

Punyashlok Ahilyadevi Holkar Solapur University, Solapur



NAAC Accredited-2022

'B++' Grade (CGPA 2.96)

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: Entrepreneurship

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

(Syllabus to be implemented from June 2022)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

Choice Based Credit System (CBCS)

B. Sc. I Entrepreneurship

(w.e.f. June 2022- 2023)

Preamble

Choice Based Credit System: With the view to ensure worldwide recognition, acceptability, horizontal as well as vertical mobility for students completing under graduate degree, PAH Solapur University, Solapur has implemented Choice Based Credit System (CBCS) at under graduate level. The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it is necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions within India to begin with and across countries. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations.

• Outline of Choice Based Credit System:

1. **Core Course:** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.
2. **Elective Course:** Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline / subject / domain or nurtures the candidate's proficiency / skill is called an Elective Course.

3. **Discipline Specific Elective (DSE) Course:** Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective.

4. **Ability Enhancement Courses (AEC):** The Ability Enhancement (AE) Courses may be of two kinds: Ability Enhancement Compulsory Courses (AECC) and Skill Enhancement Courses (SEC). “AECC” courses are the courses based upon the content that leads to Knowledge enhancement: (i) Environmental Science and (ii) English/MIL Communication. These are mandatory for all disciplines. SEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc.

- **Credit:** Credit is a numerical value that indicates students work load (Lectures, Lab work, Seminar, Tutorials, Field work etc.) to complete a course unit. In most of the universities 15 contact hours constitute one credit. The contact hours are transformed into credits. Moreover, the grading system of evaluation is introduced for B.Sc. course wherein process of Continuous Internal Evaluation is ensured. The candidate has to appear for Continuous Internal Evaluation of 20 percentage and University Evaluation for 80 percentage. It is applicable for theory and practical as well.

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1) Introduction

PAH Solapur University is the pioneer university offering B. Sc. Degree in Entrepreneurship, which is the most demanded program lined with Start-up India, Make in India, Innovation and Incubation as well as promoting entrepreneurial skills. Most of the universities / institutions / colleges offering science program at under graduate level are teaching scientific concepts and approaches. B. Sc. Entrepreneurship is the program in which students will become globally competent due the syllabi framework constructed as per the New Education Policy, 2020. Obeying to the new policy said degree program itself composed of core subjects, inter disciplinary subjects and Trans disciplinary subjects as well as ability enhancement courses, skill development courses and generic courses. This course is amalgamation of science, commerce, economics, management, research etc. Motivating first generation entrepreneurs belonging from science background is the motto of launching degree in entrepreneurship. This course provides a broad overview of entrepreneurship and aims to produce expert hands that would have sufficient knowledge and expertise to solve the urgent problems of the region by using entrepreneurship. The course structure is technology-centric where students basically learn technology and are taught necessary basic subjects. To develop the job providers rather than job seekers is the main goal of this course.

2) Advantages of Course

Entrepreneurship has tremendous business opportunities. The successful students will be able to establish trading, industrial, managerial skills and consultancy organizations in pharmaceuticals, paper, textile, fermentation, food processing & preservation, agriculture, environment protection and also their own industry for micro propagation of commercially important plants in vitro, transgenic plants, vaccine production, clinical pathology, genetic counseling, GMF etc. Students may be able to establish National and Multinational companies dealing with production of tissue cultured and genetically modified plants, food products, leather, dairy, beverages, pharmaceutical, chemical industries, agribusiness, Environment protection. In addition they would be able to seek opportunities in Medical & Scientific Research Organizations; Universities in India & abroad.

3) Objectives of the Course

The objectives of B. Sc. Entrepreneurship (Entire) course are:

1. **To create self employability:** By providing an intensive & in-depth learning to the students in field of entrepreneurship.

2. **To inculcate scientific temper:** Beyond learning and understanding the techniques, the course also addresses the underlying problems of disciplines in today's scientific and changing business world.

3. **To provide trained personnel:** Through develop skills and technique for different organization requirements and subject knowledge through varied subjects and training methodology in students.

4. **To Create the Environmental and Social awareness :** By providing training to the students to take up wide variety of roles like researchers, scientists, consultants, entrepreneurs, academicians, industry leaders and policy.

4) **Title of the Course**

B. Sc. I Entrepreneurship

5) **Eligibility of Course**

A Candidate passing 10+2 with science (PCB / PCM / PCMB) as one of the subject and passed from state syllabus / CBSE / equivalent with minimum passing percentage for open category and all reserved categories candidates as per the government rules and regulations. Admission is based on first come first serve basis.

OR

Students having 10+2 with Arts, Commerce and Vocational courses passed from state syllabus / CBSE / equivalent with minimum passing percentage for open category and all reserved categories candidates as per the government rules and regulations may be eligible for the same course. *These students are allowed to take admission for said course but it is mandatory to qualify the bridge course. These students should take admission for the bridge course at semester I and if students fail to qualify bridge course up to semester IV he / she will be not eligible for semester V.*

6) **Fees for Course**

The fees for B. Sc. I Entrepreneurship will be as per the norms of PAH Solapur University, Solapur (Displayed on university and college website).

7) **Strength of the Students**

B. Sc. I Entrepreneurship have 60 Seats Intake capacity.

8) **Admission/Selection procedure**

Admissions will be provided on First come first serve basis at the college offering B. Sc. Entrepreneurship degree.

9) **Duration of the Course**

The duration for this program is of 3 (three) years having semester pattern (Six Semester 06)

10) Medium of Instruction: English

11) Syllabus Structure:

The University follows semester system.

- An academic year shall consist of two semesters.
- Each B.Sc. Course shall consist of 3 (three) years i.e. 6 (six) semesters.
- B.Sc. Part-I Entrepreneurship shall consist of two semesters: Semester - I and Semester – II. In semester I, there will be four core subjects. Each subject is having 2 (two) papers of 50 marks for each. Similarly in Semester II there will be four core subjects. Each subject is having 2 (two) papers of 50 marks for each. English will be as Ability Enhancement Course (AECC) in both semesters I and II. English paper carries 50 marks in each semester. The scheme of evaluation of performance of candidates shall be based on University assessment as well as College internal assessment as given below. For B.Sc. Part-I Entrepreneurship Sem- I & II the internal assessment will be based on Internal tests, Home assignment, Viva, Seminar, Group discussion etc. Practical course examination of 100 marks for each course shall be conducted at the end of II semester. The practical examination of 100 marks shall also consist of 80 marks for University practical assessment and 20 marks for college internal assessment. For University practical examination both examiners will be internal and should be appointed by the College. The internal practical assessment shall be done as per scheme given below.

12) Scheme of Evaluation

As per the norms of the grading system of evaluation, out of 50 marks, the candidate has to appear for college internal assessment of 10 marks and external evaluation (University assessment) of 40 marks. The respective B.O.S. may decide the nature of college internal assessment after referring to scheme given below or may be used as it is.

