AC: 25/07/2023
Item No. :2.4

SIES (Nerul) College of Arts, Science and Commerce (Autonomous)

Syllabus for Approval

B.Sc. Packaging Technology

Sr. No.	Heading	Particulars
1	Title of the course	B.Sc (Packaging Technology)
2	Eligibility for admission	Eligibility for admission First year: HSC Science or HSC Vocational Sciences Eligibility for admission Second year: Post SSC Diploma Engg. or Tech / Vocation Sciences
3	Minimum Percentage for admission	40%
4	Passing Marks	40%
5	Semesters	I
6	Level	UG
7	Pattern	3-4 years & 6-8 semesters Choice Based Grading System
8	Status	New
9	To be implemented from	From Academic year 2023-24 in a progressive manner

Date: 25th July, 2023.

Signature:

Dr. Koel Roychoudhury
AC Chairperson

Dr. Trupti Wani
Head of the Department

Sri Chandrasekarendra Saraswati Vidyapuram,, Plot I-C, Sector V,
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Tel No: 61196409, 61196410, 61196402, 61196413, 61196414, 61196415, 27708371
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Programme Objectives:

1. To learn about packaging materials, technologies, design, sustainability and quality control.
2. To gain practical skills in packaging design, testing, and production processes, as well as a deep understanding of industry regulations and standards.
3. To understand the packaging industry trends and work towards sustainable solutions.
4. To pursue higher education in packaging in India and abroad.

Programme Outcomes:

1. At the end of the program, students are able to gain thorough knowledge in key areas in the subjects offered.
2. At the end of the program, students will be able to identify, formulate and analyze scientific problems and reach concrete solutions using various principles of mathematics and sciences.
3. At the end of the program, learners will be able to design solutions for complex problems and design a process/ processes that can meet specific needs. (Attainment of this is through projects at the final year level).
4. Learners will be able to communicate effectively on scientific issues with the scientific community and society at large in writing effective reports and designing documentation, make effective presentations and give and receive instructions.
5. At the end of this programme, students will be able to hone the soft-skills required in positively enhancing their academic, professional and personal pursuits towards self and societal advancement.

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Preamble

As lifestyles change, materials evolve and the race for branding and marketing continues, the Packaging Industry adapts & benefits. It is a very dynamic, fast-paced marketplace. Anyone working within the packaging industry should expect constant evolution and growth. For capable employees seeking to work in Packaging Industry, the possibilities are endless. This industry is innovative, stable, and creative. This being a specialized field requires special education and training.

The B.Sc. in Packaging Technology specializing in Packaging Materials, Designing, Quality & Testing is designed to impart advanced knowledge and skills that are practical-oriented, career and community oriented. Packaging is usually taught as an interdisciplinary field, bringing together elements from a variety of scientific realms. It has special relevance to industry application with hands-on laboratory training sessions.

The core philosophy of overall syllabus is to -

a. Form strong foundation of Packaging Science,

b. Introduce Packaging technologies to the students in a gradual way,

c. Groom the students for the challenges of Packaging Industry

The curriculum is designed as per the NEP Credit Framework for 4-year UG degree programme.

SIES (Nerul) College of Arts, Science and Commerce (Autonomous)

B.Sc. Packaging Technology Programme

(To be implemented from Academic Year- 2023-24)

No. of Courses	Course Code	Semester I	Credits
1	***Major***		
1	U23PT1MJ01	**Introduction To Packaging**	**02**
2	U23PT1MJ02	**Paper Based Packaging**	**03**
3	U23PT1MJP02	**Paper Based Packaging Laboratory**	**01**
2	***Minor***		
1	U23PT1MI01	**Basic Chemistry - I**	**03**
2	U23PT1MIP01	**Basic Chemistry – I Practicals**	**01**
3	***Open Electives (OE)***		
1	U23PT1E01	**Environment and Society**	**04**
4	***VSC/SEC***		
1	U23PT1VSC01	**Basics of Computers**	**02**
2	U23PT1SEC01	**Introduction to Good Laboratory Practices**	**02**
5	***AEC/VEC/IKS***		
1	U23PT1AEC01	**Effective Communication Skills – I**	**02**
2	U23PT1VEC01	**Understanding Indian Society and Constitutional Values**	**02**
6	***OJT, FP, RP, CEP, CC***		
		Total Credits	**22**

COURSE NAME: INTRODUCTION TO PACKAGING

COURSE CODE: U23PT1MJ01 **COURSE CREDIT: 02**

1 credit - 15 lectures **1 lecture is 60 minutes**

Course Objectives:

- Study the basic concepts of packaging technology.
- Study the overall perspective of the packaging industry.
- Recognize the importance of product-package interaction & its quality aspects in packaging.
- Understand marketing as an integral tool to packaging.

Course Outcomes:

Learners will be able to:

- Classify & evaluate the various types of packaging existing in the market.
- Analyse the product-packaging compatibility parameters.
- Explain the importance of packaging in the context of present scenario.

Sr. No.	Syllabus	No. of Lectures
01	**Unit I: Introduction & Product-Package Compatibility Studies:** • Packaging – History, Need & Evolution; Packaging Functions – Contain, Preserve, Protect, Inform, Identify, Sell; Packaging Hazards – Storage, Transportation, Chemical, Climatic, Biological; Packaging Classifications – Primary / Secondary / Tertiary, Unit / intermediate / Bulk, Flexible & Rigid. • Product Characteristics: Physical (nature, shape, size, texture, Centre of gravity, etc.), Chemical (Acidic, basic, reactivity etc.), Biological (Effect of micro-organisms) and Effect of moisture, oxygen and other gases; Package Characteristics: Material (Plastic, paper, wood, etc.), Physical (tensile, breaking load, burst, molecular/fibre direction, etc.), Chemical (Unreacted chemicals present, pH, etc.), Biological (sensitivity to micro-organisms), Permeability (Barrier properties – Absorption/Diffusion of moisture and gases). Live Problems / Case Studies.	**15**
02	**Unit II: Packaging – Marketing, Quality, Environment, Cost** • Market Considerations – Importance of Demography & Psychography, Retail Market (POP), Equity & Brand Name; Package Embellishment – Graphic Design Elements – Significance of Shape, Size, Colour, Font, Texture, Lines, Balance & Unity, Symmetry & Harmony; Shelf Appeal Studies - Recall Questioning, Focus Group, Eye-Tracking, S-scope studies. • Quality Control – Need for and importance of packaging; Significance of specifications; Significance of Testing; Introduction to Standards, Conditioning, Sampling; Examples of testing according to standards. • Packaging Costs; Packaging – Environmental considerations & waste management; Introduction to Packaging Laws & Regulations; Packaging Scenario – World & India – Comparison, Scope & Growth in India.	**15**

References:

1. Soroka W., “Fundamentals of Packaging Technology”, 3rd Ed, IoPP, 2002.
2. Paine F. A., “The Packaging User’s Handbook”, 1st Ed, Blackie Academic & Professional, 1991.
3. Byett J. et al., “Packaging Technology”, 2nd Ed, The Institute of Packaging (SA), 2001.
4. Selke, S. E. M., Culter, J. D. and Hernandez, R. J., “Plastics Packaging: Properties, processing,Applications and Regulation”, Carl HanserVerlag, USA, 2004.
5. Joseph F. H, Robert J. K, Hallie F, “Handbook of Package Engineering”, Third Edition,Technomic Publishing, 1998.
6. Yam K. L., “The Wiley Encyclopedia of Packaging Technology”, Third Edition, Wiley, 2009.

COURSE NAME: PAPER BASED PACKAGING

COURSE CODE: U23PT1MJ02 **COURSE CREDIT: 03**

1 credit - 15 lectures **1 lecture is 60 minutes**

Course objectives:

- Gain the basic knowledge of pulping and paper making process.
- Study various types of papers, boards and paper-based packages along with their manufacturing processes
- Understand the properties of paper & paperboard w.r.t. to packaging applications.
- Study the various types of CFB, their types & Properties.

