 (2)	22	
		DSC2-2 (2+2)#	--							
		DSC3-2 (2+2)#	--							
Exit option: Award of UG Certificate in Major with 44 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor										
5.0/200	III	DSC1-3 (2+1)	---	DSC2-3 (2+1)	GE3 / OE3(2)	VSC1 (2) (DSC1) VSC2(2) (DSC2)	L2-1 (2)	CC2 (2)	22	**44 UG Diploma (88)**
		DSC1-4 (2+1)	---	DSC-2-4 (2+1)						
	IV	DSC1-5 (2+1)	---	DSC2-5 (2+1)	GE4/ OE4 (2)	VSC3 (2) (DSC1) VSC4(2) (DSC2)	L2 -2(2)	FP1/CEP1(2)	22	
		DSC1-6 (2+1)	--	DSC2-6 (2+1)						
Exit option: Award of UG Diploma in Major with 88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major										
5.5/300	V	DSC1-7 (3+2) DSC1-8 (3+2) DSC1-9 (3+2)	DSE1-1 (2+1) or DSE1-2 (2+1)	----	----	VSC3 (2) (Hands on Training related to DSE)	IKS 2 (2) (related to major subject)	--	22	**44 UG degree (132)**
	VI	DSC1-10 (3+2) DSC1-11 (3+2) DSC1-12 (3+2)	DSE1-3 (2+1) or DSE1-4 (2+1)	----	---	VSC4 (2) (Hands on Training related to DSE)		FP2/CEP2/OJT1 (2)	22	
	Total Credits 3 Yrs	**66-8#**	**6**	**12 +8#** 20	**08**	**16**	**16**	**08**	**132**	
Exit option: Award of UG degree in Major with 132 Credits OR Continue with Major										
6.0/400	VII	DSC1-13 (4+2) DSC1-14 (4+2)	DSE1-5 (4+2)	Research Methodology (4)	------	----	----	---	22	**44 UG Honours Degree in Main faculty (176)**
	VIII	DSC1-15 (4+2) DSC1-16 (4+2)	DSE1-6 (4+2)		----	-----	----	OJT/In-house Project/ Internship/ Apprenticeship (4)	22	
	Total 4 Yrs	**90-8#**	**18**	**16+8#**	**08**	**16**	**16**	**12**	**176**	
Award of Bachelor of Science Honors., (B.Sc. Honors.) degree with Major and Minor (176 credits)										

		OR								
6.0/400	VII	DSC1-13 (4) DSC1-14 (4)	DSE1-5 (4)	Research Methodology (4)	------	----	----	Research Project (6)	22	**44 UG Honours with research Degree in Main faculty (176)**
	VIII	DSC1-15 (4+2) DSC1-16 (4+2)	DSE1-6 (4)		----	-----	----	Research Project (6)	22	
	Total 4 Yrs	**86-8#**	**14**	**16+8#**	**08**	**16**	**16**	**20**	**176**	

#Out of the three major courses in the first year, one major (comprising 4 credits for the 1st semester and 4 credits for the 2nd semester) will transition into a minor starting from the second year. Consequently, 8 credits will be reallocated from the major course credit count and added to the minor credit count, thereby meeting the requisite credit criteria for the minor as stipulated in the guidelines.

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	2 - L1-1 2 - IKS, 2 - VEC1		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) **G07-0101**	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	**G07-0106** **G07-0107** (Practical Lab – I) **G07-0108**	6
5.	GE/OE	GE-1/OE-1	Sales Management **(G07-GE-OE-101)**	2
6.	SEC 1	SEC 1	Employability Skills **(G07-SEC-101)**	2
7.	AEC	L1-1	English for Communication-Paper-I **(ENG-101)**	2
8.	IKS	IKS	Introduction to Indian Knowledge System in Science **(G07-IKS-101)**	2
9.	VEC 1	VEC 1	Indian Constitution and Democracy **(ICD-101)**	2
10.			**Total**	**22**
SEM - II				
11	Major	DSC 1-2	ENTREPRENEURSHIP – II (MACROECONOMICS) **(G07-0201)**	2
12	Major	DSC 2-2	To be selected from the Basket of Major Subjects provided in this syllabus only	2
13	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	**G07-0206** **G07-0207** (Practical Lab – II) **G07-0208**	6
15.	GE /OE	GE-2 /OE1-2	Health and Microbiology **(G07-GE-OE-201)**	2
16.	SEC	SEC - 2	Entrepreneurial Best Practices **(G07-SEC-201)**	2
17.	AEC	L1-2	English for Communication-Paper-II **(ENG-201)**	2
18.	VEC 2	VEC 2	Environmental Studies **(ENS24)**	2
19.	CC 1	CC 1	Community Engagement & Services **(CES-201)** National Service Scheme **(CC-201)** National Cadet Corps **(CC-202)** Sports **(CC-203)** Cultural Activities **(CC-204)** Health, Wellness and Fitness **(CC-205)** Yoga Education **(CC-206)**	2
20			**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

ENTREPRENEURSHIP - BASKET OF MAJOR SUBJECTS

SEMESTER - I		SEMESTER II	
DSC 1-1 (Compulsory)	ENTREPRENEURSHIP- I (FUNDAMENTALS OF MANAGEMENT) **G07-0101**	**DSC 1-2** (Compulsory)	ENTREPRENEURSHIP – II (MACROECONOMICS) **G07-0201**
DSC 2-1 (Any One)	Chemistry- I (Physical and Inorganic Chemistry) **G07-0102**	**DSC 2-2** (Any One)	Chemistry-II (Organic and Analytical Chemistry) **G07-0202**
	Basics in Microbiology **G07-0103**		Applied Microbiology **G07-0203**
DSC 3-1 (Any One)	Animal diversity-I (Non-Chordates) **G07-0104**	**DSC 3-2** (Any One)	Animal Diversity- II (Chordates) **G07-0204**
	Botany: Algae, Fungi and Archegoniate **G07-0105**		Botany: Plant Ecology & Taxonomy of Angiosperm **G07-0205**

Semester I

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***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA:30 Marks** **CA: 20 Marks**

Course Preamble: Fundamentals of Management is one of the core courses in the Entrepreneurship curriculum and one of the applied courses, dating back from the last many centuries. This course provides an in-depth understanding of the fundamental concepts in management. Students will study these subtopics in detail. By combining theoretical knowledge with numerical treatment, the course aims to develop practical skills in analyzing and optimizing the Management concepts.