Semester	Nature of Assessment	University Assessment UA	College Assessment CA	Total
Sem I	Theory 9 Papers	40 marks (As per template provided)	10 marks (As per template provided)	50 marks
Sem II	Theory 10 Papers	40 marks (As per template provided)	10 marks (As per template provided)	50 marks
Annually	Four (4) Practical	80 marks (As per template provided)	20 marks (As per template provided)	100 marks

Theory Examination Pattern UA (University Assessment) 40 marks / paper:

Question No.	1	2	3	4	5	Total
Nature of Question	Multiple Choice	Short Answer	Short Notes	Answer or Describe in brief	Answer or Describe in detail	-
Available Options	8	5	3	3	2	21
Compulsory to Solve	8	4	2	2	1	17
Each Option carrying marks	1	2	4	4	8	-
Total Marks	8	8	8	8	8	40

Theory Examination Pattern CA (Continuous Assessment) 10 marks / paper:

Continuous Internal Assessment (CA) for each paper of theory examination should carry 10 marks. College may conduct one examination having 10 marks or two examinations each of 5 marks. Nature of assessment may be open book examination, home assignment, group discussion, classroom test, seminar, field work report, project report etc.

13) Practical Examination:

Total four practical courses of 100 marks each should be assessed. The assessment pattern is 80+20 i.e. 80 marks assessment should be university assessment, UA and 20 marks for Continuous assessment, CA. Nature of question paper is given below for both examinations i.e. UA and CA

Practice Examination Pattern UA (University Assessment) 80 marks / paper:

Question No.	Nature of Question	No. of Questions	Marks	Total Marks
1	Major Practical	1	16	16
2	Major Practical	1	16	16
3	Minor Practical	1	8	8
4	Minor Practical	1	8	8
5	Spotting	5	2	10
6	Principle Writing	3	4	12
7	Certified Journal + Viva	-	-	10
Total Marks				80

Practical Examination Pattern CA (Continuous Assessment) 20 marks / paper:

Continuous Internal Assessment, CA should be (20 marks) and follow the given scheme of marking:

Question No.	Nature of Question Paper	Frequency	Marks	Total
1	Test or practical exam. on single practical	1	5	5
2	Test or practical exam. on single practical	1	5	5
3	Certified Journal + Viva	1	5	5
4	Attendance	1	3	3
5	Attitude	1	2	2
Total				20

14) Passing Standard:

The student has to secure a minimum of 4.0 grade points (Grade C) in each paper. A student who secure less than 4.0 grade point (39% or less marks, Grade FC/FR) will be declared fail in that paper and shall be required to reappear for respective paper. A student who failed in University Examination (theory) and passed in internal assessment of a same paper shall be given FC Grade. Such student will have to reappear for University Examination only. A student who fails in Continuous Internal assessment, CA and passed in University examination UA (theory) shall be given FR Grade. Such student will have to reappear for both University examination, UA as well as Continuous internal assessment, CA.

15) ATKT:

Candidate passed in all papers, except 5 (five) papers combined together of semester I and II of B.Sc. Part-I Entrepreneurship examination shall be permitted to enter upon the course of Semester III of B.Sc. Part-II Entrepreneurship.

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Subject/ Core Course	Name and Type of the Paper		No. of papers/ Practical	Hrs/week			Total Marks / Paper	UA	CA	Credits
	Type	Name		L	T	P				
Class :	B.Sc.- I Semester – I									
Ability Enhancement Compulsory Course (AECC)	AECC - 1A	English Paper I Part-A (communication skill)								
			4.0				50	40	10	2.0
Core Courses	DSC 1A	Paper-I: Principles of Entrepreneurship	2.5	--	--		50	40	10	4.0
		Paper-II: Fundamental of Economics and Accountancy	2.5	--	--		50	40	10	
	DSC 2A	Paper-I Fundamentals of Inorganic Chemistry	2.5	--	--		50	40	10	4.0
		Paper-II Fundamentals of Organic Chemistry	2.5	--	--		50	40	10	
	DSC 3A	Paper-I Fundamentals of Microbiology	2.5	--	--		50	40	10	4.0
		Paper-II Basic Techniques in Microbiology	2.5	--	--		50	40	10	
	DSC 4A	Paper-I - Cell Biology	2.5	--	--		50	40	10	4.0
		Paper-II - Animal and Plant Physiology	2.5	--	--		50	40	10	
Total			24	--	--		450	360	90	18
Class :	B.Sc.- I Semester – II									
Ability Enhancement Compulsory Course (AECC)	AECC - 1B	English Paper I Part-B (communication skill)								
			4.0				50	40	10	2.0
Core Courses	DSC 1B	Paper-III: Fundamental of Marketing & Management accounting	2.5	--	--		50	40	10	4.0
		Paper-IV: Cost accounting and Project management	2.5	--	--		50	40	10	
	DSC 2B	Paper-III Fundamentals of Physical Chemistry	2.5	--	--		50	40	10	4.0
		Paper-IV Fundamentals of Analytical Chemistry	2.5	--	--		50	40	10	
	DSC 3B	Paper-III Fundamentals of Industrial Microbiology	2.5	--	--		50	40	10	4.0
		Paper-IV Basic techniques in Industrial Microbiology	2.5	--	--		50	40	10	
	DSC 4B	Paper-III - Basic Biomolecules	2.5	--	--		50	40	10	4.0
		Paper- IV - Basic Metabolism	2.5	--	--		50	40	10	
	Democracy, Elections and Good Governance		3				50	40	10	NC
Total (Theory)			24	--	--		450	360	90	18
Core Practical	DSC 1A & 1B	Practical I	--	--	4		100	80	20	4.0
	DSC 2A & 2B	Practical I	--	--	4		100	80	20	4.0
	DSC 3A & 3B	Practical I	--	--	4		100	80	20	4.0
	DSC 4A & 4B	Practical I	--	--	4		100	80	20	4.0
Total (Practical)					16		400	320	80	16
Grand Total			48		16		1300	1040	260	52

Summary of the Structure of B.Sc. Program as per CBCS pattern

Class	Semester	Marks-Theory	Credits-Theory	Marks-Practical	Credits-Practical's	Total - credits
B.Sc.-I	I	450	18	--	--	18
	II	450	18	400	16	34
B.Sc.-II	III	300	12	--	--	12
	IV	300	12	600	24	36
B.Sc.-III	V	450	18	--	--	18
	VI	450	18	400	16	34
Total		2400	96	1400	56	152
	SEC sem.- III & V	200	8			8

B.Sc. Programme:

Total Marks: Theory + Practical's = 2400(+200) +1400 =3800+200

Credits: Theory + Practical's = 96(08) + 56 = 152+08

Numbers of Papers Theory: Ability Enhancement Compulsory Course (AECC) 04

Theory: Discipline Specific Core Paper (DSC) 20

Theory: Discipline Specific Elective paper (DSE) 02

Skill Enhancement Course (SEC) 04

Total : Theory Papers (Core paper-22) 30

: Practical Papers 11

Abbreviations:

L: Lectures T: Tutorials P: Practical UA: University Assessment CA: Continuous Assessment CC: Core Course

AEC : Ability Enhancement Course DSE : Discipline Specific Elective Paper SEC : Skill Enhancement Course,

AIC: Additional Interdisciplinary Courses

Note: Each theory papers of 50 Marks should be of two Units.

Each theory papers of 100 Marks should be of four Units.

Each theory paper Unit is of 15 Lectures.

Practical paper of 100 Marks is of at least 20 practical.