Course Outcomes:

Learners will be able to:

- Identify various types of paper & paperboards
- Testing the various properties of paper-based packaging materials
- Analyse & evaluate the different types of paper-based packaging materials based on their properties & applications

Sr. No.	Syllabus	No. of Lectures
01	**Unit I: Raw Materials, Pulping & Papermaking** • Fibrous raw materials –Soft and Hard Wood, Wood structure and morphology, non-wood fibers and recycled paper, Non fibrous Additives, Sizing Agents, Binders, Fillers and Additives, Wood harvesting, logging, sorting, Debarking, Chipping, Screening & Storage. • Pulping: Types- Mechanical, Chemical and Semi-chemical - Pulp properties – Processing of pulp for paper making. • Paper Making: Preparation of pulp – Repulping/dispersion, Beating and Refining, Bleaching, Recycled paper – Deinking, Washing and Flotation Fourdrinier Paper Machine- Dry and Wet end operations- Surface treatments- Sizing, Coating and Super calendaring.	**15**
02	**Unit II: Paper Types & Properties** • Types of papers: Printing grades-uncoated papers, coated papers, Newsprint, office paper-Packaging paper grades, properties and applications - Tissue, Parchment, greaseproof, glassine, wet strength paper, stretchable paper, coated paper • Paper properties: Optical properties – Colour, brightness, smoothness, gloss, opacity and rub resistance, Strength properties–thickness, grammage, tensile, tear, bursting strength, stiffness, Grain direction, Wire and Felt sides.	**15**

03	**Unit III: Paper based Boards & Packaging** • Paperboard – Folding box board, white lined chipboard, solid bleached board, solid unbleached board, Liquid packaging board, Duplex / grey Board, Solid Fibre Boards, Container boards / Specialty boards. Board making: Sources and Paperboard Manufacturing process, Multiply Board, Cylinder Forming machine, Vat types - Pressure and suction forming. Pressing, drying and finishing, Paper board Coating. • Corrugated Board construction - Flutes/Single, Double, Triple Wall, Board grades, Manufacture, Adhesive Bond, Specifications, Box Layout • Paper-based packaging: Paper bags & Sacks–Manufacturing & Applications-Types of bags- Multiwall Paper bags -Regenerated Cellulosic films.	**15**

References:

1. Handbook of Paper and Board, Herbert Holik, Wiley-VCH, 2006.

2. Paper and paperboard Packaging Technology, Mark J. Kirwan, Blackwell Publishing, 2005.

3. Handbook of Pulp Vol.1, Herbert Sixta, Wiley-VCH, 2005.

4. Handbook for pulp and paper technologists, G.A. Smook, Angus Wilde Publications, 2001.

5. "The Wiley Encyclopedia of Packaging Technology", 2nd Edition, Wiley,
New York, USA, 1995

6. R. E. Mark, C. C. Habeger, Jr., J. Borch and M. B. Lyne, "Handbook of Physical Testing of Paper",
2nd Edition, Marcel Dekker, 2002

7. Twede, D. and Selke, S. E. M., "Cartons, Crates and Corrugated Board – Handbook of Paper and
Wood Packaging Technology", DEStech Publications, 2005.

COURSE NAME: PAPER BASED PACKAGING LABORATORY

COURSE CODE: U23PT1MJP02 **COURSE CREDIT: 01**

1 credit - 15 lectures **1 lecture is 120 minutes**

List of Practicals:

1. To find Grammage for a given sample of paper / paperboard / individual plies & overall CFB
2. To find thickness for a given sample of paper / paperboard
3. To identify grain direction and top / wire-side of paper.
4. To find water absorption / COBB value of paper / paperboard / CFB
5. To find Bursting strength and burst factor of paper
6. To find Tearing Strength of paper and grain direction
7. To find the tensile strength of a given paper sample.
8. To find Grammage for a given sample of paperboard,
9. To identify the type of flute of a given CFB Sample.
10. To find the ECT and RCT of a given CFB Sample.
11. To find the puncture resistance of a given CFB Sample.
12. To measure Ash Content in a given paper sample
13. To measure optical properties: Colour, Brightness, Whiteness Index & Gloss

COURSE NAME: BASIC CHEMISTRY-I

COURSE CODE: U23PT1MI01 **COURSE CREDIT: 03**

1 credit - 15 lectures **1 lecture is 60 minutes**

Course Objectives:

- To acquaint the students with basic concepts of chemistry viz., nomenclature chemical bonding and stereochemistry.

Learning Outcome:

- The students will learn elaborate concepts of nomenclature of solutions,classification and buffers.
- They will also be able to elaborate the chemical bonding types in different compounds along with gaining insight into stereochemistry.

Sr. No	Syllabus	No. of lectures
01	**Module-1- Nomenclature, Classification and Solutions, Buffers** **Nomenclature and Classification of:** ● **Inorganic Compounds:** Oxides, Salts, Acids, Bases, Ionic, Molecular and Coordination Compounds ● **Organic Compounds:** Alkanes, Alkenes, Alkynes, Cyclic Hydrocarbons, Aromatic Compounds, Alcohols and Ethers, Aldehydes and Ketones, Carboxylic Acids and its derivatives, Amines, Amides, Alkyl Halides and Heterocyclic Compounds **Solutions:** Normality, Molarity, Mole fraction, ppb, ppm, millimoles, milliequivalents (Numericals expected). ● **Buffer:** Concept of Buffers, Types of Buffers, Derivation of Henderson equation for Acidic and Basic buffers, Buffer action, Buffer capacity (Numericals expected) pH of Buffer Solution.	**15**
02	**Module II- Chemical Bonding** ● Bond length, Bond order Ionic Bond- Nature of Ionic Bond, Structure of NaCl, KCl and CsCl, Factors influencing the formation of ionic bond. ● Covalent Bond- Nature of covalent bond, Structure of	**15**

	CH_4, NH_3, H_2O, Shapes of $BeCl_2$, BF_3. ● Coordinate Bond- Nature of Coordinate Bond. ● Non-Covalent Bonds: Van De Waal's forces: dipole - dipole, dipole – induced dipole, Hydrogen Bond.	
03	**Module 3-Stereochemistry** **Stereochemistry:** Isomerism, Racemic mixtures Cis-Trans, Threo, Erythro and Meso isomers. Conformation: Conformations of Ethane, Difference between Configuration and Conformation. ● Configuration: Asymmetric Carbon Atom, Stereogenic/ Chiral Centers, Chirality ● Projection formulae – Fischer, Newman and Sawhorse, The Interconversion of the Formulae	**15**

References:

1. Ahluwalia, V. K., 2010 TEXTBOOK OF ORGANIC CHEMISTRY, VOL.III, S. Chand
2. Publishers, Ane Books Pvt. Ltd.
3. Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, S. Chand
4. Atkins P.W. and Paula J.de, Atkin's Physical Chemistry, 10th Ed., Oxford University 12Press (2014).
5. Ball D.W., Physical Chemistry, Thomson Press, India (2007).Castellan G.W., Physical Chemistry, 4th Ed., Narosa (2004).
6. Mortimer R.G., Physical Chemistry, 3rd Ed., Elsevier: NOIDA, UP (2009).
7. Kalsi, P. S. Stereochemistry Conformation and Mechanism, New Age International, 2005
8. Garland C. W., Nibler J.W. and Shoemaker D.P., Experiments in Physical Chemistry, 8thEd., McGraw-Hill, New York (2003).
9. Halpern A.M. and McBane G.C., Experimental Physical Chemistry, 3rd Ed., W.H.Freeman and Co., New York (2003).

COURSE NAME: BASIC CHEMISTRY-I PRACTICALS

COURSE CODE: U23PT1MIP01 **COURSE CREDIT: 01**

1 credit - 15 lectures **1 lecture is 120 minutes**

List of Practicals
1. Spot test for compounds belonging to Carboxylic Acid, Phenol, Aldehyde/Ketone, Ester, Alcohol, Amine, Nitro Compounds, Haloalkane, Haloarene. 2. To prepare 0.1 N succinic acid and standardize sodium hydroxide of two different concentrations. 3. Study of neutralization reaction by titration. 4. Estimation of Alcohol by Dichromate method. 5. Preparation of buffers.

COURSE NAME : ENVIRONMENT AND SOCIETY

COURSE CODE: U23PT1E01 **COURSE CREDIT: 04**

1 credit - 15 lectures **1 lecture is 60 minutes**

Course Objective:

- To orient the students with various movements for the environment.

Learning Outcome:

- The students will be encouraged to participate in activities that promote environmentalconservation and are also made aware of the role of society in environmental management.

Sr. No	Syllabus	No. of lectures
01	**Module -1- Introduction to Environment and Society** ● Concept of environment, Environment and man relationship ● Scope and Multidisciplinary nature of Environmental Studies ● Environment education and public awareness ● Environmental ethics.	15
02	**Module-2 - Impact of anthropogenic activities on Environment and Society** Impact of the following anthropogenic activities on the environment and society: • Pollution • Industrialization • Urbanization • Deforestation • Mining • Developmental projects • Reclamation • Tourism	15
03	**Module-3 - Man and Environment Management** • Concept and strategies for sustainable development • The Sustainable Development Goals (SDG) 2030 Agenda • Resource utilization and sustainability	15

	• Strategies for environmental protection based on consumerism	
04	**Module-4- Environmental Movements and Society** • Concept of Social and Environmental Movements • Origin of Environmental movements in India • Case studies of environmental movements (Bishnoi movement, Chipko Movement, Appiko Movement, Narmada Bachao Andolan, Silent Valley movement) • Ideological trends in Environmental Movement	15

References:

1. A Textbook of Environmental Studies, D. K. Asthana, S Chand & Co Ltd
2. A Textbook of Environmental Chemistry and Pollution Control, S. S. Dara, S Chand & Co Ltd
3. Essential Environmental Studies, S P Misra & S N Pandey, Ane Books Pvt. Ltd.
4. Understanding Environment, Chokkan, K.B., Pandya, H. & Raghunathan, H. (eds). 2004 Sagar Publication India Pvt. Ltd., New Delhi.
5. Pandit, M.K. 2013. Chipko: Failure of a Successful Conservation Movement. In: Sodhi, N.S., Gibson, L. & Raven, P.H. Conservation Biology: Voices from the Tropics. pp. 126- 127. Wiley Blackwell, Oxford, UK.