	Course Objectives:
●	To learn basic concepts and principles of management practices required to run an organization.
●	To know the levels of management
●	To develop knowledge and skills regarding functions of Management
	Course Outcomes:
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 1:	**Introduction to Management** **Hrs (15), Weightage: 15-23 Marks**
	● 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 2:	**Functions of Management** **Hrs (15), Weightage: 15-23 Marks**

2	• 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.

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **First Year BSc (ENTREPRENEURSHIP) Semester-I** **Vertical: DSC** **Course Code: G07-0106** **Course Name: ENTREPRENEURSHIP PRACTICAL - I** **(FUNDAMENTALS OF MANAGEMENT)**
***Teaching Scheme** **Practical: 04Hours/week, 02 Credit**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Entrepreneurship Practical – I, is one of the core practical courses in the Entrepreneurship curriculum. This course provides an in-depth understanding of the fundamental concepts and practical skills in local business. By combining theoretical knowledge with hands on practicals will helps students to develop practical skills in analyzing and optimizing the management skills.

	Course Objectives:
●	To develop practical skills in local business.
●	To conduct local survey on local firms.
●	To study the leadership strategies
●	To write a report of visit on local business
	Course Outcomes:
	On successful completion of this practical course student will be able to:
●	Develop practical skills in local business.
●	Conduct local survey on local firms.
●	Study the leadership strategies
●	Write a report of visit on local business
	List of Experiments
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
	Reference Books:
1.	Fundamentals of Management by Stephen P Robbins
2.	Essentials Of Management by Harold Koontz
3.	Marketing Management by G.Shainesh Philip Kotler, Kevin lane Keller, Alexander Chernev, Jagdish N. Sheth

MAJOR SUBJECTS BASKET FOR DSC 2-1
(Any One 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

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***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Physical and Inorganic Chemistry is one of the core courses in the Chemistry curriculum and one of the traditional courses, dating back from the last many centuries. This course provides an in-depth understanding of the fundamental concepts in Chemical kinetics, Gaseous state, Covalent bonding: VBT and MOT approach. Students will study these subtopics in detail. By combining theoretical knowledge with numerical treatment, the course aims to develop practical skills in analyzing and optimizing the Chemistry concepts.

	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.
	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
Unit 1:	
A	**Gaseous State** **Hrs (07), Weightage: 7-11 Marks**
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** **Hrs (08), Weightage: 8-12 Marks**
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** **Hrs (07), Weightage: 7-11 Marks**
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** **Hrs (08), Weightage: 8 to 12 Marks**
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.
	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 Valency Theory- G. J.Brown

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***Teaching Scheme** **Practical: 04Hours/week, 02Credit**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Chemistry I practical is one of the core courses in the Chemistry curriculum. This course provides an in-depth understanding of the fundamental concepts in Physical and Inorganic chemistry. By combining theoretical knowledge with hands on practicals will helps students to develop practical skills in analyzing and optimizing the Physical and Inorganic Chemistry concepts.

	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
	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.
	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
	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)

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***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Microbiology is the scientific study of microorganisms, which are too small to be seen with the naked eye. These organisms include bacteria, viruses, fungi, protozoa, and archaea. This course aims to provide a solid foundation in the principles of microbiology. It will explore the diversity of microorganisms, their structure, metabolism, genetics, and their interactions with other organisms and the environment.

	Course Objectives:
●	Students will be able to Understand the History of Microbiology
●	Identify key figures and their contributions to the field and analyze the impact of technological innovations on microbiological research.
	Course Outcomes:
	students will gain a comprehensive understanding of the history, scope, and branches of microbiology, providing a solid foundation for further exploration and study in this fascinating field
	Students will understand the applied branches of microbiology and scope of microbiology.
	Students will be able to understand diversity amongst microorganisms.
	Understand beneficial and harmful effects of microorganisms in different fields of Microbiology
Unit 1:	**History, Scope and Branches of Microbiology** **Hrs (15), Weightage: 15-23 Marks**
	Historical Background: Contribution of Robert Hooke, Antony Van Leuwenhoek, Ernst Ruska Theory of spontaneous generation: Francisco Redii, John Needham, Friedrich Schroder and Van Dusch, Louis Pasteur (Swan neck flask experiment) and John Tyndall. Golden era of Microbiology (1857-1914) - i) Germ theory of fermentation ii) Germ theory of disease

	Contribution of Martinus Beijerinck, Sergei Winogradsky, Joseph Lister and Dmitri Ivanovski, Edward Jenner, Eli Metchnikoff, Salman Waksman, Alexander Fleming. In development of applied microbiology. **Branches of Microbiology:** (Water, Air, Agriculture, Food and Dairy, Environmental, Medical, Industrial, Geomicrobiology, Space Microbiology) **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.
Unit 2:	**Microbial Diversity** **Hrs (15), Weightage: 15-23 Marks**
	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. **Prescott, Harley, and Klein's Microbiology** (9th edition) by Michael J. Pelczar, Jr., Eugene C. Klein, and Rodrick M. Krieg 2. **Brock Biology of Microorganisms** (15th edition) by Michael T. Madigan, John M. Martinko, Kelly S. Bender, Brock Chisholm, David P. Clark, Nicholas P. Gerard, and David H. Kahler 3. **Microbiology: A Laboratory Manual** (11th edition) by Michael J. Pelczar, Jr., Eugene C. Klein, and Rodrick M. Krieg

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***Teaching Scheme** **Practical: 04 Hours/week, 02 Credits**	***Examination Scheme** **UA:30 Marks** **CA: 20 Marks**

Course Preamble: Microbiology laboratory practices are essential for the safe and effective study of microorganisms. This course will introduce you to the fundamental techniques used in microbiology laboratories, emphasizing good laboratory practices (GLP) and biosafety measures.