Semester I

DSC 1A

Paper-I Principles of Entrepreneurship

Marks-40

Period-30 L

Unit I	Introduction to Entrepreneurship	15
	Entrepreneurship- Concept, Evolution, Functions, Characteristics, Types, Need and Importance- Role of entrepreneurship in economic development- entrepreneurship development process-, Barriers to entrepreneurship- Managerial Vs. Entrepreneurial , Approach- Innovation and Entrepreneurship. Classification of Business Activity- Types of business Organization.	
Unit II	Institutions Supporting Entrepreneurship & Women and Rural Entrepreneurship	15
	A brief overview of financial institutions in India- Central level and state level institutions- SIDBI- NABARD- IDBI- SIDCO- Indian Institute of Entrepreneurship- DIC- Single Window- Latest Industrial Policy of Government of India a) Women Entrepreneurship: SHG IN Women Entrepreneurship Development. b) Rural Entrepreneurship- Meaning- Need- Scope- Problems faced by Rural Entrepreneurs	

Reference books

Entrepreneurship

1. Entrepreneurial Development - S.S. Khanka
2. Entrepreneurial Development - Satish Taneja & Dr.S.L. Gupta
3. Entrepreneurial Development - P.C. Shejwalkar
4. Dynamics of Entrepreneurial Development - Vasant Desai.
5. Fundamental of Entrepreneurship – Dr. A.K. Gavai

The world of business

1. General Commercial Knowledge - P.K. Ghosh & Y.K. Bhushan
2. Modern Business Organization & Management - S.A. Sherlekar

DSC 1A

Paper-II Fundamental of Economics and Accountancy

Marks-40

Period-30 L

Unit I	I. Business Economics	15
	Introduction to Business Economics- Meaning, Nature & Scope- Basic problems of economy Demand & Supply Analysis: law of demand, and schedule of demand. Demand analysis- meaning, importance, types of elasticity of demand. Market Structure: Meaning and types of market- Perfect competition market and imperfect, Competition market.	
Unit II	Book Keeping and Accountancy	15
	Accounting: Nature & scope of accounting- Branches of accountancy-Basic Accounting terminologies- users of accounting information and their Needs- Concepts & Conventions- Double entry system of accounting. Journal entry, cash book, Ledger, Trial Balance – Final accounts of Proprietor	

Managerial Economics

- Managerial Economics in a Global Economy - Dominick Salvotole.
- Introduction to Economics - Samulson & Nordhams
- Managerial Economics – Mahajan
- Accountancy : S .N. Maheshwari

Unit I Chemical Bonding**15****07****A. Valence Bond Theory**

1. Introduction, Types of Chemical bonds, Covalent, Ionic, Coordinate, Metallic, Hydrogen, Van der Waal's forces.
2. Hybridization, Need of Hybridization, Types of Hybridization. Formation of molecules with sp, sp², sp³ hybrid orbital such as BeCl₂, BF₃, CH₄
3. Valence Shell Electron Pair Repulsion (VSEPR) Theory w.r.t. NH₃, H₂O.

B. Molecular orbital Theory**08**

- (a) Atomic and Molecular orbitals.
- (b) L.C.A.O. Principle
- (c) Bonding, Antibonding and Nonbonding Molecular orbitals.
- (d) Conditions for successful overlap
- (e) Different types of overlap. s-s, s-px, px-px and py-py or pz-pz
- (f) Energy level sequence of molecular orbitals for n = 1 and n = 2
- (g) M. O. Diagrams for -
 - i) Homonuclear diatomic molecule. H₂, Be₂, C₂, N₂ and O₂
 - ii) Heteronuclear diatomic molecules CO and NO
- (h) Comment on- a) bond order, b) stability and c) magnetic properties for above molecules.

Unit II Ionic Solids**15****1. Ionic Bonding**

- (a) Formation of ionic bond,
- (b) Energetics of ionic bonding: Ionization potential, Electron affinity and Lattice energy.
- (c) Characteristics of ionic compounds.
- (d) Born-Haber Cycle for Alkali metal halide (NaCl). (Numerical Problems are expected)
- (d) Fajans Rule

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 Rock salt (NaCl) and CsCl w.r.t. unit cell, radius ratio, coordination number and Stoichiometry.

Reference Books :

- 1) Advanced Inorganic Chemistry - Cotton and Wilkinson
- 2) Inorganic Chemistry - J. E. Huheey
- 3) Concepts and models of Inorganic Chemistry - Douglas & Mc-Daniel
- 4) Principles of Inorganic Chemistry - Puri, Sharma
- 5) New Concise Inorganic Chemistry - (ELBS) - J. D. Lee
- 6) Text book of Inorganic Chemistry - P. L. Soni
- 7) Advanced Inorganic Chemistry - Satyaprakash, Tuli, Basu
- 8) Theoretical Principles of Inorganic Chemistry - G. S. Manku
- 9) Principles of Inorganic Chemistry - Puri, Sharma & Kalia

DSC 2A
Paper-II Fundamentals of Organic Chemistry

Marks-40

Period-30 L

Unit I Chemistry of Hydrocarbon and Aromatic compounds

15

A) Chemistry of Hydrocarbon

08

a) Alkanes: -

1. Methods of formation with special reference to Wurtz reaction and Kolbe reaction.
- 2 Mechanism of free radical halogenation of alkanes.
- 3 Cycloalkanes - Nomenclature methods of formation (a) Internal Wurtz reaction (b) Distillation of calcium or barium salt of dicarboxylic acid.
- 4 Chemical properties of cyclopropane (i) Free radical substitution of chlorine in presence of light. (ii) Action of HBr and conc. H_2SO_4

b) Alkenes:

1. Nomenclature of alkenes.
2. Methods of formation of alkenes with mechanism
 - i) By dehydration of lower alcohols.
 - ii) By dehydrohalogenation of lower alkyl halides.
3. Chemical reactions of alkenes - Hydrogenation, Electrophilic and free radical additions, Hydroboration, Epoxidation, Ozonolysis, Hydration, Hydroxylation, Oxidation with $KMnO_4$, Polymerization of alkenes -ethylene and propylene

c) Dienes:

1. Nomenclature and classification of dienes.
2. Isolated, Conjugated and cumulated dienes.
3. Butadiene - Methods of formation, polymerization, 1 : 2 & 1 : 4 additions and Diels-Alder reaction.

d) Alkynes: -

1. Nomenclature, Acidity of alkynes.
2. Electrophilic and Nucleophilic addition reactions, Hydroboration, Oxidation,
3. Oxidation and polymerization.

B) Chemistry of Aromatic compounds

07

1. Meaning of the terms - Aromatic, non-aromatic, anti aromatic and pseudo aromatic compounds.
- 2 a) Kekule structure of benzene b) Resonance structures of benzene.
 - c) Molecular orbital picture of benzene. d) Representation of benzene ring.
3. Modern theory of aromaticity. Fundamental Concepts - delocalisation of electrons, co-planarity and Huckel's $(4n + 2) \pi$ rule. Applications of Huckel's rule to naphthalene, anthracene, pyrrole, furan and thiophene.
4. Mechanism of electrophilic aromatic substitution in benzene w.r.t. nitration, sulphonation, halogenation.

