SOPHIA COLLEGE FOR WOMEN (EMPOWERED AUTONOMOUS)

Affiliated to

UNIVERSITY OF MUMBAI

Syllabi for the Common Courses

Based on the National Education Policy 2020

Skill Enhancement Course

Course Code: SSEC

F.Y.B.Sc.

2023-24 (NEP)

Programme Outline: Skill Enhancement Course
FYBSc (SEMESTER II)

Course Code	Name of the Course	Credits
SSEC201	Journey of Metals: Ores to Alloys	2
SSEC202	Chemistry of the universal solvent: Water	2
SSEC203	Science of Genetics	2
SSEC204	Bioecology	2
SSEC205	Mathematical Techniques in Project Scheduling	2
SSEC206	Mathematics of Financial Investments	2
SSEC207	Microbes and Human health	2
SSEC208	Microbial Technology	2
SSEC209	Instrumentation and Circuit Design	2
SSEC210	Semiconductor Devices and Amplifier	2

ASSESSMENT DETAILS:

Continuous Assessment (50 marks)

1. A minimum of two activities will be given in each semester.
2. Each activity will be for 20 marks.
3. Activity 1: The nature of the activities will be decided by the examiner and may include Assignment/ MCQs/ Short notes and/or any other type of /combination of objective or descriptive type activity.
   Activity 2: Student will be examined on the practical component and project work submitted.
4. 10 marks will be given for Class participation.

NAME OF THE COURSE	JOURNEY OF METALS: ORES TO ALLOYS
CLASS	FYBSc
COURSE CODE	**SSEC201**
NUMBER OF CREDITS	2 (01 Theory +01 Practical)
NUMBER OF LECTURES PER WEEK	3 (01 Theory +02 Practical)
TOTAL NUMBER OF LECTURES PER SEMESTER	45 (15 Theory + 30 Practical)
EVALUATION METHOD TOTAL MARKS PASSING MARKS	CONTINUOUS ASSESSMENT 50 20

COURSE OBJECTIVES:

CO 1.	To have knowledge and understanding about ores and alloys
CO 2.	To gain skills to test ores and alloys for their metal content

COURSE LEARNING OUTCOMES:

CLO 1.	Identify composition of ores and alloys
CLO 2.	perform quantitative determination of metallic composition of ores and alloys

UNIT 1	Theory (15 LECTURES)
1.1	**Introduction to ores [1L]** Basic terminology in metallurgy: minerals, ores, gangue, flux, slag Occurrence of ore and types of ore
1.2	**Extractive techniques [2L]** Hydraulic washing, leaching, froth floatation, magnetic separation
1.3	**Metallurgical process [2L]** Pyrometallurgy, hydrometallurgy, electrometallurgy
1.4	**Extraction of metals from their ores [4L]** 1.4.1Iron from hematite 1.4.2Aluminum from bauxite 1.4.3 Nickel from oxide ores 1.4.4Copper from copper pyrites
1.5	**Introduction to alloys [1L]** Alloying of metals, types of alloys, purpose of alloying and their importance

1.6	**Chemical composition , methods of estimation and application of alloys [5L]** 1.6.1 Alloys of iron: steel, stainless steel 1.6.2 Alloys of copper: Brass, bronze, german silver, gun metal 1.6.3 Alloys of aluminum: Duralumin, Magnalium 1.6.4 Alloys of nickel: Inconel, Monel metal, nichrome, haste alloy
UNIT 2	Practical (30 LECTURES)
2.1	**Opening of ores and their analysis** 2.1.1 Analysis of hematite 2.1.2 Analysis of limestone
2.2	**Opening of alloys and their estimation** 2.2.1 Magnalium (magnesium by complexometry) 2.2.2 Monel metal (nickel by complexometry) 2.2.3 Brass (zinc by potassium ferrocyanide titration)
2.3	**Estimation of the metal from synthetic samples of alloys** 2.3.1 Iron in steel by redox titration. 2.3.2 Copper in bronze by iodometry (drop method) 2.3.3 Aluminium in Duralumin by complexometry (back titration method) 2.3.4 Estimation of nickel in nichrome by complexometry

REFERENCES:
1. Chemical analysis of metals ; Sampling and analysis of metal bearing ores: American Society for Testing and Materials 1980 - Technology & Engineering

2. Manual of Procedures for Chemical and Instrumental Analysis of Ores, Minerals, and Ore Dressing Products. Government of India Ministry of Steel & Mines, Indian Bureau of Mines, 1979.