	Course Objectives:
●	**Understand the importance of laboratory safety and biosafety practices.**
●	**Implement** appropriate safety measures to prevent accidents and protect oneself and others from exposure to hazardous materials. Learn to prepare and inoculate various types of culture media for the growth of different microorganisms
	Course Outcomes:
	students will gain practical experience in microbiology laboratory techniques, develop essential skills for future studies and careers, and cultivate a strong foundation in the field of microbiology.
	Students will be able to perform aseptic techniques and other essential laboratory procedures with accuracy and precision.
	Students will be able to operate laboratory equipment, such as microscopes, autoclaves, and incubators, effectively and safely
	Students will be able to prepare various culture media and inoculate them with microorganisms using appropriate techniques
	List of Practicals
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 inocu15lation techniques –Pour plate.
15	Study of morphology of fungi by Mounting method – (a) *Aspergillus* (b) *Rhizopus* (c) *Penicillium* (d) *Mucor*
	Reference books:
	Microbiology: A Laboratory Manual (11th edition) by Michael J. Pelczar, Jr., Eugene C. Klein, and Rodrick M. Krieg
	Laboratory Exercises in Microbiology (9th edition) by Kathleen A. Barker, Paul A. Engelkirk, and Donald W. Porter
	Microbiology: Principles and Applications (3rd edition) by Jacquelyn G. Black, Janice L. Harley, and Michael J. Jorden

MAJOR SUBJECTS BASKET FOR DSC 3-1
(Any One to be Selected)

Sr. No.	Course Type	Paper Title	Credit
1.	Major	Animal diversity-I (Non-Chordates)	2
2.	Major	Botany: Algae, Fungi and Archegoniate	2

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***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Invertebrate zoology is the study of animals that lack a backbone. This course will explore the diversity of invertebrate phyla, their characteristics, classification, and biological importance.

	Course Objectives:
•	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.
	Course Outcomes: By the end of this course, students will be able to:
	Identify the key characteristics of different invertebrate phyla.
	Classify invertebrates into their respective taxonomic groups.
	Describe the anatomy, physiology, and life cycles of various invertebrate species.
	Analyze the ecological roles and economic importance of invertebrates.
Unit 1:	**Kingdom Protista: Hrs (15), Weightage: 15-23 Marks**
	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 Hrs (15), Weightage: 15-23 Marks**
	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
	References:
	1. Invertebrate Zoology by Richard C. Brusca, Gary J. Brusca, and William Moore
	2. Essentials of Vertebrate Zoology by Richard E. Fox
	3. General Zoology by A. C. Dutta
	4. Textbook of Invertebrate Zoology by P. P. Gupta

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***Teaching Scheme** **Practical: 04 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: This practical course is designed to provide students with hands-on experience in studying the diversity of invertebrate animals**.** It will focus on the identification, morphology, and anatomy of various invertebrate groups, including protists, sponges, cnidarians, flatworms, roundworms, annelids, arthropods, molluscs, and echinoderms.

	Course Objectives:
●	Identify the major groups of invertebrates.
●	Describe the morphological characteristics of different invertebrate species.
	Course Outcomes: By the end of this course, students will be able to:
	Identify different invertebrate groups based on their morphological characteristics.
	Describe the key features of various invertebrate structures.
	Analyze the anatomical and physiological adaptations of invertebrates.
	Collect and identify invertebrate specimens from the field.
	List of Practicals
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.
	Reference books:
	1. Invertebrate Zoology by Richard C. Brusca, Gary J. Brusca, and William Moore 2. Essentials of Vertebrate Zoology by Richard E. Fox 3. Textbook of Invertebrate Zoology by P. P. Gupta 4. Cnidaria and Ctenophora by Hyman 5. Platyhelminthes, Nemertinea, and Acoelomata by Hyman 6. Annelida by Hyman 7. Arthropoda by Hyman 8. Mollusca by Hyman 9. Echinodermata by Hyman

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***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Botony (Algae, Fungi, and Archegoniates)
This course is designed to provide students with a comprehensive understanding of plant biology, focusing on the major groups of non-flowering plants. It will explore the characteristics, classification, and biological importance of algae, fungi, bryophytes, pteridophytes, and gymnosperms.

	Course Objectives:
•	To get the knowledge about the Introduction, characters, classification, and economic importance of algae and fungi
•	To get the knowledge about the general Characters of Chlorophyta, Phaeophyta, Zygomycotina, and Phaeophyta division
•	To get Knowledge about Introduction & general characters of Archegoniate, Bryophytes, Pteridophytes and Gymnosperms
•	To understand economic importance of Gymnosperm
	Course Outcomes:

	Students will be able to understand characters, classification, economic importance of algae and fungi
	The students will be able to understand in detail about the division Phaeophyta along with its one example of *Sargassum* in detail.
	Students will be able to understand the economic importance of fungi and its importance in day-to-day life.
	Students will be able to understand the Bryophytes and life cycle of ***Riccia*** with its economic importance
Unit 1:	**ALGAE & FUNGI Hrs (15), Weightage: 15-23 Marks**
	Introduction, General Characters, And Classification of Algae (As Per Smith-1955) up to Class. Economic importance of algae. Chlorophyta: General Characters Study of ***Spirogyra*** - Occurrence, Classification, Thallus structure and Reproduction (Excluding Developmental Stages) Phaeophyta: General Characters Study of ***Sargassum*** - Occurrence, Classification, Thallus structure and Reproduction (Excluding Developmental Stages) General Characters, Classification of Fungi up to Class (As per Ainsworth) Zygomycotina: General Characters Study of ***Mucor***: Occurrence, Classification, Thallus Organization, Life Cycle (Excluding Developmental Stages) Economic Importance of Fungi
Unit 2:	**ARCHEGONIATE Hrs (15), Weightage: 15-23 Marks**
	Introduction, General Characters of archegoniate
	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
	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
	Gymnosperms: General Characters and Classification (As Per Sporne) Study of ***Cycas:*** Occurrence, Classification, Morphology (Sporophyte, Coralloid Root), Anatomy of Leaflet and Reproduction.
	Economic Importance of Gymnosperm
	References:
	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.