Unit II Qualitative and Quantitative elemental analysis

15

1. Qualitative analysis of Carbon, Hydrogen, Nitrogen and Sulphur
2. Quantitative analysis of -
 - i) Carbon & hydrogen by Combustion method
 - ii) Nitrogen by Kjeldahl's method
 - iii) Halogen and sulphur by Carius method.
3. Determination of molecular weight of an acid by titration method and Base platinumchloride method.
- 4 Empirical formula and molecular formula determination.
(Numerical Problems Expected)

Reference books:

- 1) Organic Chemistry : Hendrickson, Cram, Hammond.
- 2) Organic Chemistry : Morrison & Boyd
- 3) Organic Chemistry : Volume I & II I.L. Finar
- 4) Organic Chemistry : Pine
- 5) Advanced Organic Chemistry : Sachinkumar Ghosh
- 6) Advanced Organic Chemistry : B.S. Bahl and ArunBahl
- 7) A Guide book to Mechanism in organic Chemistry : Peter Sykes
- 8) Text book of Organic Chemistry : P. L. Sony
- 9) Practical Organic Chemistry : By A. I. Vogel
- 10) Advanced Organic Chemistry - Reactions, Mechanism & Structure : Jerry March
- 11) Organic Chemistry : M.R. Jain
- 12) Organic Chemistry : J. M. Shaigel

DSC 3A

Paper-I Fundamentals of Microbiology

Marks-50

Period-30L

<p>Unit I</p>	<p>History and Development of Microbiology: A) Development of microbiology as a discipline (Robert Hook) B) Spontaneous generation vs. biogenesis. Contributions of Anton von Leeuwenhoek, John Needham, Louis Pasteur & John Tyndall. C) Golden era of microbiology (Role of microorganisms in fermentation, Germ theory of disease and concept of Immunology and medical microbiology and immunology through the work of Joseph Lister and Edward Jenner. D) General Characteristics of Microorganism with Economic Importance i) Acellular microorganisms- Viruses ii) Cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) iii) Difference between Prokaryotic & Eukaryotic cell.</p>	<p align="center">15</p>
<p>Unit II</p>	<p>Microbial nutrition, growth and their control. A) Microbial Nutrition: i) Definition of nutrition and components of media with their functions. ii) Types of culture media- 1) Non-living media. Natural, Synthetic and semi synthetic media, enrichment media, selective and differential media. 2) Living media- Eggs, cell lines and animals. B) Microbial Growth: Definition of growth, Bacterial growth curve, synchronous growth and diauxic growth. C) Cultivation, isolation and preservation techniques of Microorganisms: 1) Biochemical tests (characteristics): Glucose test, IMViC (Indole, Methyl red, Vogues Prouskers and Citrate utilization), Urea and gelatin hydrolysis. 2) Definition and methods of Pure culture. Streak plate, pour plate and Spread plate. 3) Measurement of growth: Direct method-DMC, Indirect Methods- SPC and Membrane filter technique. D) Maintenance and preservation/stocking</p>	<p align="center">15</p>
	<p>References:</p> <ol style="list-style-type: none"> 1. Tortora GJ, Funke BR and Case CL. (2008). Microbiology: An Introduction. 9th edition. Pearson Education 2. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition 3. Cappucino J and Sherman N. (2010). Microbiology: A Laboratory Manual. 9th edition. Pearson Education Limited 4. Wiley JM, Sherwood LM and Woolverton CJ. (2013) Prescott's Microbiology. 9th Edition. McGraw Hill International. 5. Atlas RM. (1997). Principles of Microbiology. 2nd edition. W.M.T. Brown Publishers. 6. Pelczar MJ, Chan ECS and Krieg NR. (1993). Microbiology. 5th edition. McGraw Hill Book Company. 7. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. (2005). General Microbiology. 5th edition. McMillan. 	

DSC 3A**Paper-II Basic Techniques in Microbiology****Marks-50****Period-30L**

Unit I	Microscopy & Staining A) Microscopy: i) Principle, working & Application of compound Microscope. ii) Principle, working, Types & Application of Scanning and Transmission Electron Microscopy. B) Stains and Staining Procedures: i) Definitions of stain and dye. ii) Classification of stains- Acidic, Basic and Neutral with example. iii) Staining methods- Principle, methodology and importance of – a) Simple (Monochrome) staining b) Negative staining c) Differential staining- Gram staining. d) Special staining- Cell wall (Chance Method) and Capsule staining (Manvel's method).	15
Unit II	Control of growth of micro-organisms: i) Definition of sterilization, disinfectant, antiseptic, germicide, microbicidal and micro static agent. ii) Methods of sterilization: a) Physical agent of sterilization– Temperature (dry heat, moist heat and incineration) b) Filtration c) Radiation d) Chemical agents– Alcohol, Phenol, Halogens, gaseous agents (ethylene oxide and formaldehyde).	15
	References: 1. Tortora GJ, Funke BR and Case CL. (2008). Microbiology: An Introduction. 9th edition. Pearson Education 2. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition 3. Cappucino J and Sherman N. (2010). Microbiology: A Laboratory Manual. 9th edition. Pearson Education Limited 4. Wiley JM, Sherwood LM and Woolverton CJ. (2013) Prescott's Microbiology. 9th Edition. McGraw Hill International. 5. Atlas RM. (1997). Principles of Microbiology. 2nd edition. WM.T.Brown Publishers. 6. Pelczar MJ, Chan ECS and Krieg NR. (1993). Microbiology. 5th edition. McGraw Hill Book Company. 7. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. (2005). General Microbiology. 5th edition. McMillan.	

DSC 4A**Paper-I - Cell Biology****Marks - 50****Period - 30L**

Unit I	A) Cell: Introduction and classification of organisms by cell structure, Cell Membrane and Permeability: Chemical components of biological membranes, organization and Fluid Mosaic Model. B) Cell Organelles: Structure and functions of; Endoplasmic reticulum, Golgi Bodies, Mitochondria, Chloroplasts, Nucleus, Lysosomes and Vacuoles.	15
Unit II	A) Cell Membrane & Cellular Matrix: Structure and function of cell membrane- Fluid mosaic model Basic concepts of Microtubules and microfilament B) Cell Reproduction Introduction and basic concept of Meiosis and Mitosis. C) Cancer: General characteristics of cancer, types of cancer, carcinogenesis, agents promoting carcinogenesis.	15

References:

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

DSC 4A**Paper-II - Animal and Plant Physiology****Marks - 50****Period - 30L**

Unit I	<p>A) Circulation: Composition of blood, Plasma proteins & their role, blood cells, Haematopoeisis, Mechanism of coagulation of blood. Mechanism of working of heart.</p> <p>B) Digestion and Respiration: Digestion: Mechanism of digestion & absorption. Composition of bile, Saliva, Pancreatic, gastric and intestinal juice</p> <p>Respiration: Exchange of gases, Transport of O₂ and CO₂.</p> <p>C) Nervous and endocrine coordination: Mechanism of generation & propagation of nerve impulse,</p> <p>Mechanism of action of hormones- (insulin and glucagon)</p> <p>Different endocrine glands -Hypothalamus, pituitary, pineal, thymus, thyroid, parathyroid and adrenals, hypo & hyper-secretions.</p>	15
Unit II	<p>A) Plant Anatomy: Types of tissues (simple & complex permanent tissues)</p> <p>Shoot and root anatomy - primary structure of shoot & root.</p> <p>Plant water relations & nutrients: Plant water relations: diffusion, osmosis, transpiration, stomata & their mechanism of opening & closing.</p> <p>B) Carbon and nitrogen metabolism: Photosynthesis- Photosynthesis pigments, concept of two photo systems, Photophosphorylation, Calvin cycle, CAM plants.</p> <p>Nitrogen metabolism- inorganic & molecular nitrogen fixation, nitrate reduction and ammonium assimilation in plants.</p> <p>C) Growth and development: Growth and development: Definitions, phases of growth, growth hormones (auxins, gibberlins, cytokinins, abscisic acid, ethylene)</p>	15