COURSE NAME : BASICS OF COMPUTERS

COURSE CODE : U23PT1VSC01 **COURSE CREDIT: 02**

1 credit - 15 lectures **1 lecture is 60 minutes**

Course Objective:

- To acquaint the students with Microsoft office and its various tools.

Learning outcomes:

- Students will learn the basics of computers and to use various toolbars in Microsoft Word,Microsoft Excel and Microsoft PowerPoint.

Sr. No	Syllabus	No. of lectures
01	**Module 1- Basics of Computers** ● **Microsoft Word** – Creating new documents; Page Layout; Styles and Themes; Columns and Ordering; Working with Text; Format Text; Text boxes; Listing of Text; Use of various shapes; Use of Tables; SmartArt Graphics; Saving documents. **Microsoft Excel –** Starting a workbook; Modifying columns rows and cells; Formatting cells; Creating formulas; Formatting Tables; Aligning Texts; Working with Worksheets; Freezing worksheet panes; Use of Charts; Conditional Formatting. ● **Microsoft PowerPoint –** Uses of PowerPoint presentations; Basics of Presentation slides; Text Basics; Themes and Background styles; Pictures and Clip Art; Viewing and Printing slides; Animating Texts and Objects; Use of Slide Transitions; Slide Show options.	15
02	**Module 2- Tutorials** • **Tutorials based on Basics of Computers**	15

References:

1. Maluth, J. (2016). Basic Computer Knowledge. (n.p.): Amazon Digital Services LLC - Kdp.
2. Wempen, F. (2014). Computing Fundamentals: Introduction to Computers. Germany: Wiley.
3. Thareja, R. (2019). Fundamentals of Computers. India: Oxford University Press.
4. Foulkes, L. (2020). Learn Microsoft Office 2019: A Comprehensive Guide to Getting Started with Word, PowerPoint, Excel, Access, and Outlook. United Kingdom: Packt Publishing.
5. Habraken, J. (2022). Microsoft Office Inside Out (Office 2021 and Microsoft 365). United States: Microsoft Press.

COURSE NAME :INTRODUCTION TO GOOD LABORATORY PRACTICES

COURSE CODE: U23PT1SEC01 **COURSE CREDIT: 02**

1 credit - 15 lectures **1 lecture is 60 minutes**

Course Objective:

- To acquaint the students with basic rules, etiquettes and handling of chemicals in laboratory.

Learning outcomes:

- Students will be able to work in the laboratory with confidence and professional diligencerequired at the industrial level.

Sr. No	Syllabus	No. of lectures
01	**Module 1- Good Laboratory Practices** ● Basic rules and etiquettes to be followed in a laboratory. ● Types of glassware used. ● Storage and labeling of chemicals. ● Handling of chemicals. ● Transfer of chemicals; Use of pipettes. ● Disposal of chemicals and housekeeping practices. ● Measures to follow in case of accidents and injuries. ● Laboratory safety ● Personal Protective Equipments	**15**
02	**Module 2- Tutorials** • **Tutorials based on Good laboratory practices**	**15**

References:

1. Seiler, J. P. (2012). Good Laboratory Practice: The Why and the How. Germany: Springer Berlin Heidelberg.
2. Good Laboratory Practice Regulations, Revised and Expanded. (2002). United States: CRC Press.
3. Good Laboratory Practice Regulations. (1989). Switzerland: M. Dekker.
4. Anderson, M. A. (2002). GLP Essentials: A Concise Guide to Good Laboratory Practice. United Kingdom: Interpharm Press.

COURSE NAME: EFFECTIVE COMMUNICATION SKILLS-1

COURSE CODE: U23PT1AEC01 **COURSE CREDIT: 02**

1 credit - 15 lectures **1 lecture is 60 minutes.**

Course Objectives:

- To develop an awareness among learners about the complexity of the communication process.
- To develop effective letter writing skills among students with reference to prescribed layouts and formats.
- To demonstrate the effective use of communication skills applicable for employability in the present situation.

Course Outcomes:

- Learner will be aware about the general nature of the Communication process.
- Learner will be able to write business letters in prescribed layouts and formats.
- Learner will be able to use different types of oral and written skills to face employability conditions.

Sr. No	Syllabus	No. of lectures
01	**Module-1. Theory of Communication** Introduction and Process of Communication, Channels of Communication: Formal /Informal, Vertical, Downward, Upward, Horizontal, Grapevine, Methods of Communication: Verbal/Nonverbal, Barriers in Communication: Physical, Linguistic, Psychological, Sociocultural, Mechanical, Modern Modes of Communication	**10**
02	**Module-2.Business Correspondence -1** Theory of Business Letter Writing,7 Cs of Writing, Format of Letter Writing, Full Block Format, Modified Block Format, Parts of Letter : Major Parts/Minor Parts, Personnel Correspondence: Job Application Letter, Resume, Job Acceptance Letter, Resignation Letter, Recommendation Letter. Professional E mail Writing: Format, Principles of E-mail writing	**10**
03	**B) Tutorial Activities:** 1. Listening Comprehension 2. Speaking Skills: Public Speech 3.Barriers to Communication-case study 4. ICT Enabled Communication 5. Non-Verbal Communication 6. Job Application Letter 7. Resume Writing 8. Job Acceptance Letter 9. Recommendation Letter 10. E-Mail Writing	**10**

Reference Books:

1. A Handbook of Commercial Correspondence by Ashley, A, Oxford University Press, 1992.
2. Business Communication by D Chaturvedi and Mukesh Chaturvedi,Third Edition, Pearson Publications Ltd,2013.
3. Business Communication by Meenakshi Raman and Prakash Singh, Oxford University Press,2007.
4. Business Communication Strategies by Monippally, Matthukutty, M,Tata Mc Graw Hill New Delhi,2001.
5. Effective Business Communication by Herta Murphy, Herbert Hildebrandt,Jane Thomas, Mc Graw Hill Education,2009.
6. Effective Communication by Balan K.R. and Rayadu C.S. Beacon Publication, New Delhi, 1996.
7. Effective Technical Communication by M.Ashraf, Rizvi,Mc Graw Hill Publications,2006.

Course Name: Understanding Indian Society and Constitutional Values

COURSE CODE: U23PT1VEC01 **COURSE CREDIT: 02**

1 credit - 15 lectures **1 lecture is 60 minutes**

Course Objectives:

1. To introduce students to the overview of the Indian Society.
2. To help them understand the constitution of India.
3. To acquaint them with the socio-political problems of India.
4. To introduce students to a basic understanding of the Indian Political System.
5.

Learning Outcome:

1. Students will understand Indian Social conditions.
2. Students will be acquainted with features of Indian Constitutions.
3. Learners will be aware of the measures to tackle societal problems
4. Learners will understand the intricacies of Indian political system.

UNIT	TOPICS	LECTURES
Unit-I Salient features of Indian Society	1. Understand the multi-cultural diversity of Indian society through its demographic composition: Population distribution according to religion, caste, geographical location and gender and age. (3) 2. Co-existence of traditionalism and Modernism in Indian Society (1) 3. Values emerging from the diversity in Indian Society (1)	5 Lectures
Unit-II Challenges of Diversity to Unity	Disparity Arising out of- 1. Regionalism and Linguism-Meaning, causes and Impact (2) 2. Casteism and Communalism - Meaning, History, measures to solve these problems. (2) 3. Social Inequalities: Meaning, Causes and Effects, (1) 4. Gender Inequalities- Treatment and exclusiveness of Women and Other Genders in the society (2) 5. Economic/ Wealth Inequalities-Class System and Economic Segregation of the Society (2) 6. Measures to improve Equality and Social Justice in	10 Lectures

	the society (1)	
Unit-III Constitutional Values	7. Philosophy of the Constitution as set out in the Preamble (2) 8. Features of the Constitution (2) 9. Fundamental Rights (2) 10. Fundamental Duties (1) 11. Directive Principles of State Policy (1) 12. Federal structure (2)	10 Lectures
Unit-IV Significant Aspects of Political Processes	13. The party system in Indian politics; (2) 14. Local self -government in urban and rural areas; the 73rd and 74th Amendments and their implications for inclusive politics (2) 15. Role and significance of women in politics (1)	5 Lectures

References-

1. Social and Economic Problems in India, Naseem Azad, R Gupta Pub (2011)
2. Indian Society and Culture, Vinita Padey, Rawat Pub (2016)
3. Urbanisation in India: Challenges, Opportunities & the way forward, I J Ahluwalia, Ravi Kanbur, P K Mohanty, SAGE Pub (2014)
4. Regional Inequilities in India Bhat L SSSRD- New Delhi
5. The Problems of Linguistic States in India, Krishna Kodesia Sterling Pub
6. Problems of Communilism in india, Ravindra Kumar Mittal Pub
7. Combating Communalism in India: Key to National Integration, KawalKishor Bhardwaj, Mittal Pub
8. Khare, R. S. (1998). Cultural diversity and social discontent: Anthropological studies on contemporary India.
9. Ganesh, K., & Thakkar, U. (Eds.). (2005). Culture and the making of identity in contemporary India. SAGE Publications India.
10. Das, B., & Khawas, V. (2009). Gender issues in development: concerns for the 21st century. (No Title).
11. Mandal, B. P. (2011). Cultural Sociology. Centrum Press.
12. Rapport, N. (2014). Social and cultural anthropology: The key concepts. Routle
13. Oxford Concise Dictionary of Politics, Iain Mclean / Alistair McMillan, Oxford University Press
14. Politics, 2nd Edition, Andrew Heywood, Ane Books.
15. Dictionary of Politics, D. Robertson, Penguin Books India.
16. An Introduction to Political Theory, Gauba, O. P., Macmillan
17. Political ideas and concepts : An introduction, Heywood Andrew, Macmillan, Houndmills
18. Political ideologies : An introduction, Heywood Andrew, Macmillan, Houndmills
19. Oxford Companion to Politics of the World, Krieger Joel Joseph William A Kahler Miles Nzongola – Ntalaja Georges Stallings Barbara B. Weir Margaret, Oxford University Press New York.
20. Political Theory, Das Hari Hara and Chaudhari B. C., National Publishing House.
21. Introduction to the Indian Constitution, Basu D.D., Wadhwa Publications.