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***Teaching Scheme**	***Examination Scheme**
Practical: 04 Hours/week, 02 Credits	**UA: 30 Marks** **CA: 20 Marks**

Course Preamble: This practical course is designed to provide students with hands-on experience in plant biology. It will focus on the identification, morphology, and anatomy of various plant groups, including algae, fungi, bryophytes, pteridophytes, gymnosperms, and angiosperms.

	Course Objectives:
●	Identify different plant groups, including algae, fungi, bryophytes, pteridophytes, and gymnosperms.
●	Describe the morphological and anatomical features of various plant structures
	Course Outcomes: By the end of this course, students will be able to:
	Identify different plant groups based on their morphological characteristics.
	Describe the key features of various plant structures, such as leaves, stems, roots, and reproductive organs.
	Analyze the evolutionary relationships between different plant groups.
	Demonstrate proficiency in using microscopes and other laboratory equipment.
	List of Practicals
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)
	References:
	1. Plant Biology by Raven, Evert, and Eichhorn
	2. Biology by Campbell, Reece, Taylor, Simon, Dickey, Hogan, Reece, and Wagner
	3. A Textbook of Angiosperms by B. M. Johri
	4. Plant Taxonomy by A. Cronquist
	5. Algae by Bold, Alexopoulos, and Delevoryas
	6. Fungi by Alexopoulos, Mims, and Blackwell

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***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Entrepreneurship GE/OE-I is one of the courses in the Entrepreneurship curriculum. This course provides an in-depth understanding of the various salesmanship skills They will learn the Sales organization, Sales Promotion, etc. They will know various types of salesmanship.

	Course Objectives:
●	The objective of this paper is to provide students' knowledge on sales and distribution strategies and their implications in managerial decision making
●	To explain the concepts of sales management, personnel selling and sales task

	summarize history of sale stages
•	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:
•	Recognize and demonstrate the significant responsibilities of sales person as key individual
•	Understand the basic concepts and techniques of selling and their applications to managerial decision makings in the field
•	Describe and formulate strategies to effectively manage company's sales operations
•	Evaluate the role of Sales manager and his/ her responsibilities in recruiting, motivating, managing and leading sales team
Unit I	**Sales Management Hrs: (15L), Weightage: 15-23Marks**
	Definition, objectives of Sales Management Evolution of Sales Management Sales organization Sales Budget Sales Promotion
Unit II:	**Personal Selling Hrs: (15), Weightage: 15-23 Marks**
	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

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***Teaching Scheme** **Practical: 04 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Employability Skill practical is one of the courses in the Entrepreneurship curriculum. This course provides an in-depth understanding of the fundamental concepts of various employability skills.

	Course Objectives:
●	Directives and specifications of working in a professional environment.
●	Acquire respectful and polite workplace etiquettes
●	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:
	On successful completion of this practical course student will be able to:
●	Students will understand the soft skills and its applications in terms of behavioral skills, technical skills and Etiquettes.
●	Students will be able to learn all professional skills necessary for the sake of employability and Gain employability skills.
●	Procure successful career. Being an aware, respectful, and well-cultivated employee.
	List of Experiments
Sr. No.	**List of the Practicals (any 10 practicals)**
1	Role-play on the communication process
2	Group discussion on the importance of communication and factors affecting perspectives in communication
3	Interviewing employees and entrepreneurs

4	Group activity on identifying and solving problems
5	Brainstorming on generating a business idea
6	Group activity to conduct a customer survey
7	Poster Presentation on developing a business plan
8	Conducting a classroom quiz on various aspects of entrepreneurship
9	Chart preparation on types of entrepreneurs
10	Playing games, such as “Who am I”
11	Group activity on listing stress and methods to deal with it like Yoga, deep breathing exercise
12	Group activity on methods of communication
13	Role Play on Conversation between employer and employee regarding business idea
14	Brainstorming activity on What motivates an entrepreneur
15	Group Discussion on Personality traits of eminent personalities in business world.
	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.

	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **First Year B.Sc. (Entrepreneurship) Semester-I** **Vertical: AEC** **Course Code: ENG-101** **Course Name: English for Communication-Paper-I**
***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **First Year B.Sc. (Entrepreneurship) Semester-I** **Vertical: IKS** **Course Code: G07-IKS-101** **Course Name: Introduction to Indian Knowledge System in Science**
***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **First Year BSc (Chemistry) Semester-I** **Vertical: VEC** **Course Code: ICD-101** **Course Name: Indian Constitution and Democracy**
***Teaching Scheme** **Lectures:02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Semester II

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ ।। विद्यया संपन्नता ।। NAAC Accredited-2022 'B++' Grade (CGPA-2.96)	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **First Year B.Sc. (ENTREPRENEURSHIP) Semester-II** **Vertical: DSC** **Course Code: G07-0201** **Course Name: Entrepreneurship – II (Macroeconomics)**
***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Entrepreneurship (Macroeconomics) is one of the core courses in the Entrepreneurship curriculum. This course provides an in-depth understanding of the general economic concepts. They will learn the information related to economics and different policies. etc. They will know how market functions in capitalistic society.