3. Alloying: understanding the basics, edited by Joseph R. Davis, ASM International (2001).

4. Zone refining and allied techniques, Norman L. Parr, G. Newnes Technology & Engineering (1960)

5. Advanced experiments in Inorganic Chemistry., G. N. Mukherjee., 1stEdition., 2010., U.N. Dhur & Sons Pvt Ltd

6. The Synthesis and Characterization of Inorganic Compounds by William L. JollyInorganic Chemistry Practical Under UGC Syllabus for M.Sc. in all India Universities By:Dr Deepak Pant

NAME OF THE COURSE	CHEMISTRY OF THE UNIVERSAL SOLVENT: WATER
CLASS	FYBSc
COURSE CODE	**SSEC202**
NUMBER OF CREDITS	2 (01 Theory + 01 Practical)
NUMBER OF LECTURES PER WEEK	3 (01 Theory + 02 Practicals)
TOTAL NUMBER OF LECTURES PER SEMESTER	45 (15 Theory + 30 Practical)
EVALUATION METHOD TOTAL MARKS PASSING MARKS	CONTINUOUS ASSESSMENT 50 20

COURSE OBJECTIVES

CO 1.	To gain knowledge of the general properties of water and quality parameters.
CO 2.	Understand the chemistry of the various parameters of water
CO 3.	Learn about water resources, pollution and its causes and control.
CO 4.	To be able to analyze water samples.

COURSE LEARNING OUTCOMES:

CLO 1.	Explain the various properties of water.
CLO 2.	Design models for water conservation.
CLO 3.	Carry out quantitative analysis of water samples.

UNIT 1	Theory (15 LECTURES)
1.1	**Origin of the universal solvent [1L]** Sources of water, water cycle
1.2	**Chemical and physical properties [3L]** Structure, density, anomalous behaviour of water, conductivity, surface tension, dipole moment, specific heat capacity, capillary action, solvation and auto-ionization. Heavy water, supercritical water.
1.3	**Standards and Important Parameters for Measuring the quality of water [6L]** Standard for Industrial and potable water. pH, acidity, alkalinity, salinity, total hardness, dissolved oxygen, chemical oxygen demand, biochemical oxygen demand, total solids, total suspended solids, total

	dissolved solids. (numericals to be included wherever applicable)
1.4	**water pollution prevention and control** **[3L]** Water pollution, classification of pollutants, prevention and control.
1.5	**Water Conservation, through law, methods of conservation [2L]** The Water Act Rain water harvesting, watershed management.
UNIT 2	Practical (30 LECTURES)
	1. To determine the acidity of the given water sample. 2. To determine the alkalinity of the given water sample 3. To determine the total hardness of water. 4. To determine the dissolved oxygen in the given water sample.(demonstration) 5. To determine the chemical oxygen demand of the given water sample. 6. To determine the physical parameters of water samples from different sources. 7. To determine the total solids, total dissolved solids, total suspended solids in the given water sample. 8. To determine the salinity of the water sample. (demonstration) 9. Determination of sulphate. (by Benzidine method)

REFERENCES:

1. Chemistry the molecular nature of matter and change, Martin S. Silberberg, 4th Edition, McGraw Hill International edition 2006

2. Environmental chemistry, H Kaur, 7th Addition Pragati Prakashan

3. Textbook of Environmental Chemistry, Balram Pani, I.K International Publishing House Pvt Ltd

4. Environmental Chemistry A.K De, 5th Edition New Age International (P) Ltd

5. Applied Chemistry Theory and Practice O.P Vermani, A.K Narula, 2ndEdition., New Age International (P) Ltd

6. Vogel's textbook of Quantitative Analysis (Longman ELBS Edition)

NAME OF THE COURSE	SCIENCE OF GENETICS
CLASS	FYBSc
COURSE CODE	**SSEC203**
NUMBER OF CREDITS	2 (01 Theory + 01 Practical)
NUMBER OF LECTURES PER WEEK	3 (01 Theory + 02 Practicals)
TOTAL NUMBER OF LECTURES PER SEMESTER	45 (15 Theory + 30 Practical)
EVALUATION METHOD TOTAL MARKS PASSING MARKS	CONTINUOUS ASSESSMENT 50 20

COURSE OBJECTIVES:

CO 1.	To make the students understand the history and basics of modern genetics.
CO 2.	To familiarize the students with the laws of genetics and its modifications.
CO 3.	To make the students aware of chromosomal anomalies.

COURSE LEARNING OUTCOMES:

CLO 1.	Achieve an understanding of classical genetics.
CLO 2.	Understand the process of gene interactions.
CLO 3.	Identify genetic disorders.