22. An Introduction to the Constitution of India, Pylee M V,Vikas Publishing House.
23. Introduction to the Constitution of India, Sharma, Brij Kishore, Prentice-Hall of India.
24. Our Constitution Kashyap Subhash, National Book Trust.
25. Indian Policy for Preliminary Examination, Lakshmikant, Tata McGraw Hill.
26. Indian Government and Politics, Narang A.S., Gitanjali Publishing House, New Delhi.
27. Introduction to Media and Politics, Sarah Oates, Sage publishers.
28. Principles of Modern Political Science, J.C. Johari, Sterling publishers

Reference Links for preparing Study Material-

1. https://lotusarise.com/salient-features-of-indian-society-upsc/
2. https://iasscore.in/upsc-syllabus/indian-society/indian-society-mains
3. https://lotusarise.com/upsc-notes/indian-society-upsc-notes/
4. https://asiasociety.org/education/indian-society-and-ways-living
5. https://www.drishtiias.com/to-the-points/Paper2/inequality-in-india

SCHEME OF EXAMINATION

For 4 Credits Subject

The scheme of examination shall be divided into two parts:

- **Internal assessment 40% i.e. 40 marks**
- **Semester end examination 60% i.e. 60 marks**

(A) Internal Assessment 40 marks

Description	Marks
Internal tests of 20 marks each Q.1 Multiple choice Questions/True or False - 10 Marks Q.2. Attempt 2 questions out of 3 questions (5 marks each)- 10 Marks	20
One Project and Viva voce/Presentation/Case studies/Assignments	15
Attendance and Class behavior	5
Total	40

B) Semester end examination 60 marks

PAPER PATTERN

Duration : 2 hours	
Total Marks: 60	
Q.1 12 marks OR 12 marks	12
Q.2 12 marks OR 12 marks	12
Q.3 12 marks OR 12 marks	12
Q.4 12 marks OR 12 marks	12
Q.5 12 marks OR 12 marks Three short notes of 4 marks each or Case study	12
Total	60
Note: 1. Q.1, 2, 3 and 4 - 12 marks question may be divided into sub questions if required. 2. Q.5 May include theory (short notes) /Case Study in one of the options.	

Passing criteria: Minimum 40% in Internal (16 out of 40) and 40% (24 out of 60) in semester end examination.

PRACTICAL EXAMINATION

Paper Pattern

1. **Major Experiment:** 20 Marks
2. **Minor Experiment:** 10 Marks
3. **Journal: 05 Marks**
4. **Viva Voce: 05 Marks**

NOTE:

1. Practical examination to be conducted as per the practical Syllabus enlisted.
2. Candidates are required to present certified journal on the day of practical examination.

SCHEME OF EXAMINATION

For 2 Credits Subject

The scheme of examination shall be divided into two parts:

- Internal assessment 40% i.e., 20 marks
- **Semester end examination 60% i.e., 30 marks**

(A) Internal Assessment 40 marks

Description	Marks
Internal tests of 10 marks each Q.1. Attempt 2 questions out of 3 questions (5 marks each)- 10 Marks	10
One Project and Viva voce/Presentation/Case studies/Assignments	10
Total	20

Periodical class test Question paper pattern

Sr. No.	Particulars	10 Marks
Q.1.	Match the column/ Fill in the blanks/ MCQ's/ Answer in one- or two-lines concept-based question (1 Mark / 2 Mark each)	05 Marks
Q.2.	Answer in Brief / Practical question (Attempt any 1 out of 3) - 5 marks each	05 Marks

B) Semester end examination 30 marks

PAPER PATTERN

Duration: 2 hours	
Total Marks: 60	
Q.1 10 marks OR 10 marks	10
Q.2 10 marks OR 10 marks	10
Q.3 10 marks OR 10 marks	10
Total	30
Note: 1. Q.1, 2, 3 - 10 marks question may be divided into sub questions if required.	

Passing criteria: Minimum 20% in Internal (4 out of 20) and 40% (12 out of 30) in semester end examination.

AC: 22/12/2023
Item No. :2.4

SIES (Nerul) College of Arts, Science and Commerce (Autonomous)

Syllabus for Approval

B.Sc. Packaging Technology

Sr. No.	*Heading*	*Particulars*
1	Title of the course	B.Sc (Packaging Technology)
2	Eligibility for admission	Eligibility for admission First year: HSC Science or HSC Vocational Sciences Eligibility for admission Second year: Post SSC Diploma Engg. or Tech / Vocation Sciences
3	Minimum Percentage for admission	40%
4	Passing Marks	40%
5	Semesters	II
6	Level	UG
7	Pattern	3-4 years & 6-8 semesters Choice Based Grading System
8	Status	New
9	To be implemented from	From Academic year 2023-24 in a progressive manner

Date: 22nd December, 2023.

Signature:

Dr. Koel Roychoudhury — **AC Chairperson**

Dr. Trupti Wani — **Head of the Department**

Sri Chandrasekarendra Saraswati Vidyapuram,, Plot I-C, Sector V,
Nerul, Navi Mumbai – 400706 India
Tel No: 61196409, 61196410, 61196402, 61196413, 61196414, 61196415, 27708371
Fax No: 022-27713356, **Email:** ascnsies@sies.edu.in / siesascn@yahoo.in **Website:** www.siesascn.edu.in

SIES (Nerul) College of Arts, Science and Commerce (Autonomous)

(Affiliated to University of Mumbai)

RE-ACCREDITED GRADE "A" BY NAAC (3rd CYCLE)

BOARD OF STUDIES SYLLABUS
FOR

B.Sc.(Packaging Technology)

(WITH EFFECT FROM THE ACADEMIC YEAR 2023-2024)

Programme Objectives:

1. To learn about packaging materials, technologies, design, sustainability and quality control.
2. To gain practical skills in packaging design, testing, and production processes, as well as a deep understanding of industry regulations and standards.
3. To understand the packaging industry trends and work towards sustainable solutions.
4. To pursue higher education in packaging in India and abroad.

Programme Outcomes:

1. At the end of the program, students are able to gain thorough knowledge in key areas in the subjects offered.
2. At the end of the program, students will be able to identify, formulate and analyze scientific problems and reach concrete solutions using various principles of mathematics and sciences.
3. At the end of the program, learners will be able to design solutions for complex problems and design a process/ processes that can meet specific needs. (Attainment of this is through projects at the final year level).
4. Learners will be able to communicate effectively on scientific issues with the scientific community and society at large in writing effective reports and designing documentation, make effective presentations and give and receive instructions.
5. At the end of this programme, students will be able to hone the soft-skills required in positively enhancing their academic, professional and personal pursuits towards self and societal advancement.

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Preamble

As lifestyles change, materials evolve and the race for branding and marketing continues, the Packaging Industry adapts & benefits. It is a very dynamic, fast-paced marketplace. Anyone working within the packaging industry should expect constant evolution and growth. For capable employees seeking to work in Packaging Industry, the possibilities are endless. This industry is innovative, stable, and creative. This being a specialized field requires special education and training.

The B.Sc. in Packaging Technology specializing in Packaging Materials, Designing, Quality & Testing is designed to impart advanced knowledge and skills that are practical-oriented, career and community oriented. Packaging is usually taught as an interdisciplinary field, bringing together elements from a variety of scientific realms. It has special relevance to industry application with hands-on laboratory training sessions.

The core philosophy of overall syllabus is to -

a. Form strong foundation of Packaging Science,

b. Introduce Packaging technologies to the students in a gradual way,

c. Groom the students for the challenges of Packaging Industry

The curriculum is designed as per the NEP Credit Framework for 4-year UG degree programme.