References:

1. Guyton, A.C. & Hall, J.E. (2006). Textbook of Medical Physiology. XI Edition. Hercourt Asia PTE Ltd. /W.B. Saunders Company.
2. Tortora, G.J. & Grabowski, S. (2006). Principles of Anatomy & Physiology. XI Edition. John wiley & sons,Inc.
3. Dickinson, W.C. 2000 Integrative Plant Anatomy. Harcourt Academic Press, USA.
4. Esau, K. 1977 Anatomy of Seed Plants. Wiley Publishers.
5. Fahh, A. 1974 Plant Anatomy. Pergmon Press, USA and UK.
6. Hopkins, W.G. and Huner, P.A. 2008 Introduction to Plant Physiology. John Wiley and Sons.

- 7.** Mauseth, J.D. 1988 Plant Anatomy. The Benjamin/Cummings Publisher, USA.
- 8.** Nelson, D.L., Cox, M.M. 2004 Lehninger Principles of Biochemistry, 4th edition, W.H. Freeman and Company, New York, USA.
- 9.** Salisbury, F.B. and Ross, C.W. 1991 Plant Physiology, Wadsworth Publishing Co. Ltd.
- 10.** Taiz, L. and Zeiger, E. 2006 Plant Physiology, 4th edition, Sinauer Associates Inc. MA, USA.

Semester II

DSC 1B

Paper-III Fundamental of Marketing & Management accounting

Marks-40
30 L

Period-

Unit I	Marketing Concepts and Segmentation	15
	Origin of marketing Definition of market & types of marketing, Nature & scope of marketing. Selling Vs marketing Market Segmentation: Meaning & criteria for market segmentation, Selecting the market segmentation, Advantages of segmentation, Benefits of market segmentation. E-marketing: Introduction, objectives, History and features of E-marketing- Benefits and problems of E-Marketing- E-marketing tools.	
Unit III	Management Accounting : Working Capital and Ratio Analysis	15
	Meaning- Objective- Nature- Scope- Limitations. Working Capital- Classification- Determinants of working capital- Problems on working capital. Introduction- Meaning- Types of Financial Statement Analysis. Ratio Analysis	

Marketing Management

1. Marketing Management Analysis, Planning, Implementation And Control - Philip Kotlar
2. Marketing Management - Philip Kotlar
3. Fundamental Marketing - W.J.Stanton
4. Fundamental Marketing - M.J. Etzes.
5. Fundamental Marketing - B.J. Walker
6. Fundamental Marketing - S.A. Sherlekar

Management Accounting

1. Management Accounting - J. Made Gowda
2. Principles of Management Accounting - S.N. Maheshwari
3. Management Accounting - Guru Prasad Murthy
4. Practical Problems in Management Accounting - RS Kulshreshta, SC Gupta
5. Management Accounting Practical Problem - Dorai Raj S.N.

DSC 1B

Paper-IV Cost accounting and Project management

Marks-40

Period-30 L

Unit I	Cost Accounting	
	Cost Accounting and Financial Accounting- Methods of Costing with advantages And disadvantages- Techniques of Costing, Classification of Costs- Elements of Cost- Preparation of Cost Sheet- Problems on Cost Sheet.	15
Unit II	Project Management & Planning	15
	Concept of Project and Project Management- Characteristics of Projects- Classification of Project- Importance of Project Management- Project Selection Process- Project Life Cycle- Project Manager- Roles and Responsibilities of Project Manager. Contents of Project Report- Project Appraisal- Methods of Project Appraisal- Tools and Techniques for Project Management	

Cost Accounting

1. Cost Accounting - Jain & Narang
2. Cost Accounting - Bhar
3. Cost Accounting – Jawahar

Small Scale Industries

1. Project Management - Nagarajan
2. Project Management: A Development Perspective - B.B. Goel
3. Dynamics of Entrepreneurship Development - Vasant Desai
4. Entrepreneurship - Madhurima Lall
5. Entrepreneurship - Shikha Sahai
6. Entrepreneurship Development - S.S. Khanka Srivastava S.B.A. Practical Guide to Industrial
7. Entrepreneurship Sultan Chand and Sons, New Delhi.
8. Prasanna Chandra: Project Preparation, Appraisal, Implementation, Tata McGraw Hill, New Delhi. Holt :
Entrepreneurship - New Venture Creation : Prentice hall of India

DSC 2B
Paper-III Fundamentals of Physical Chemistry

Marks-40

Period- 30 L

Unit I Chemical Kinetics

15

A: Reaction Kinetics

07

1. Chemical Kinetics and its scope, Rate of reaction, Definition and units of rate constant.
2. Factors affecting rate of reaction. Concentration, pressure, temperature and catalyst.
3. Order and Molecularity of reaction, Zero order reaction and its example: Photochemical union of H_2 and Cl_2

B: Kinetics of first and second order reaction:

08

1. First order reactions: Derivation of Rate constant. Examples: i) Decomposition of oxalic acid
Characteristics of first order reactions.
2. Second order reaction: Derivation of rate constant for equal concentration of the reactants. Examples: i)
Reaction between $K_2S_2O_8$ and KI
Characteristics of Second order reactions.
3. Pseudo unimolecular reactions such as Hydrolysis of methyl acetate in presence of Acid
4. Methods to determine the order of reaction :
 - a) Integration method
 - b) Graphical method
 - c) Half change method,
 - d) Ostwald's isolation method
5. Energy of Activation
(Numerical Problems Expected)

Unit II Study of properties of Liquid and Gaseous State

15

A: Properties of Liquid

08

1. Introduction, additive & constitutive properties.
2. Viscosity, coefficient of viscosity, determination of viscosity by Ostwald's Viscometer
3. Surface tension:- Determination of surface tension by Drop –Weight method
4. Parachor:-Macleod equation & its modification by Sugden, applications of parachor in the determination of molecular structures as benzene, quinone, NO_2 group & PCl_5 (Numerical problems not expected).