	Course Objectives:
●	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
●	Students will learn the major perspectives on what determines performance of the overall economy and will learn to analyze impacts on the economy.
●	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:
●	Effectively express general economic concepts and the ability to think critically in written/oral form.
●	Locate and use information related to economics.
●	Demonstrate ability to integrate knowledge and ideas in a coherent and meaningful manner.

Unit I	**Introduction to Macro Economics Hrs: (15L), Weightage: 15-23 Marks**
	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** **Hrs: (15), Weightage: 15-23 Marks**
	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.

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ ।। विद्यया संपन्नता ।। NAAC Accredited-2022 'B++' Grade (CGPA-2.96)	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **First Year B.Sc. (ENTREPRENEURSHIP) Semester-II** **Vertical: DSC** **Course Code: G07-0206** **Course Name: ENTREPRENEURSHIP PRACTICAL – II (MACROECONOMICS)**
***Teaching Scheme** **Practical: 04Hours/week, 02Credit**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Macroeconomic practical is one of the core courses in the entrepreneurship curriculum. This course provides an in-depth understanding of the fundamental concepts business cycle. By combining theoretical knowledge with hands on practicals will helps students to develop practical skills to write mini project, to make survey on causes etc.

	Course Objectives:
●	To study business cycle of any product
●	To study the consumers behavior
●	To make mini project on any relevant topic of the subject
	Course Outcomes:
	On successful completion of this practical course student will be able to:
●	Study business cycle of any product
●	Study the consumers behavior
●	To make mini project on any relevant topic of the subject
	List of Experiments
Sr. No.	**Practical/Assignment/Exercise/Activity**
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

	Reference Books:
	1. Dr. Mangesh P. Waghmare (2019) Principles of Management, NirhaliPrakashan Pune. 2. Rajkumar. S and Nagarajan. G (2021) Management Principles and Applications, Jayvee International Publications, Bangalore. 3. Drucker, P. F. (1999). Management Challenges for the 21st Century. Harper Collins Publishers Inc Harold. 4. J.S. Chandan (2002) Management Concepts and Strategies Vikas Publishing House, Pvt. Ltd New Delhi.

MAJOR SUBJECTS BASKET FOR DSC 2-2
(Any One to be Selected)

Sr. No.	Course Type	Paper Title	Credit
1.	Major	Chemistry- II (Organic and Analytical Chemistry)	2
2.	Major	Applied Microbiology	2

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ ।। विद्यया संपन्नता ।। NAAC Accredited-2022 'B++' Grade (CGPA-2.96)	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **First Year B.Sc. (ENTREPRENEURSHIP) Semester-II** **Vertical: DSC** **Course Code: G07-0202** **Course Name: Chemistry-II** **(Organic and Analytical Chemistry)**
***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Organic and Analytical Chemistry is one of the core courses in the Chemistry curriculum. This course provides an in-depth understanding of the fundamental concepts in Organic name reactions, structure and bonding, stereochemistry, physical properties of liquids, ionic solids and qualitative and quantitative analysis. Students will study these subtopics in detail. By combining theoretical knowledge with numerical treatment, the course aims to develop practical skills in analyzing and optimizing the Chemistry concepts.

	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 empirical and molecular formula of a compound
	Course 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.
Unit 1:	
A	**Fundamentals of organic reaction mechanism** **Hrs (05) Weightage: 5-8 Marks**
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 bond 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** **Hrs (05) Weightage: 5-8 Marks**
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** **Hrs (05) Weightage: 5-7 Marks**
3.1	Types of stereo-isomerism: Optical isomerism, Geometrical isomerism and Conformational isomerism
3.2	Opticalactivity
3.3	Essential conditions for Optical activity i. Elements of symmetry ii. Chiral cente rw.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** **Hrs (5) Weightage: 5-8 Marks**
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** **Hrs (05) Weightage: 5-8 Marks**
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	**Qualitativeand QuantitativeAnalysis** **Hrs (05) Weightage: 5-7 Marks**
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
	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.BahlandArunBahl
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).

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **First Year BSc (ENTREPRENEURSHIP) Semester-II** **Vertical: DSC** **Course Code: G07-0207** **Course Name: Chemistry-II-Practical Lab-II**
***Teaching Scheme** **Practical: 04Hours/week, 02Credit**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Chemistry II practical is one of the core courses in the Chemistry curriculum. This course provides an in-depth understanding of the fundamental concepts in Organic and Analytical Chemistry. By combining theoretical knowledge with hands on practical will helps students to develop practical skills in analyzing and optimizing the Organic and Analytical Chemistry concepts.

	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
	Course Outcomes COs
	The students will able to
●	Identify the given organic compound by performing systematic analysis
●	Prepare various derivatives of the organic compounds
●	Estimate typical organic compounds
●	Separate and identify the inorganic metal ions using chromatography technique
●	Determine viscosity and refractive index of given liquids
	List of Experiments
Sr. No.	**Name of the Practical**
	Organic Chemistry Organic Qualitative Analysis.
	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) ConfirmatoryTest 7) Summary **8)** Result
	Organic Preparation: (Any one)
	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 glycol and 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]
	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:
1.	Experiments in Chemistry: D.V. Jahagirdar
2.	Vogel's Text Book of Quantitative Chemical Analysis (Longman ELBS Edition)

3.	Basic Concepts in Analytical Chemistry (Wiley Eastern Ltd.) : S. M. Khopkar
4.	Handbook of Organic Qualitative Analysis: Clarke
5.	Comprehensive Practical Organic Chemistry- Quantitative Analysis by V.K. Ahluwalia, Sunita Dhingra, University Press. Distributor - Orient LongmanLtd.,
6.	Comprehensive Practical Organic Chemistry preparation and Quantitative Analysis.: V.K. Ahluwalia, Renu Agarwal, University Press. Distributor-OrientLongmanLtd.,
7.	A laboratory Hand-Book of organic Qualitative Analysis and separation: V. S. Kulkarni, Dastane Ramchandra and Co.Pune.