SIES Nerul College of Arts, Science and Commerce (Autonomous)

B.Sc. Packaging Technology Programme

Sem II

(To be implemented from Academic Year- 2023-24)

No. of Courses	Course Code	Semester I	Credits
1	***Major***		
1	U23PT2MJ01	**Glass , Metal and Textile Packaging Materials**	**02**
2	U23PT2MJ02	**Plastic Packaging Materials**	**03**
3	U23PT2MJP02	**Plastic Packaging Materials Practicals**	**01**
2	***Minor***		
1	U23PT2MI01	**Basic Chemistry - II**	**03**
2	U23PT2MIP01	**Basic Chemistry – II Practicals**	**01**
3	***Open Electives(OE)***		
1	U23MS2E01	**Personality Development**	**02**
2	U23AF2E01	**Introduction to Entrepreneurship**	**02**
4	***VSC/****SEC*		
1	U23PT2VSC01	**Web Designing**	**01**
2	U23PT2VSCP01	**Web Designing Practicals**	**01**
5	***AEC/VEC/IKS***		
1	U23PT2AEC01	**Effective Communication Skills– II**	**02**
2	U23PT2VEC01	**Sustainability and Green Business Practices**	**02**
3	U23PT2IKS01	**India's Contribution to Mathematics since Ages**	**02**
6	*OJT, FP, RP, CEP, CC*		
		Total Credits	**22**

1 credit = 15 lectures
1 lecture/theory = 60 minutes
1 Practical = 2 hours session

COURSE CODE	TITLE	CREDITS 2 (2Th)
U23PT2MJ01	**Glass Metal and Textile Packaging Materials**	
Course Objectives:	1. Understand the use and application of primary packaging materials i.e. glass and metal. 2. Study the types of textile materials and their application 3. Learn the basics package forms and the technology to manufacture them for the above listed materials.	
Course Outcomes:	Learners will be able to: 1. Explain the properties, types and design aspects for various types of package forms made up of glass. 2. Explain the properties, types and for various types of package forms made up of metal. 3. Describe the basics of fabric & textile technology to produce bags of various materials like jute, hemp etc. 4. Discuss various quality control and testing procedures for these package forms.	

Unit I: Glass in Packaging:	**Lectures 10**
• Introduction & History of Glass Materials - Composition - Chemical Structure - Raw Materials used for manufacturing glass containers - Glass properties - Glass Industry - Market Overview • Glass Manufacturing Process - Container Forming Processes - Study of important control parameters during the processes - Post forming Treatments or processes • Types of Glass - Types of glass containers - Advantages & Disadvantages - Applications • Glass bottle design - Specifications & Quality Control - Defects	
Unit II: Metals in Packaging:	**Lectures 15**
• Introduction & History of Metals - Overview of Extraction Processes - Important Metals in Packaging & their properties - Market & Industry Overview - Aluminium based: Conversion processes for Sheets - Aluminium Foil, properties & their applications; Steel based: Stainless & Galvanized Steel - Coated steels like Tinplate, Tinfree Steel, Polymer coated - Manufacturing Process & Description • Metal Cans: History of Metal Cans – Three-piece & Two-piece Cans - Draw & redraw, Draw & iron, Walled iron Cans - Welded & Seamless Cans - Can Dimensioning - Specifications & Quality Control • Collapsible Tubes - Manufacturing process - Design of Metal Collapsible Tubes - Advantages & Disadvantages of Metal Collapsible tubes, Aerosol Containers - Classification of Aerosols - Design Features - Components - Filling Process - Advantages & Disadvantages of Aerosols - Applications • Metal Drums & Overview of metal corrosion and anticorrosion techniques.	
Unit III: Textile based Packaging:	**Lectures 5**
• Materials for textile based packaging - Raw materials like Jute, Hemp etc. - Terminologies - Sack Manufacturing Process - Jute Bag classification like Hessians, Tarpaulins & Twilled - Finishing Treatments -Standardization of Sizes - Lining & its Significance - Applications - Comparison with Plastic Bags	

References:

1. K. L. Yam,The Wiley Encyclopedia of Packaging Technology, 3rd ed., Wiley, 2009
2. W. Soroka, Fundametals of Packaging Technology, 4th ed., IoPP, 2009
3. J. F. Hanlon, Handbook of Package Engineering, 3rd ed., CRC Press, 1998
4. F. A. Paine, The Packaging User's Handbook, Springer, 1990
5. Le Bourhis, Glass: Mechanics and Technology, 2nd ed., Wiley, 2014
6. Bansal and Doremus, Handbook of Glass Properties, 1st ed., Academic Press, 1986
7. Tinplate in Packaging, Indian Institute of Packaging
8. Aluminium in Packaging, Indian Institute of Packaging
9. The Complete Technology Book on Aluminium and Aluminium Products, Asia Pacific Business Press, 2007

SCHEME OF EXAMINATION

The scheme of examination shall be divided into two parts:

- Internal assessment 40% i.e., 20 marks
- **Semester end examination 60% i.e., 30 marks**

(A) Internal Assessment 40 marks

Description	Marks
Internal tests of 10 marks each Q.1. Attempt 2 questions out of 3 questions (5 marks each)- 10 Marks	10
One Project and Viva voce/Presentation/Case studies/Assignments	10
Total	20

Periodical class test Question paper pattern

Sr. No.	Particulars	10 Marks
Q.1.	Match the column/ Fill in the blanks/ MCQ's/ Answer in one- or two-lines concept-based question (1 Mark / 2 Mark each)	05 Marks
Q.2.	Answer in Brief / Practical question (Attempt any two out of four 5 marks each)	05 Marks

B) Semester end examination 60 marks

PAPER PATTERN

Duration: 2 hours	
Total Marks: 60	
Q.1 10 marks OR 10 marks	10
Q.2 10 marks OR 10 marks	10
Q.3 10 marks OR 10 marks	10
Total	30
Note: 1. Q.1, 2, 3 – 10 marks question may be divided into sub questions if required.	

Passing criteria: Minimum 20% in Internal (4 out of 20) and 40% (12 out of 30) in semester end examination.

COURSE CODE	TITLE	CREDITS 3 (3Th)
U23PT2MJ02	**Plastic Packaging Materials**	
Course objectives:	1. Understand the fundamentals of polymer science. 2. Study and appreciate the macro, micro & molecular level interaction in polymers. 3. Learn the factors that affect rheological properties of plastics. 4. Study the different types of plastics and their associated properties.	
Course Outcomes:	Learners will be able to: 1. Describe the various polymerization mechanisms and techniques. 2. Explain different commodity, engineering & speciality polymers based on their types, properties and applications. 3. Describe the properties that are important from the point of view of plastic processing. 4. Choose a plastic material for a specific application based on their physical and chemical properties.	

Unit I: Introduction to Polymers — **Lectures 15**

- Introduction to Historical Background of Polymer Science, Various applications of polymers, Raw materials, Market and future of polymers, India in global scenario.
- Macromolecular concept, structural features of polymers, Basic concepts and terminology like monomers, oligomers, polymers, copolymers, functionality, degree of polymerization, thermoplastics, thermosets, elastomers/rubbers, plastics, fibers, adhesives.
- Classification of Polymers: Classification based on structure, origin, fabrication, properties etc. Linear, branched, crosslinked polymers etc. Crystalline and Amorphous polymers. Polymerization reaction - Polymerization mechanisms (Addition & Condensation), Types of polymerization (Bulk, Solution, Suspension & Emulsion).

Unit II: MWD & Structure Property Relationship — **Lectures 15**

- Concept of average molecular weight of polymers, Molecular Weight Distribution, Mw, Mn, Mv and Mz, Polydispersity index. Thermal changes – Glass Transition Temperature (Tg), Softening/ MeltingTemperature (Tm), Degradation Temperature (Td). Heat Distortion Temperature, understanding Melt Flow Index of plastics.
- Glass transition temperature, factors affecting glass transition temperature, melting point and factors affecting it, melt viscosity, Factors affecting Tensile strength, yield strength, modulus, density, impact strength. Heat Distortion Temperature, Vicat Softening Point, and hardness.

Unit III: Plastics in Packaging: — **Lectures 15**

- Commodity Plastics in Packaging: Polyethylene (PE): Types, Properties & Applications; Polypropylene (PP): Varieties, Properties & Applications; Polyvinyl Chloride (PVC): Properties, Compounding & Applications; Polystyrene (PS): Types, Properties & Applications.
- Properties & Applications of Engineering & Speciality Plastics: Thermoplastics Polyesters (PET & PBT), Polycarbonate (PC), Acrylics (PAN & PMMA), Polyamide (PA 6 & PA 6,6), Polyvinylidene chloride (PVdC), Ethyl Vinyl Acetate (EVA), Ethyl Vinyl Alcohol (EVOH), Ionomer, Polychlorotrifluoroethylene (PCTFE)
- Overview of Copolymerization, Alloying and Blending.

References:

1. Strong A. B., “Plastics: Materials and Processing”, 3rdEd, Pearson-Prentice Hall, 2006.
2. Gowariker V. R., Viswanathan N. V., Sreedhar J., “Polymer Science”, 1stEd, New Age International Publishers, 1986.
3. Selke, S. E. M., Culter, J. D., Hernandez, R. J., “Plastics Packaging: Properties, processing, Applications and Regulation”, Carl HanserVerlag, USA, 2004.
4. Margolis J. M., “Engineering Plastics Handbook”, 1stEd., McGraw-Hill, 2006.
5. Athalye A. S., “Handbook of Packaging Plastics’, 1stEd., Multi Tech Publishing Co., 1999.
6. Yam K. L., “The Wiley Encyclopedia of Packaging Technology”, 3rdEd., Wiley, 2009.