B: Gaseous State

07

1. a) Ideal and Non ideal gases
b) Deviation from ideal behavior. (Only Boyle's law)
c) Causes of deviation, van der Waal's equation, explanation of real gas behavior by Vander Waal's equation.
2. Critical Phenomena : PV-Isotherms of real gases (Andrew's isotherms), continuity of state, Relationship between critical constants and Vander Waal's constants.
3. Liquefaction of gases, Joule-Thomson effect.
(Numerical Problems expected)

Reference Books:

- 1) Mathematical preparation of Physical Chemistry : F. Daniel Mc-Graw Hill Book Com.
- 2) Elements of Physical Chemistry : S. Glasstone and D.Lewis (D.VanNostrandCo.Inc)
- 3) Physical Chemistry : W. J. Moore (Orient Longman)

- 4) Principles of Physical Chemistry :MaronPrutton
- 5) University Chemistry : B. H. Mahan (Addision - Weseley Publ. Co.)
- 6) Chemistry Principle &Applications : P.W. Atkins, M. J. Clugsto, M.J. Fiazer, R. A. Y.Jone (Longman)
- 7) Physical Chemistry : G. M. Barrow (Tata Mc-Graw Hill)
- 8) Essentials of Physical Chemistry : B. S. Bahl& G.D. Tuli (S. Chand)
- 9) Physical Chemistry : A. J. Mee.
- 10) Physical Chemistry : Daniels - Alberty.
- 11) Principles of Physical Chemistry :Puri - Sharma (S. Nagin)

DSC 2B
Paper-IV Fundamentals of Analytical Chemistry

Marks-40

Period-30 L

Unit I

15

A: Fuels

07

- 1) Types of fuels, testing of fuels i.e. calorific value, heating value.
- 2) Octane number, flash point, fire point & applications.
- 3) Introduction of petroleum
- 4) Constituents and refining of petroleum i.e. fractionation of crude oil.
- 5) Natural gas, (C1 to C4) strain run, gasoline (C5 to C12), kerosene.
- 6) Diesel & Residual oil.
- 7) Cracking
- 8) Reforming, hydro forming, isomerisation.

B: Industrial Polymer

08

- 1) General idea of polymers
- 2) Types of polymers, homogeneous & heterogeneous polymers, classification based on a) origin b) composition c) method of vulcanization d) physical properties e) elastomers f) thermoplastic g) thermo settings.
- 3) Linear, branched & cross linked polymers
- 4) Addition polymers, polyethylene, polypropylene, pvc, orlon, teflon, polystyrene
- 5) Condensation polymers, terylene, nylon-66, resin, bakelite & melamine
- 6) Synthetic elastomers - styrene, butadiene, nitrilerubber, Buna-s, Buna-N, rubbers vulcanization.

Unit II Chemistry in day to day life

15

- 1) Types of water, desalination, Fresh water, Dissolved Oxygen and water quality.
- 2) Milk: Definition, Chemical composition of milk of different species such as cow, buffalo and goat. Adulteration in milk like Sugar, Urea, Starch.
- 4) Essential nutrients for plants, Classification, Major, minor & trace their sources and forms.
- 5) Importance of Inorganic Compounds as Medicine- Antacid products Na_2CO_3 , $\text{Al}(\text{OH})_3$, AlPO_4 , $\text{Mg}(\text{OH})_2$, Cis – platin
6. Pharmaceuticals: Introduction, Qualities of ideal drug, Methods of classification of drugs, Classification based on therapeutical action.

Reference Books

- 1) Chemistry - Central Science, Brown, Lemay, Bursten 8th Edition.
- 2) Outline of Dairy Technology - Sukumar De Oxford university Press.
- 3) Introduction to Agronomy & soil water management - V. G. Vaidya, N.R.Sahastrabudhye.
- 4) Principles of Soil Science - M. M. Raj, Millian Co. of India, Bombay 1977
- 5) Inorganic Medicinal & Pharmaceutical Chemistry- Block, Roche, Soine –Wilson, Varghese Publishing House.
- 6) Industrial Chemistry - B.K. Sharma
- 7) Physical Chemistry - G.M. Barrow, International Student Edition,
- 8) Polymer Chemistry - Govarikar
- 9) Polymer Chemistry - Bill Meyer
- 10) Text Book of Physical Chemistry - Puri & Sharma

Unit I	<p>Introduction of fermentation:</p> <p>A) Basic concept of fermentation-</p> <p>B) Screening- Definitions and types of screening (Primary and secondary)</p> <p>C) Bioreactor/ Fermenter- Ideal criteria of bioreactor design, their parts and function, computerized control of fermentation process.</p> <p>D) Fermentation medium- Raw Materials, Media Ingredients: Water, Carbon source (molasses, corn steep liquor, sulfite waste liquor and whey), Nitrogen source, Minerals, Vitamins, and Growth Factors, Precursors, and Antifoam Agents.</p> <p>E) Sterilization of fermenter and fermentation media- Batch and Continuous sterilization.</p> <p>F) Scale up of fermentation process – laboratory, pilot-scale and production-scale</p> <p>G) Types of fermentation process -Batch culture and continuous culture</p>	15
Unit II	<p>Inoculum Development and Strain improvement:</p> <p>A) Inoculum development- General principle, Development of bacterial, fungal and yeasts.</p> <p>B) Strain improvement:</p> <p>i) Definition, criteria for Strain improvement for the selected organism.</p> <p>ii) Methods of strain improvements: use of UV/Chemicals method, mutation, recombinant DNA technology and protoplast fusion</p> <p>iii) Screening method of improved cultures: random and strategic screening methods</p> <p>C) Biological and Physicochemical assay: Diffusion, Turbidometric, Enzymatic and metabolic response assay.</p>	15
	<p>References:</p> <ol style="list-style-type: none"> 1. Brock, Biology of microorganism 2. Text book of microbiology by C.H. Pelzar. 3. Text book of Microbiology By T.Bapat Phadake Publication. 4. Text book of Industrial Microbiology By L.E. Casida. 5. Principles of Fermentation Technology by Whithakar. 6. Bergey's Manual of systematic bacteriology Vol-IV 7. Text book of Industrial microbiology By A.H. Patel 	

DSC 3B

Paper-IV Basic techniques in Industrial Microbiology

Marks-50

Period-30L

Unit I	Downstream Processing and effluent treatment: i) Criteria for selection of downstream process ii) Factors affecting on downstream process iii) Filtration- Batch filtration and rotary vacuum filtration and cross flow filtration (Tangential filtration) iv) Centrifugation, precipitation, cell aggregation and flocculation. v) liquid-liquid extraction vi) Solvent extraction. vii) Extraction of intracellular products- cell disruption viii) Purification of product by chromatography- Adsorption, Ion exchange, affinity and HPLC ix) Finishing stages- Crystallization and Drying. B) Effluent treatment i) Definitions of BOD (Biological oxygen demand), DO (Dissolved oxygen) and COD (Chemical oxygen demand) iii) Methods of effluent treatment: Activated sludge and biological method	15	
Unit II	Product quality and fermentation economics A) Product quality tests- sterility testing, pyrogenicity, carcinogenic and allergy testing B) Fermentation economics: A case study, market potential for product and fermentation, product recovery cost, Entrepreneurship, plan for industry, product selection process, site selection, finance, feasibility, excise and legal aspects.	15	
	References: 1. Brock, Biology of microorganisms 2. Text book of microbiology by C.H. Pelzar. 3. Text book of Microbiology By T.Bapat Phadake Publication. 4. Text book of Industrial Microbiology By L.E. Casida. 5. Principles of Fermentation Technology by Whithakar. 6. Bergey's Manual of systematic bacteriology Vol-IV 7. Text book of Industrial microbiology By A.H. Patel		