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ ॥ विद्यया संपन्नता ॥ NAAC Accredited-2022 'B++' Grade (CGPA-2.96)	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **First Year B.Sc. (ENTREPRENEURSHIP) Semester-II** **Vertical: DSC** **Course Code: G07-0203** **Course Name: Applied Microbiology**
***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Applied microbiology is the study of microorganisms and their applications in various industries and fields. This course will explore the practical uses of microorganisms in areas such as food production, biotechnology, environmental science, and healthcare. This course is designed to provide students with a comprehensive understanding of applied microbiology, focusing on the microbiology of air, water, milk, and medical contexts**.** It will explore the role of microorganisms in these environments, their impact on human health and safety, and the methods used to detect, monitor, and control microbial activity.

	Course Objectives:
●	Understand the microbial content of air, water, soil and milk.
●	Study the health effects associated with air, water, soil borne microorganisms.
●	Understand the fundamental of microbiology and their importance in environmental process.
●	Study the methods and techniques used for milk, soil, air and water microbial monitoring and assessment
	Course Outcomes:

	Assess the types and role of microorganisms present in milk, air and water and sewage.
	Analyse microbiological quality of milk, air and water.
	Practice hygiene at individual and community level.
	Evaluate food and milk safety and incorporate in daily life
Unit 1:	**Air, Water and sewage Microbiology** **Hrs (15), Weightage: 15-23 Marks**
	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
Unit 2:	**Milk and Medical Microbiology** **Hrs (15), Weightage: 15-23 Marks**
2	**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** ● Definitions: - Infection, etiology, etiological agents, disease, pathogen, opportunistic pathogen, pathogenicity, incubation period, fomite, virulence, morbidity rate, mortality rate, carriers, host, epidemiology, prophylaxis. ● 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 ● Preventive and control of Microbial Diseases
	Reference books:
	1. **Prescott, Harley, and Klein's Microbiology** (9th edition) by Michael J. Pelczar, Jr., Eugene C. Klein, and Rodrick M. Krieg
	2. **Brock Biology of Microorganisms** (15th edition) by Michael T. Madigan, John M. Martinko, Kelly S. Bender, Brock Chisholm, David P. Clark, Nicholas P. Gerard, and David H. Kahler
	3. **Standard Methods for the Examination of Water and Wastewater** (23rd

	edition) published by the American Public Health Association (APHA)
	4. **Industrial Microbiology** by A. H. Rose and J. S. Harrison
	5. Environmental Microbiology by Paul Singleton and Diana Sainsbury
	6. Wastewater Microbiology by Thomas R. Gauntt and David C. White
	7. Air Microbiology: Methods and Applications by Richard M. Atlas
	8. Jawetz Melnick Adelberg's Medical Microbiology by Brooks, Carroll, Butel, Morse, and Mietzner

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **First Year B.Sc. (ENTREPRENEURSHIP) Semester-II** **Vertical: DSC** **Course Code: G07-0207** **Course Name: Applied Microbiology Practicals**
***Teaching Scheme** **Practical: 04 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble -Applied microbiology is the study of microorganisms and their applications in various industries and fields. This practical course will provide you with hands-on experience in the techniques used in applied microbiology, allowing you to explore the practical applications of microorganisms in areas such as food production, biotechnology, and environmental science.

	Course Objectives:
●	Describe the colony characteristics of various bacterial isolates.
●	Enumerate bacteria in milk samples using the DMC and SPC methods.
●	Study the fermentation of sugars, such as glucose and lactose, by bacteria.
	Course Outcomes: By the end of this course students will be able to
	Apply microbiological methods to study bacterial colony characteristics, motility, and biochemical properties.
	Conduct experiments related to food microbiology, industrial microbiology, and environmental microbiology.
	Analyze bacterial isolates based on their morphological and biochemical characteristics.
	Evaluate the impact of microorganisms on food safety, industrial processes, and the environment.
	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
	Reference books:
	Microbiology: A Laboratory Manual (11th edition) by Michael J. Pelczar, Jr., Eugene C. Klein, and Rodrick M. Krieg
	Microbiology: Principles and Applications (3rd edition) by Jacquelyn G. Black, Janice L. Harley, and Michael J. Jorden
	Laboratory Exercises in Microbiology (9th edition) by Kathleen A. Barker, Paul A. Engelkirk, and Donald W. Porter
	Compendium of Methods for the Microbiological Examination of Foods (5th edition) published by the American Public Health Association (APHA)
	Standard Methods for the Examination of Dairy Products (19th edition) published by the American Public Health Association (APHA)
	Industrial Microbiology by A. H. Rose and J. S. Harrison
	Biotechnology by David M. Prescott and John P. Harley
	Environmental Microbiology by Paul Singleton and Diana Sainsbury

MAJOR SUBJECTS BASKET FOR DSC 3-2
(Any One to be Selected)

Sr. No.	Course Type	Paper Title	Credit
1.	Major	Animal Diversity- II (Chordates)	2
2.	Major	Botany: Plant Ecology & Taxonomy of Angiosperm	2

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **First Year BSc (ENTREPRENEURSHIP) Semester-II** **Vertical: DSC** **Course Code: G07-0204** **Course Name: Animal diversity-II (Chordates)**
***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Chordates are a phylum of animals characterized by having a notochord, a dorsal hollow nerve cord, pharyngeal slits, a post-anal tail, and an endostyle. This course will explore the diversity of chordate animals, focusing on their anatomical, morphological, and evolutionary characteristics.