COURSE CODE	TITLE	CREDITS 1 (2Pr)
U23PT2MJP02	**Plastic Packaging Materials Laboratory**	
Course objectives:	1. Understand the various testing methods employed on plastic materials.	
Course Outcomes:	Learners will be able to: 1. Describe the properties that are important from the point of view of plastic processing.	

List of Practicals:

1. Identification of Plastics by Chemical method
2. Identification of Plastics by Instrumentation Method – FTIR / DSC
3. Determination of Melt Flow Index of a given plastic sample.
4. Determination of thickness of a given plastic sample.
5. Determination of tensile strength & elongation of a plastic film.
6. Determination of tear resistance of a plastic film.
7. Determination of Impact resistance on packaging/plastic specimen – Dart Impact test
8. Performing thermal analysis of Plastics by Differential Scanning Calorimeter.
9. Determination of specular gloss of plastic films.
10. Determination of Coefficient of friction of plastic films.
11. Study of Environmental Stress Crack Resistance of plastic items.

SCHEME OF EXAMINATION

The scheme of examination shall be divided into two parts:

- **Internal assessment 40% i.e. 40 marks**
- **Semester end examination 60% i.e. 60 marks**
- **Practical Examination i.e. 50 marks**

(A) Internal Assessment 40 marks

Description	Marks
Internal tests of 20 marks each Q.1 Multiple choice Questions/True or False - 10 Marks Q.2. Attempt 2 questions out of 3 questions (5 marks each)- 10 Marks	20
One Project and Viva voce/Presentation/Case studies/Assignments	15
Attendance and Class behavior	5
Total	40

B) Semester end examination 60 marks

PAPER PATTERN

Duration : 2 hours	
Total Marks: 60	
Q.1 12 marks OR 12 marks	12
Q.2 12 marks OR 12 marks	12
Q.3 12 marks OR 12 marks	12
Q.4 12 marks OR 12 marks	12
Q.5 12 marks OR 12 marks Three short notes of 4 marks each or Case study	12
Total	60
Note: 1. Q.1, 2, 3 and 4 - 12 marks question may be divided into sub questions if required. 2. Q.5 May include theory (short notes) /Case Study in one of the options.	

Passing criteria: Minimum 40% in Internal (16 out of 40) and 40% (24 out of 60) insemester end examination.

PRACTICAL EXAMINATION

Paper Pattern

1. **Major Experiment:** 20 Marks
2. **Minor Experiment:** 10 Marks
3. **Journal: 05 Marks**
4. **Viva Voce: 05 Marks**

NOTE:

1. Practical examination to be conducted as per the practical Syllabus enlisted.
2. Candidates are required to present certified journal on the day of practical examination.

Basic Chemistry-II

COURSE CODE : U23PT2MI01 **COURSE CREDIT: 02 (02 theory)**

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objective:

- **To acquaint the students with the concept of titrimetric and volumetric estimation.**

Course Outcome:

- **The students will acquire in-depth skills in titrimetric and gravimetric analysis besides understanding the applications of redox.**
-

Sr. No	Syllabus	No. of lectures
01	**1. Thermodynamics** Thermodynamics:System, Surrounding, Boundaries Sign Conventions, State Functions, Internal Energy and Enthalpy:Significance, examples, (Numericals expected), Standard free energy change and Equilibrium constant, Laws of thermodynamics and their application in sciences	15
02	. **2.Titrimetry and Gravimetry** Titration, Titrant, Titrand, End Point, Equivalence Point, Titration Error, Indicator, Primary and Secondary Standards, Characteristics and examples 2. Types of Titrations: Acid –Base, Redox, Precipitation, Complexometric Titration 3. Acid-base titration- Strong Acid Vs Strong Base, Theoretical aspects of Titration Curve and End Point Evaluation. Theory of Acid –Base Indicators, Choice and Suitability of Indicators. **3. Gravimetric Analysis:** Introduction, principle, Solubility and Precipitation, Factors affecting Solubility, Nucleation, Particle Size, Crystal Growth, Colloidal State, Steps involved. (Numericals Expected).	**15**

03	**1. Reaction kinetics and redox reaction** Rate of Reaction, Rate Constant, Measurement of Reaction Rates Order Molecularity of Reaction, Integrated Rate Equation of First and Second Order, determination of order of reaction, Principles of Oxidation and Reduction Reactions: Oxidising and Reducing Agents, Oxidation number, Rules to assign Oxidation Numbers with examples Ions like Oxalate, Permanganate and Dichromate. Balancing Redox Reactions by Ion Electron Method Oxidation, Reduction, Addition and Substitution & Elimination Reactions **2. Principles of Oxidation and Reduction** Principles of Oxidation & Reduction Reactions: Oxidizing and Reducing Agents, Oxidation Number, Rules to assign Oxidation Numbers with examples Ions like Oxalate, Permanganate and Dichromate. Balancing Redox Reactions by Ion Electron Method Oxidation, Reduction, Addition and Substitution & Elimination Reactions. • Application of redox chemistry: extraction of elements, redox reagents in volumetric analysis.	**15**

References:

- Ahluwalia, V. K., 2010 TEXTBOOK OF ORGANIC CHEMISTRY, VOL.I, S. Chand Publishers, Ane Books Pvt. Ltd.
- McQuarrie D.A. and Simon J.D., Molecular Thermodynamics, Viva Books Pvt. Ltd., New Delhi (2004).
- Morrison, R. T. and Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt Ltd. (Pearson Education).2012.
- Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, S. Chand
- Khosla B.D., Garg V.C. and Gulati A., Senior Practical Physical Chemistry, R. Chand and Co., New Delhi (2011)

COURSE CODE	TITLE	CREDITS	HOURS
U23PT2MIP01	**Practical's in Basic Chemistry-II**	**1**	**15**

Major

1. Colorimetric Determination of Copper ions in given Solution by using calibration curve method and calculation of % error.
2. Gravimetric estimation of Nickel (II) as Ni-DMG and calculation of % error.
3. Estimation of the amount of ferrous and ferric ions in the given sample.

Minor

1. To study hydrolysis of methyl acetate.
2. To determine enthalpy of dissolution of salt (KNO_3).
3. Commercial Analysis of a) Mineral Acid b) Organic Acid.
4. To determine the percentage purity of a sample of $BaSO_4$ containing NH_4Cl.

SCHEME OF EXAMINATION

The scheme of examination shall be divided into two parts:

- **Internal assessment 40% i.e. 40 marks**
- **Semester end examination 60% i.e. 60 marks**
- **Practical Examination i.e. 50 marks**

(A) Internal Assessment 40 marks

Description	Marks
Internal tests of 20 marks each Q.1 Multiple choice Questions/True or False - 10 Marks Q.2. Attempt 2 questions out of 3 questions (5 marks each)- 10 Marks	20
One Project and Viva voce/Presentation/Case studies/Assignments	15
Attendance and Class behavior	5
Total	40

B) Semester end examination 60 marks

PAPER PATTERN

Duration : 2 hours	
Total Marks: 60	
Q.1 12 marks OR 12 marks	12
Q.2 12 marks OR 12 marks	12
Q.3 12 marks OR 12 marks	12
Q.4 12 marks OR 12 marks	12
Q.5 12 marks OR 12 marks Three short notes of 4 marks each or Case study	12
Total	60
Note: 1. Q.1, 2, 3 and 4 - 12 marks question may be divided into sub questions if required. 2. Q.5 May include theory (short notes) /Case Study in one of the options.	

Passing criteria: Minimum 40% in Internal (16 out of 40) and 40% (24 out of 60) insemester end examination.

PRACTICAL EXAMINATION

Paper Pattern

1. **Major Experiment:** 20 Marks
2. **Minor Experiment:** 10 Marks
3. **Journal: 05 Marks**
4. **Viva Voce: 05 Marks**

NOTE:

1. Practical examination to be conducted as per the practical Syllabus enlisted.
2. Candidates are required to present certified journal on the day of practical examination.

PERSONALITY DEVELOPMENT – ACHIEVING PERSONAL AND PROFESSIONAL SUCCESS

COURSE CODE: U23MS2E01 **COURSE CREDIT: 02**

1 credit - 15 lectures

1 lecture is 60 minutes

Course Objectives:

- The course aims to train students on the importance of self-awareness, personal growth, soft skills, and life skills.
- The course facilitates the participants to understand the skill of influencing, being an effective team member and understanding self-motivation.
- The course aims to foster talent and facilitate employability, empowering the participant to thrive in the fiercely competitive corporate world.