DSC 4B
Paper-III - Basic Biomolecules

Marks-50

Period-30L

Unit I	<p>A) Amino acids & Proteins: Structure and properties of Amino acids, Types of proteins and their classification, Forces stabilizing protein structure and shape. Different Level of structural organization of proteins.</p> <p>B) Carbohydrates: Structure, Function and Properties of Monosaccharides, Oligosaccharides and Polysaccharides and their biological functions.</p> <p>C) Lipids: Structure and functions –Classification, nomenclature and properties of Fatty acids, Triglycerides and Phospholipids.</p>	15
Unit II	<p>A) Nucleic acids: Structure and functions of Nucleic acids, Nucleosides & Nucleotides, Double helical Right handed structure of DNA, forms of DNA</p> <p>B) Enzymes: Definition, Holoenzyme, Apoenzyme, Cofactors, coenzyme, prosthetic groups, Mechanism of enzyme action (Lock & Key, Induced fit hypothesis) and active site.</p> <p>C) Vitamins: Types of water soluble and fat soluble vitamins, deficiency diseases and symptoms.</p>	15

References:

1. Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edition. W.H Freeman and Co.
2. Buchanan, B., Gruissem, W. and Jones, R. (2000) Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists.
3. Nelson, D.L., Cox, M.M. (2004) Lehninger Principles of Biochemistry, 4th Edition, WH Freeman and Company, New York, USA.
4. Hopkins, W.G. and Huner, P.A. (2008) Introduction to Plant Physiology. John Wiley and Sons.
5. Salisbury, F.B. and Ross, C.W. (1991) Plant Physiology, Wadsworth Publishing Co. Ltd.

DSC 4B**Paper- IV - Basic Metabolism****Marks-50****Period-30L**

Unit I	A) Carbohydrates metabolism: Definitions of Metabolism, Anabolism and Catabolism. Glycolysis, fate of Pyruvate (alcoholic and lactic acid fermentation) TCA cycle & glycogen synthesis. B) Lipid metabolism: β-oxidation of saturated and unsaturated fatty acids (ω-omega) oxidation of fatty acids	15
Unit II	A) Amino Acid: Classification of amino acids Urea cycle, and metabolic disorders of amino acid metabolism (phenylketonuria, alkaptonuria) B) Nucleic Acid Metabolism: De novo, Salvage pathways.	15

References:

1. Voet & Voet, 2000 Biochemistry, John Wiley, New York
2. Zubay, 1995, Biochemistry, Brown Publishers.
3. Lehninger, 2000, Principles of Biochemistry, CBBS Publishers.
4. I.Stryer, 2002. Biochemistry, W.H.Freeman

Practical Annual
DSC 1 A & 1B
Laboratory Course I
(Entrepreneurship
Science)

(100 marks)

1.	To Collect information of any five entrepreneurs.
2.	To Collect newspaper cutting related to business.
3.	To study recent government policies regarding development of entrepreneurship.
4.	To study any two rural businesses.
5.	To study the procedure to obtain financial resources from various institutions under DIC Scheme.
6.	To study on successful women entrepreneurs.
7.	Exercise on market survey.
8.	Exercise on market segmentation.
9.	To study E-marketing strategies of any two organisation.
10.	Exercise on ratio analysis of any organization.
11.	Exercise on journal entries.
12.	Exercise on ledger accounts.
13.	To collect source documents required for accounting.
14.	Exercise on final account.
15.	Exercise of cost sheets.
16.	Exercise of job cost sheets.
17.	To study problems of small scale industry.
18.	To prepare project report on market analysis.
19.	To prepare project report on technical analysis.
20.	To prepare project report on financial analysis.

Industrial visits:

- 1 (one) visits in first term,
- 1 (one) visits in second term

Visit to Institutions:

- 1 (one) visit in semester-I 1 (one) visit in Semester-II

During visit following observations must be done.

- 1. To see plant or factory, Interaction with concerned officers, supervisor and workers.
- 2. Questioners should be supplied to students about manufacturing process, accounting section, administration section or any other department

DSC 2 A and 2B
Laboratory Course II
(Industrial Chemistry)

100 M

1. Calibration of burette, pipette and beryl pipette
2. Preparation of 100 ml of 0.1 N KMnO_4 and its standardization.
3. Preparation of 0.1 N HCl by density calculation & its standardization.
4. Study of flash point & fire point of given solvent fuel.
5. Viscosity measurement using Oswald's Viscometer.
6. To determine the strength of aniline in the given solution in g/dm^3
7. Study of soaping point.
8. Preparation of *m*-dinitrobenzene
9. Preparation of nitro derivative of salicylic acid.
10. Separation of amino acids by thin layer chromatography
11. Determination of hardness of water.
12. Determination of D.O.
13. Determination of acidity, alkalinity of water
14. Determination of saponification value of oil
15. Determination of acid value in bleaching powder
16. Determination of available chlorine in bleaching powder
17. Determination of chloride in water by Mohr's method.
18. Determination of heat solution of CuSO_4
19. Estimation of iron from the cement (Volumetrically)
20. Separation of metal ions (Cu^{2+} , Co^{2+} , Ni^{2+}) by paper chromatography.
21. Kinetics of 1st and 2nd Order reaction.
22. Density of given liquid by Pycnometer.

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. GrawHill)
- 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
- 9) Vogel's Text Book of Qualitative Chemical Analysis, (Longman) ELBS. Edition
- 10) Comprehensive Practical Organic Chemistry - Quantitative Analysis by V.K. Ahluwalia, SunitaDhingra, University Press. Distributor - Orient Longman Ltd.,
- 11) Comprehensive Practical Organic Chemistry preparation and Quantitative Analysis. V.K. Ahluwalia, Renu Agarwal, University Press. Distributor - Orient Longman Ltd.,

12) A laboratory Hand-Book of organic Qualitative Analysis and separation :V. S. Kulkarni, DastaneRamchandra and Co. Pune

DSC 3A & 3B

Laboratory Course III (Industrial Microbiology)

100 M

1. Study of Compound Microscope
2. Demonstration of Laboratory Equipments: Incubator, Autoclave, Hot Air Oven, Centrifuge, Laminar Air flow, Colony counter.
3. Monochrome staining
4. Negative staining
5. Gram staining
6. Hanging drop technique
7. Cell wall staining
8. Mounting & Identification of Fungi
9. Isolation of *E. coli* on differential media
10. IMViC test
11. Starch hydrolysis test
12. Urea hydrolysis test
13. Sugar utilization test
14. Isolation of bacteria using Streak plate technique
15. Isolation of bacteria using Spread plate technique
16. Enumeration of microorganisms from Soil by SPC (Pour Plate technique)
17. Antibiotic producer screening from soil
18. Penicillin disc diffusion assay
19. Penicillin end point determination assay (MIC)
20. Study of Growth curve of bacteria (*E. coli*)

DSC 4A & 4B
Laboratory Course IV
(Industrial Biotechnology)

100 M

1. Finding the coagulation time of blood
2. Determination of blood groups
3. Enumeration of RBC
4. Determination of TLC and DLC
5. Determination of Haemoglobin
6. Qualitative tests for Carbohydrates, lipids and proteins
7. Preparation of stained mounts of anatomy of monocot and dicot's root, stem & leaf.
8. Demonstration of plasmolysis by *Tradescantia* leaf peel.
9. Demonstration of opening & closing of stomata
10. Demonstration of guttation on leaf tips of grass and garden nasturtium.
11. Separation of photosynthetic pigments by paper chromatography.
12. Demonstration of aerobic respiration.
13. Preparation of root nodules from a leguminous plant.
14. Separation of Amino acids by paper chromatography
15. To study the effect of substrate concentration on the activity of amylase enzyme.
16. Estimation of blood glucose by glucose oxidase method.
17. Principles of Colorimetry: Verification of Beer's law
18. Preparation of buffers.