	Course Objectives:
•	Understand the principles of natural selection and other evolutionary mechanisms in chordates.
•	Trace the evolutionary history of chordates from their earliest ancestors to modern-day representatives.
•	Understand the functions of different organ systems in chordates.
	Course Outcomes: By the end of this course, students will be able to:
	Identify the key characteristics of different chordate groups.
	Compare and contrast the anatomy and physiology of chordate animals.
	Analyze the evolutionary relationships between chordate groups.
	Understand the ecological roles and adaptations of chordates.
Unit 1:	**Hrs (15), Weightage: 15-23 Marks**
	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
Unit 2:	**Hrs (15), Weightage: 15-23 Marks**
	1) Amphibia: General features and classification upto orders of Anura, Apoda and Urodela, Parental care in Amphibia **2) 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 **3) 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 **4) 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
	References:
	Invertebrate Zoology by Richard C. Brusca, Gary J. Brusca, and William Moore
	Essentials of Vertebrate Zoology by Richard E. Fox
	Comparative Vertebrate Anatomy by Kenneth V. Kardong
	Fishes of India by J. R. Bhatia
	Amphibians of India by Bijan Kumar Dutta
	Reptiles of India by Romulus Whitake.
	Birds of India by Grimmett, Inskipp, and Inskipp

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **First Year BSc (ENTREPRENEURSHIP) Semester-II** **Vertical: DSC** **Course Code: G07-0208** **Course Name: Animal diversity-II (Chordates) Practical's**
***Teaching Scheme** **Practical: 04 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: This practical course is designed to provide students with hands-on experience in studying the diversity of chordate animals. Chordates are a phylum of animals characterized by having a notochord, a dorsal hollow nerve cord, pharyngeal slits, a post-anal tail, and an endostyle. This course will focus on the anatomical and morphological characteristics of various chordate groups, including fish, amphibians, reptiles, birds, and mammals.

	Course Objectives:
●	Comprehensive understanding of chordate diversity and the principles of comparative anatomy.
●	Use microscopes and other laboratory equipment effectively
	Course Outcomes:
	By the end of this course students will be able to identify the key anatomical and morphological features of different chordate groups
	Students will be able to compare and contrast the characteristics of fish, amphibians, reptiles, birds, and mammals.
	Analyze the evolutionary relationships between chordate groups based on anatomical similarities.
	Classify chordates based on their morphological and anatomical characteristics
	List of Practicals
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. Study of skeleton of frog: Skull, Atals, Typical vertebra, Pectoral girdle, Pelvic girdle.
3.	Filed visit: study of vertebrate from any local ecosystem, visit to zoo, Museum, Aquaria, etc.
4	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.
	Reference books:
	Invertebrate Zoology by Richard C. Brusca, Gary J. Brusca, and William Moore
	Comparative Vertebrate Anatomy by Kenneth V. Kardong
	Essentials of Vertebrate Zoology by Richard E. Fox
	A Laboratory Manual of Vertebrate Anatomy by William H. Howell
	Laboratory Exercises in Comparative Vertebrate Anatomy by David G. Kleiner and Thomas J. Parsons

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ ॥ विद्यया संपन्नता ॥ NAAC Accredited-2022 'B++' Grade (CGPA-2.96)	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **First Year BSc (ENTREPRENEURSHIP) Semester-II** **Vertical: DSC** **Course Code: G07-0205** **Course Name: Botany - Plant Ecology and Taxonomy of Angiosperm**
***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: Plant ecology and taxonomy of angiosperms is a fascinating field that explores the interactions between plants and their environment, as well as the classification and naming of flowering plants. This course will provide a comprehensive understanding of the principles and concepts underlying these two key areas of botany.

	Course Objectives:
•	To get the knowledge about the introduction, basic concept, levels of organization
•	To get the knowledge about the Edaphic Factors

•	To get the knowledge about the Ecological Adaptation- xerophytes
•	To get knowledge about aim and principles of taxonomy
	Course Outcomes:
•	The students will be able to understand about the basic concept, levels of organization
	The students will be able to understand about the Edaphic Factor- soil, its origin, formation and components
	The students will be able to understand about the Morphological, anatomical, and **Physiological** adaptations in xerophytes
	The students will be able to understand about aim and principles of taxonomy
Unit 1:	**Plant Ecology** **Hrs (15), Weightage: 15-23 Marks**
	Introduction, Basic Concept., Levels of organization Climatic Factors- Light, Temperature, Humidity, Wind & Rainfall. Edaphic Factor: Origin, Formation & Components of soil. **Ecological Adaptation:** Morphological, anatomical, and Physiological adaptations in hydrophytes Morphological, anatomical, and Physiological adaptations in xerophytes Ecological succession – Introduction, concept & process, Hydrosere and Xerosere
Unit 2:	**ARCHEGONIATE** **Hrs (15), Weightage: 15-23 Marks**
	Introduction, Aims and Principles of Taxonomy General characters of angiosperms, primitive, and advanced characters of flower. Types of classification: Artificial, Natural and Phylogenetic, Salient features, outline of Bentham and Hooker system of classification, Merits, and demerits Principles of ICBN , Nomenclature, Binomial nomenclature of plants Botanical gardens of India- Sir J. C. Bose Botanical Garden, Calcutta & Lead Botanical Garden of Shivaji University Kolhapur Study of Angiosperms families: systematic position, morphological & distinguishing characters with economic importance of following families: a) Caesalpiniaceae b) Solanaceae c) Nyctaginaceae d) Amaryllidaceae
	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.
27. Simpson, M.G. (2006). *Plant Systematics.* Elsevier Academic Press, San Diego, CA, U.S.A.
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29. Jeffrey, C. (1982). An introduction to plant Taxonomy, Cambridge University Press, Cambridge.
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पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ ।। विद्यया संपन्नता ।। NAAC Accredited-2022 'B++' Grade (CGPA-2.96)	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **First Year BSc (ENTREPRENEURSHIP) Semester-II** **Vertical: DSC** **Course Code: G07-0208** **Course Name: Botany: Plant Ecology & Taxonomy of Angiosperm Practical's**
***Teaching Scheme** **Practical: 04 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: This practical course aims to provide students with hands-on experience in Botany: Plant Ecology & Taxonomy of Angiosperm. Through a series of laboratory exercises and field studies, you will explore various aspects of the natural world, including soil properties, plant adaptations, and plant taxonomy.