Sr. No	Syllabus	No. of lectures
01	Concept of Self Introduction to Personality Development: Personality traits and theories, MBTI, Self-Image and Self-Concept, Locus of Control, Managing Oneself. Concept, Emotional Intelligence , Importance of Emotional Intelligence and Role of Emotional Intelligence in developing effective personality , Positive Attitude, Self-esteem, Self-confidence	**15**
02	Understanding Self in Relation with others Concept of Influencing , Art of Influencing , Johari Window , FIRO – B , Interpersonal Relations, Communication in organizations, Personal Branding, Leadership Skills, Presentation Skills, Personal skills- Stress Management, Negotiation skills, Conflict Management, Time Management and Anger Management.	**15**

References:

- Organizational Behavior by Fred Luthans
- Organization Behavior by Neharika Vohra Stephen P. Robbins, Timothy A. Judge
- The 7 Habits of Highly Effective People by Stephen Covey
- The Art and Science of Personality Development Dan P. McAdams

SCHEME OF EXAMINATION

The scheme of examination shall be divided as follows:

- **Comprehensive Internal assessment 100% i.e. 50 marks**

Description	Marks
Case Study/ Case-let/ Situation Analysis – (Group Activity or Individual Activity)/ Group Discussion/ Role Play/ Story Telling/ Presentation/ Practical Assignment/ Written Home Assignment/ Industry Analysis – (Group Activity or Individual Activity)/ Literature Review/ Book Review/ In-depth Viva/ Student Driven Activities/ Newspaper reading/ Report Writing/Precis Writing. (Any one of these)	**15**
Project	**20**
Class Test/ Open Book Test/ Quiz	**10**
Class Participation	**5**
Total	**50**

Passing criteria: Minimum 40% (20 out of 50) in Comprehensive Internal Assessment.

Introduction to Entrepreneurship

COURSE CODE: U23AF2E01 **COURSE CREDIT: 02**

1 credit - 15 lectures
1 lecture is 60 minutes

Course Objectives:

- Entrepreneurship is one of the major focus areas of the discipline of Management. This course introduces Entrepreneurship to budding managers.
- To develop entrepreneurs & to prepare students to take the responsibility of the full line of management function of a company.

Course Outcome: After completion of this course students will be able to:-

- To identify the importance of Entrepreneurship
- To identify the mechanisms available to evaluate and analyze the external environment which affects entrepreneurship .
- The learners will be able to understand venture capital, its sources and problems faced during raising funds.

Sr. No	Syllabus	No. of lectures
1	**Foundations of Entrepreneurship Development:** Concept and Need of Entrepreneurship Development Definition of Entrepreneur, Entrepreneurship, Importance and significance of growth of entrepreneurial activities Characteristics and qualities of entrepreneur • Theories of Entrepreneurship: Innovation Theory by Schumpeter & Imitating Theory of High Achievement by McClelland X-Efficiency Theory by Leibenstein Theory of Profit by Knight Theory of Social change by Everett Hagen • External Influences on Entrepreneurship Development: Socio-Cultural, Political, Economical, Personal. Role of Entrepreneurial culture in Entrepreneurship Development.	**10**
2	**Entrepreneur Project Development** Innovation, Invention, Creativity, Business Idea, Opportunities through change. • Idea generation– Sources-Development of product /idea, • Environmental scanning and SWOT analysis • Creating Entrepreneurial Venture-Entrepreneurship Development Cycle •	**10**

3	.**Venture Development** Steps involved in starting of Venture • Institutional support to an Entrepreneur • Venture funding, requirements of Capital (Fixed and working) Sources of finance, problem of Venture set-up and prospects	**10**

References:

1. Dynamics of Entrepreneurial Development Management - Vasant Desai, Himalaya Publishing House.

2. Entrepreneurial Development - S.S. Khanna

3. Entrepreneurship & Small Business Management - CL Bansal, Haranand Publication

4. Entrepreneurial Development in India - Sami Uddin, Mittal Publication

5. Entrepreneur Vs Entrepreneurship- Human Diagno

SCHEME OF EXAMINATION

The scheme of examination shall be divided into two parts:

- **Internal assessment 40% i.e. 20 marks**
- **Semester end examination 60% i.e. 30marks**

(A) Internal Assessment 20 marks

Descrion	Marks
Internal tests of 10 marks each Q.1 Multiple choice Questions/True or False - 5 Marks Q.2. Attempt 1 Question out of 2 Questions 5 Marks	**10**
One Project and Viva voce/Presentation/Case studies/Assignments	**10**
Total	**20**

B) Semester end examination 30 marks

PAPER PATTERN

Duration : 1 Hour	
Total Marks: 30	
Q.1 10 Marks OR 10 Marks	**10**
Q.2 10 Marks OR 10 Marks	**10**
Q.3 10 Marks OR 10 Marks	**10**
Total	**30**
Note: 10 marks question may be divided into sub questions of 5 Marks each if required.	

Passing criteria:

Minimum 40% in Internal (8 out of 20) and 40% (12 out of 30) in semester end examination.

Web Designing

COURSE CODE: U23PT2VSC01 **COURSE CREDIT: 01**

1 credit - 15 lectures

1 lecture - 60 minutes

Course Objectives:

- The course has been designed to provide the basic knowledge for developing of the web pages using HTML.

Course Outcomes:

- To design valid, well-formed, scalable, and meaningful pages using emerging technologies.

Sr. No	Syllabus	No. of lectures
01	**HTML5:** Fundamental Elements of HTML, Formatting Text in HTML, Organizing Text in HTML, Links and URLs in HTML, Tables in HTML, Images on a Web Page, Image Formats, Image Maps, Colors, FORMs in HTML, Interactive Elements, Working with Multimedia - Audio and Video File Formats, HTML elements for inserting Audio / Video on a web page . **CSS:** Understanding the Syntax of CSS, CSS Selectors, Inserting CSS in an HTML Document, CSS properties to work with background of a Page, CSS properties to work with Fonts and Text Styles, CSS properties for positioning an element	**15**

Text Book(s):

1) HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2ed, Dreamtech Press

2) Web Programming and Interactive Technologies, scriptDemics, StarEdu Solutions India.

3) PHP: A Beginners Guide, Vikram Vaswani, TMH

Additional Reference(s):

1) HTML, XHTML, and CSS Bible Fifth Edition, Steven M. Schafer, WILEY

2) Learn to Master HTML 5, scriptDemics, StarEdu Solutions Pvt Ltd

Web Designing Practical

COURSE CODE: U23PT2VSCP01 **COURSE CREDIT: 01**

1 credit - 2 lectures
1 lecture - 60 minutes

Sr.No.	**List of Practicals**
1	Design a webpage that makes use of a. Document Structure Tags b. Various Text Formatting Tags c. List Tags d. Image and Image Maps
2.	Create an HTML page using tags to accomplish the following: a. A paragraph containing text "All that glitters is not gold". Bold face and italic size this text b. Create equation: $x = 1/3(y1^2 + z1^2)$ c. Put a background image to a page and demonstrate all attributes of background image
3	Design a web page which displays the map of India. Create a clickable region using an image map on the same image so that when we click on Maharashtra it opens another tab with information about Maharashtra. Create two more clickable regions for states of your choice.
4	Design a web page which contains three hyperlinks (audio,video, and gif image). I. When a user clicks on an audio link web page should open in the same tab with some audio content. II. When a user clicks on a video web page should open in the same tab with some video content. III. When a user clicks on a gif image web-page should open in the same tab with some gif content.
5	Design a web page to display following output by using list tags **HTML List Example** • Coffee • Tea • Milk 1. Coffee 2. Tea 3. Milk
6	Design a webpage to display nested ordered and unordered lists.
7	Design a webpage to display the time table of your class.
8	Create the following table using HTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary

<table>
<tr><td></td><td>
Activities
<table>
<tr><td rowspan="3">Sr School</td><td>Maths Club</td></tr>
<tr><td>Robotics Club</td></tr>
<tr><td>Photography</td></tr>
<tr><td rowspan="3">Middle School</td><td>Gymnastic</td></tr>
<tr><td>Yoga</td></tr>
<tr><td>Computer Club</td></tr>
<tr><td rowspan="3">Primary School</td><td>Dance</td></tr>
<tr><td>Vocal Music</td></tr>
<tr><td>Swimming</td></tr>
</table>
</td></tr>
<tr><td>9</td><td>Design a webpage to display following form
Send e-mail to someone@example.com:

Name:
your name
E-mail:
your email
Comment:
your comment

Send Reset</td></tr>
<tr><td>10</td><td>Design a webpage to display student registration forms.</td></tr>
<tr><td>11</td><td>Design a webpage that makes use of Cascading Style Sheets with (Background, fonts, Text styles).</td></tr>
<tr><td>12</td><td>Using CSS
a. Create a class called income, and make it a background color of #0ff.
b. Create a class called expenses, and make it a background color of #f0f.
c. Create a class called profit, and make it a background color of #f00.
d. Throughout the document, any text that mentions income, expenses, or profit, attach the
appropriate class to that piece of text.
e. Further create following line of text in the same document: The current price is 50₹ and new price is 40₹</td></tr>
</table>

A) Semester end examination 30 marks

PAPER PATTERN

Duration: 1 hours	
Total Marks: 30	
Description	**Marks**
Q.1 10 marks OR 10 marks	10
Q.2 10 marks OR 10 marks	10
Q.3 10 marks OR 10 marks	10
Total	30
Note: 1. Q.1, 2, 3 may be divided into sub questions if required. 2. Q.3 May include theory (short notes) /Case Study in one of the options.	

Passing criteria: Minimum 40% (12 out of 30) in semester end examination.