Equivalent Subject for Old Syllabus

Sr. No.	Name of the Old Paper	Name of the New Paper
1	Paper I: Entrepreneurship and the world of business	Paper-I: Principles of Entrepreneurship
2	Paper II: Economics for manager and managerial accounting	Paper-II: Fundamental of Economics and Accountancy
3	Paper I: Fundamental of inorganic chemistry	Paper-I Fundamentals of Inorganic Chemistry
4	Paper II: Fundamental of organic chemistry	Paper-II Fundamentals of Organic Chemistry
5	Paper I: Fundamental of microbiology	Paper-I Fundamentals of Microbiology
6	Paper II: Basic techniques in microbiology	Paper-II Basic Techniques in Microbiology
7	Paper I: Cell Biology	Paper-I - Cell Biology
8	Paper II: Animal and plant physiology	Paper-II - Animal and Plant Physiology
9	Paper-III : Principles of marketing and management accounting	Paper-III: Fundamental of Marketing & Management accounting
10	Paper-IV: Cost accounting and project management	Paper-IV: Cost accounting and Project management
11	Paper-III: Fundamental of physical chemistry	Paper-III Fundamentals of Physical Chemistry
12	Paper-IV: Fundamental of analytical chemistry	Paper-IV Fundamentals of Analytical Chemistry
13	Paper-III: Fundamental of industrial microbiology	Paper-III Fundamentals of Industrial Microbiology
14	Paper-IV : Basics techniques in industrial microbiology	Paper-IV Basic techniques in Industrial Microbiology
15	Paper-III: Basics of Biomolecules	Paper-III - Basic Biomolecules
16	Paper-IV: Basics of Metabolism	Paper- IV - Basic Metabolism

Nature of Question Paper

For Choice Based Credit System (CBCS) Semester Pattern

Faculty of Science (w.e.f. June 2022 for B.Sc. I and from June 2023 B.Sc. II)

Time: 2 Hrs.

Total Marks - 40

Instructions: (Instructions may differs for subject to Subject)

1. All questions are compulsory.
2. Draw neat diagrams and give equations wherever necessary.
3. Figures to the right indicate full marks.
4. Use of logarithmic table and calculator is allowed.

(At. Wts.: H = 1, C = 12, O = 16, N = 14, Na = 23, Cl = 35.5)

Q. No. 1 Multiple Choice Questions (8 out of 8) (08 marks)

a) b) c) d)

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)

Q. No. 2 Answer the following (4 out of 5) (08 marks)

- 1)
- 2)
- 3)
- 4)
- 5)

Q. No. 3 Write Short Notes (2 out of 3) (08 marks)

- 1)
- 2)
- 3)

Q. No. 4 Answer the following (2 out of 3) (08 marks)

- 1)
- 2)
- 3)

Q. No. 5 Answer the following (1 out of 2) (08 marks)

- 1)
- 2)

Bridge Course for B.Sc. I Year Entrepreneurship Admission

Code	Title of the Paper	Examination			Lectures	Credits
		UA	CA	Total		
BCE.3	Introduction to Science and Entrepreneurship	80	20	100	30	4
Objectives of Paper:		1. To introduce the Chemistry, Microbiology and Biotechnology terms, definitions and processes. 2. To introduce the concepts, terms, definitions and mechanisms applicable in commerce and management.				
Expected out comes from Paper:		1. To create eligibility required for science subject learning 2. To create eligibility required for commerce and management subject learning				
Units	Content					Lec.
I	Industrial Chemistry: Only Introduction and Definitions of: Elements of chemistry, Chemical bonding - Hybridization, Valence bond theory, Solution and colligative properties, Co-ordination compounds, Metallurgy, Catalysis, Thermodynamics, Chemical kinetics, Electrochemistry, Chemical equilibrium, Electroplating, Chemistry of hydrocarbon - alkanes, alkenes, alkynes, Chemistry of aromatic compounds, Synthetic and natural dyes, Chromatography, Polymers, Biomolecules, Agrochemicals, Drug - Chemical and natural, Fertilizers, Environmental pollution.					8
II	Industrial Microbiology: Only Introduction and Definitions of: General characteristics and outline of classification of microorganisms, Isolation techniques of microorganisms, Sterilization and Aseptic techniques, Industrial applications of microorganisms – Mycology - role of fungi in production of alcohol, citric acid, antibiotic and bakery products, Phycology –algal biofertilizers, economic importance of algae (food fodder), Bacteria – Types, role of bacteria in food, dairy products and agriculture, IPR.					8
III	Industrial Biotechnology: Only Introduction and Definitions of: DNA as genetic material, mechanisms of prokaryotic and eukaryotic DNA replication, transcription, translation, Concept of r-DNA technology and its application, Recombination, Principles, Types and Applications of Chromatography, Electrophoresis, and Centrifugation. Concept of Plant and Animal tissue culture and its applications, Production of transgenic plants. Importance of maintenance of sterility and use of antibiotics, Media preparation, Organ culture, Culture and maintenance of Cell lines. Cell Biology – Cell types, structure, Organelles and its functions, Metabolism – Glycolysis; aerobic and anaerobic, Krebs cycle; Hexose monophosphate shunt, Glycogenesis and glycogenolysis.					7
IV	Entrepreneurship: Only Introduction and Definitions of: Types of Business Economics, demand analysis, Accountancy, basic accounting terminologies, Financial account, Issue of shares, Cost accounting, Auditing, MSMEs, Project management, Marketing environment, Market segmentation, Consumer behavior, Sources of Business finance, Stock exchange, Human resource management, Selection process, Training and development, International business, modes of entering into international business and its Management, Functions of management, Organizational behavior, Business Ethics and E-commerce.					7
References:	1. Theoretical Principles of Inorganic Chemistry - G. S. Manku 2. Organic Chemistry : Volume I & II I.L. Finar 3. Cappucino J and Sherman N. (2010). Microbiology: A Laboratory Manual. 9th edition. Pearson Education Limited 4. Wiley JM, Sherwood LM and Woolverton CJ. (2013) Prescott’s Microbiology. 9th Edition. McGraw Hill International 5. Introduction to Biotechnology, Low Price Edition, W.J. Thieman and M.A. Palladino, Peaeson Education (2007) 6. Hall, R.D. (Ed.) 1999. Plant Tissue Culture: Techniques and Experiments, Academic Press, New York. 7. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia. 8. Modern Business Organization & Management - S.A. Sherlekar 9. Dynamics of Entrepreneurial Development - Vasant Desai. 10. Fundamental of Entrepreneurship – Dr. A.K. Gavai					