	Course Objectives:
●	Determine the pH of different soil samples using universal indicator, pH paper, and a pH meter.
●	Classify plants based on their morphological characteristics. Identify the various parts of a typical flower, including petals, sepals, stamens, and pistils.
	Course Outcomes:
	By the end of this course, students will have developed a deeper understanding of the interrelationships between plants, soil, and the environment.
	Students will be able to collect data on plant diversity and environmental conditions.
	Students will be able to identify the key features of the Caesalpiniaceae, Solanaceae, Nyctaginaceae, and Amaryllidaceae families.
	Students will be able to analyze the relationship between flower structure and pollination
	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	Ecological adaptations of Hydrophytes (*Hydrilla*, *Eichhornia* and *Typha*).
5	Ecological adaptations of Xerophytes (*Nerium* and *Aloe*).
6	Study of typical flower
7	Study of types of placentation

8	Study of types of aestivations
9	Study of floral formula and floral diagram
10	Study of plant family Caesalpiniaceae
11	Study of plant Family Solanaceae
12	Study of Plant family Nyctaginaceae
13	Study of Plant family Amaryllidaceae
14	Excursion report.
	References:
	Biology by Campbell, Reece, Taylor, Simon, Dickey, Hogan, Reece, and Wagner **Environmental Science** by G. Tyler Miller and Scott E. Spoolman
	A Textbook of Angiosperms by B. M. Johri

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ ।। विद्यया संपन्नता ।। NAAC Accredited-2022 'B++' Grade (CGPA-2.96)	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **First Year BSc (ENTREPRENEURSHIP) Semester-II** **Vertical: GE/OE** **Course Code: G07-GE-OE-201** **Course Name: GE/OE-II (Health and Microbiology)**
***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: GE/OE-II (Health and Microbiology) is one of the courses in the Entrepreneurship curriculum. This course provides an in-depth understanding of the fundamental concepts in health and microbiology. The students can learn common diagnostic practices.

	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.
	Course Outcomes:
●	Able to provide general information on microbial diseases.
●	Able to know the common diagnostic practices.
●	Able to aware common man about personal and social hygiene.
●	Able to gather information related to medicines available in medical store.

Unit I	**Information of Common Diseases Hrs (15) Weightage: 15-23 M**
	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 II	**Control on Diseases Hrs (15) Weightage: 15-23 M**
	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.
	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

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***Teaching Scheme** **Practical: 04 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

Course Preamble: SEC-II (Entrepreneurial Best Practices) is one of the skill enhancement courses in the Entrepreneurship curriculum. This course provides practical skills related banking. Students will able to do financial visit to bank. By combining theoretical knowledge with hands on practices will helps students to develop Entrepreneurial skills.

	Learning Objectives:
	To provide conceptual exposure on converting idea to a successful entrepreneurial firm.

	List of Experiments
Sr. No.	**Name of the Practical (Any Eight practical)**
	To identify significant changes and trends which create business opportunities and to analyze the environment for potential business opportunities.
	To enable the students to understand the concept of Entrepreneurship and to learn the professional behavior expected of an entrepreneur.
	Course Outcomes
	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
1	Poster Presentation on Mission, Vision and Goals
2	Group discussion on Building a Motivated Team
3	Group discussion Entrepreneurial Psychology, Driving Forces and Characteristics
4	Case studies on Business Ethics and Best Practices
5	Collect loan application forms from nationalized banks and other financial institutions
6	Field visit to bank and other financial institutions regarding funding various funding schemes for start up
7	Arrange exhibitions cum sale of products activities
8	Conduct Seminars on technology effect on entrepreneurship
10	Conduct surveys on after sales services of business
11	Conduct interviews on successful local entrepreneurs.
12	Undertake Self-assessment test to discover your entrepreneurial traits and skills
13	Group activity on methods of communication
14	Role Play on Conversation between customer and salesman
15	Conduct exhibitions on new business ideas
16	Compile information from government agencies regarding start up
	Reference Books:
1	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

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **First Year B.Sc. (ENTREPRENEURSHIP) Semester-II** **Vertical: AEC** **Course Code: ENG-201** **Course Name: English for Communication-Paper-II**
***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **First Year B.Sc. (ENTREPRENEURSHIP) Semester-II** **Vertical: VEC** **Course Code: ENS24** **Course Name: Environmental Studies**
***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **First Year BSc (ENTREPRENEURSHIP) Semester-II** **Vertical: CC** **Course Code: CES-201/CC-201/CC-202/CC-203/CC-204/CC-205/CC-206** **Course Name: Community Engagement and Services /National Service Scheme/National Cadet Corps/Sports/Cultural Activities/Health, Wellness and Fitness/ Yoga Education**
***Teaching Scheme** **Lectures: 02 Hours/week, 02 Credits**	***Examination Scheme** **UA: 30 Marks** **CA: 20 Marks**

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UA

Punyashlok Ahilyadevi Holkar Solapur University, Solapur.

Faculty of Science & Technology.

Nature of Question Paper for CBCS Pattern

B. Sc. (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

1)

a) b) c) d)

2)

a) b) c) d)

3)

a) b) c) d)

4)

a) b) c) d)

5)

a) b) c) d)

6)

a) b) c) d)

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. (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

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- **Pattern of Examination:**
  - External Evaluation + Internal Evaluation
  - 30 Marks + 20 Marks = 50 Marks
- **Passing Criteria:**
  - Written Exam – 12 out of 30
  - Continuous Assessment (CA) – 08 out of 20