SCHEME OF PRACTICAL EXAMINATION

(B) Practical Assessment 20 marks

Description	**Marks**
One question of 10 marks practical	10
Journal	5
Viva	5
Total	20

Passing criteria: Minimum 40% (8 out of 20) in practical examination

EFFECTIVE COMMUNICATION SKILLS-II (AEC)

COURSE CODE: U23PT2AEC01 **COURSE CREDIT: 02**

1 credit - 15 lectures **1 lecture is 60 minutes**

Course Objectives:

1. To develop effective interpersonal skills among learners for corporate employability.
2. To develop effective business letter writing skills among students applicable in corporate world.
3. To develop oral employability skills among learners for better personality development.

Course Outcomes:

1. Learner will be able to apply interpersonal skills for better employability.
2. Learner will be able to utilize effective business letter writing skills required in corporate world.
3. Learner will be able to improve oral employability skills for better personality development.

Sr. No	Syllabus	No. of lectures
01	**Module-1.Group Communication** Interview Skills: Preparing for Interview, Types of Interviews, Group Discussion: Nature and Ingredients, Process and Preparation, Corporate Meetings: Theory, Group Dynamics, Process of Conducting Meeting, Notice, Agenda and Minutes of Meeting, Conference: Types, Organization, Advanced Methods of conducting conferences	**10**
02	**Module-2.Business Correspondence -2** Trade Letters: Inquiry Letter, Complaint Letter, Adjustment Letter, Sales Letter, RTI and Consumer Grievance Letter ,Report Writing: Types of Report, Format of Report, Investigative Report, Feasibility Report	**10**
03	**B) Tutorial Activities** 1. Demo Interviews 2. Group Discussion 3. Presentation Skills 4. Organizing of Meeting 5.Modern Methods of Conferencing 6. Inquiry Letter 7. Complaint Letter 8. Adjustment Letter 9. Sales Letter	**10**

	10. Consumer Grievance Letter	

Reference Books:

1. A Handbook of Commercial Correspondence by Ashley, A, Oxford University Press, 1992.
2. Business Communication by D Chaturvedi and Mukesh Chaturvedi,Third Edition, Pearson Publications Ltd,2013.
3. Business Communication by Meenakshi Raman and Prakash Singh ,Oxford University Press,2007.
4. Business Communication Strategies by Monippally, Matthukutty, M,Tata Mc Graw Hill New Delhi,2001.
5. Effective Business Communication by Herta Murphy, Herbert Hildebrandt,Jane Thomas, Mc Graw Hill Education,2009.
6. Effective Communication by Balan K.R. and Rayadu C.S. Beacon Publication, New Delhi, 1996.
7. Effective Technical Communication by M.Ashraf, Rizvi,Mc Graw Hill Publications,2006.

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SCHEME OF EXAMINATION

The scheme of examination shall be divided into two parts:

- **Internal assessment 40% i.e. 20 marks**
- **Semester end examination 60% i.e. 30 marks**

(A) Internal Assessment 20 marks

Description	Marks
Continuous Evaluation	10
Assignments	5
Attendance and Class behavior	5
Total	20

B) Semester end examination 30 marks

A) Theory Exam, Total Marks: 30 Marks

Question no.1	A) OR B) Descriptive Question Module no.1	10 Marks
Question no.2	A) OR B) Descriptive Question Module no.2	10 Marks
Question no.3	A)Short Notes 2 out of 3 Module no.1 (5 Marks each) OR B)Short Notes 2 out of 3 Module no.2 (5 Marks each)	10 Marks

Passing criteria: Minimum 40% in Internal (8 out of 20) and 40% (12 out of 30) insemester end examination.

SUSTAINABILITY & GREEN BUSINESS PRACTICES

COURSE CODE: U23PT2VEC01 **COURSE CREDIT: 02**

1 credit - 15 lectures
1 lecture is 60 minutes

Objectives

- This program is intended to provide students with the tools needed to help their organization create effective programs, increase efficiency, cut costs, and improve their overall sustainability.
- Students will learn the core principles behind environmental sustainability, explore the "business case" for sustainability, and learn strategies for measuring sustainable practices.

Sr. No	Syllabus	No. of lectures
01	**Module -1- Natural Resources:** **Their Sustainable Management & Conservation, Sustainable Development** • Natural Resources: Meaning, Classification and types of natural resources - Water, Land, Forest, Energy, Minerals, Food; Threats to Natural Resources; Approach for Resource Conservation and Management: Air, Water, Soil and Energy • Sustainable Development: Definition and Meaning, 3 Pillars of sustainable development; Sustainable Development - Yesterday, Today and Tomorrow development; Global challenges of sustainable development : Our common future report, Agenda 21 and Millenium Development Goal, etc.; National sustainable development strategies in India; Important current Issues related to sustainable development (Global warming, climate change, etc.)	**15**
02	**Module-2 - Business Strategies and Sustainability and Designing Sustainable Futures** • Business and sustainability: Concept of responsible business, CERES (coalition for environmentally responsible economics) principles and blended value; Sustainable development in planning and management: Principles and Approaches - Triple botton line, ESG, etc.; Sustainability reporting(CSR); Life Cycle Analysis; Circular Economy; Indicators of sustanability:	**15**

	Introduction to Nature's Living Planet Index (WWF), Happy Planet Index (New Economics Foundation), Gross Domestic Prouct, Human Development Index, Dow Jones Sustanability Index, etc. • Innovation in Business Practices: Waste as a resource, Renewable Energy Resources (sun, wind, bioenergy, etc.) - Case Studies; Green Marketing and Green Consumerism; Green Business Practices: Ecofriendly Packaging, Organic Farming, Ecotourism, Smart Agriculture,etc.	

References:

- Green Marketing and Management: A global Perspective by John F. Whaik, Qbase Technologies.
- Green Project Management by Richard Maltzman And David Shiden, CRC Press Books.
- Green and World by Andrew S. Winston, Yale Press B

SCHEME OF EXAMINATION

The scheme of examination shall be divided as follows:

- **Comprehensive Internal assessment 100% i.e. 50 marks**

Description	Marks
Case Study/ Case-let/ Situation Analysis – (Group Activity or Individual Activity)/ Group Discussion/ Role Play/ Story Telling/ Presentation/ Practical Assignment/ Written Home Assignment/ Industry Analysis – (Group Activity or Individual Activity)/ Literature Review/ Book Review/ In-depth Viva/ Student Driven Activities/ Newspaper reading/ Report Writing/Precis Writing. (Any one of these)	**15**
Project	**20**
Class Test/ Open Book Test/ Quiz	**10**
Class Participation	**5**
Total	**50**

Passing criteria: Minimum 40% (20 out of 50) in Comprehensive Internal Assessment.

India's Contribution to Mathematics since Ages

COURSE CODE: U23PT2IKS01 **COURSE CREDIT: 02**

1 credit - 15 lectures
1 lecture is 60 minutes

Course Objectives:

- To make students aware about the contribution of India to Mathematics.
- To make students aware about the several methods of ancient mathematics that will enhance their speed and accuracy in various competitive and placement exams.

Course Outcome:

- Learners will be able to know about the contribution of Indian mathematicians and they will be able to apply several tricks and techniques of Vedic mathematics.

Unit	Details	Lectures
I	**The Non-zero Indian Contribution to Mathematics** The Indian Number System, The Baudhayana-Pythagoras Theorem, The Mathematics of Language, The Sine Function in Trigonometry, Negative Number, Solution to Quadratic Equations, The Virahanka-Fibonacci Sequence, Binomial Distribution, First Exact Formula for Pie, Geometric Construction with Compass and unmarked Straightedge. **Indian Mathematician and their Contribution** Aryabhata, Brahamagupta, Mahavira, Bhaskara, Ramanujan, Madhava.	**15**
II	**Sutras** Ekadhikena Purvena, Urdhva – tiryagbhyam, Nikhilam navatascaramam Dasatah, Paravartya Yojayet, Sunyam Samya Samuccaye, Anurupye Sunyamanyat, Sankalana Vyavakalanbhyam, Ekanyunena Purvena, Yavadunam Tamadun Kartya Varganca Yojayet. **Vedic Computation** Beejank, Vinculum Numbers, Simultaneous Linear Equations, Magic Squares, Dates and Calendars	**15**

References:

1. Vedic Mathematics Made Easy by *Dhaval Bhatiya*, Jaico Publishing House.rtfgh
2. Vedic Mathematics by *Bharathi Krishna Tripathi*, Motilal Banarsidass Publisher.
3. Cultures and History of Mathematics, by C. S. Seshadri, Hindustan Book Agency.
4. Contributions to the History of Indian Mathematics by *Gerard G. Emch, R. Sridharan and M. D. Srinivas.*

SCHEME OF EXAMINATION (for 50 marks ,2 credits (Theory))

The scheme of examination shall be divided into two parts:

- **Internal assessment 40% i.e.20 marks**
- **Semester end examination 60% i.e.30 marks**

(A)Internal Assessment 20 marks

Description	**Marks**
An internal test	10
Assignment	05
Attendance and Class Participation	05
Total	20

B) Semester End examination 30 marks

PAPER PATTERN

Duration: 1 hour	
Total Marks:30	
Q.1 15 marks OR 15 marks (7 and 8 marks)-Unit 1	15
Q.2 15 marks OR 15 marks (7 and 8 marks)-Unit 2	15
Total	30

Passing criteria: Minimum 40% in Internal (08 out of 20) and 40% (12 out of 30) in semester-end examination.