UNIT 1	**Science of Genetics** (15 LECTURES)
1.1	Overview and history of Modern Genetics, Chromosome Theory of Inheritance-Sutton-Boveri, Thomas Hunt Morgan's Experiment.

1.2	**Mendelian inheritance** Herman's experiment on X ray induced mutations- Concept of homozygous, heterozygous, phenotype, genotype, alleles; Mendel's Laws and Mono and Dihybrid ratios with problems, chi square - for 3:1 and 1:1 ratio. Use sickle cell anaemia as an example to explain the concept of gene
1.3	**Modification of Mendel's laws -** Gene interactions: incomplete dominance, co-dominance; Multiple genes, Multiple alleles: Blood group, Epistasis, Linkage, Sex limited, sexinfluenced.
1.4	**Chromosomal anomalies**– ● Structural: deletion, duplication, inversion, translocation. ● Numerical: euploidy and aneuploidy (e.g. Downs, Turners, Klienfelter's, Cri-du-chat).
1.5	**Applications** - scope of genetics in Healthcare, therapeutics, evolutionary biology, Biotechnology. (dominant and recessive).

Unit 2: Practical SSEC203P

1. Pairing game to produce a Punnet square.

2. Collection of blood group information from family and construction of pedigree charts.

3. Human Karyotyping- Normal and Abnormal (Numerical and Structural).

4. Observation of Barr body from buccal smear.

5. Study of polyploidy in onion root tip by colchicine treatment.

6. Sex-linked inheritance in Drosophila melanogaster.

7. Identification of adult zebrafish mutants.

REFERENCES:

1. Principles of Genetics by Snustad and Simmons 4thedn. John Wiley and Sons, 2006.
2. iGenetics; A Molecular approach by Peter Russel 2nd ed. Pearson,2006.
3. Introduction to Genetic Analysis by Griffiths et al 8th ed. Freeman and Co., 2005.
4. Genes IX by Benjamin Lewin; Jones and Bartlett Publishers, 2008.
5. Principles of Gene Manipulation and Genomics by S. B. Primrose and R. M. Twyman 7th ed., Blackwell Publication,2007.
6. Concepts of Genetics by W. S. Klug and M. R. Cummings 7th ed. Pearson, 2003.
7. Concepts of Genetics by W. S. Klug, M. R. Cummings, C. A. Spencer 8th ed. Pearson, 2006.
8. Human Molecular Genetics by Tom Strachan and Andrew Read, 3rd ed. Garland Sciencepub., 2004.
9. Principles of Genetics by R. Tamarin, 7th ed, Brown Co., 2002

NAME OF THE COURSE	BIOECOLOGY
CLASS	FYBSc
COURSE CODE	**SSEC204**
NUMBER OF CREDITS	2 (01 Theory + 01 Practical)
NUMBER OF LECTURES PER WEEK	3 (01 Theory + 02 Practicals)
TOTAL NUMBER OF LECTURES PER SEMESTER	45 (15 Theory + 30 Practical)
EVALUATION METHOD TOTAL MARKS PASSING MARKS	CONTINUOUS ASSESSMENT 50 20

COURSE OBJECTIVES:

CO 1.	To familiarize the students with the influence of the environment on the survival of organisms
CO 2.	To introduce students with components of ecology.
CO 3.	To acquaint the students with various species interactions.

COURSE LEARNING OUTCOMES:

CLO 1.	Achieve an understanding of the functioning of ecosystems.
CLO 2.	Identify elements of an ecosystem.
CLO 3.	Delineate various forms of positive and negative species interactions

UNIT 1	**Bioecology** (15 LECTURES)
1.1	Organism and its environment: Distribution and abundance of Organisms, Importance of carbon-based life. Concept of Ecosystem.
1.2	Biotic Environment: Population, population density, Reproduction, Population growth (Natality, Mortality) Extinction of Population.

1.3	Interspecific and Intraspecific Population Regulation: Competition, Dispersal, Territoriality, Predation. (Lotka-Volterra model), Parasitism, Mutualism.

Unit 2: Practical of SSEC204P

1. Construction of a fold scope and biodiversity analysis.

2. Adaptive radiation using

   a. Darwin finches

   b. Mouthparts in insects- mosquitoes, houseflies and cockroaches.

3. Animal Biodiversity:

   a. Part I: Classification of Animals –Invertebrates.

   b. Part II: Classification of Animals–Vertebrates.

   c. Digital recording and detailed classification of one animal from campus/ local environment

4. To estimate the basal area of trees around Sophia College campus.

5. Study of Ecological Adaptations in Plants.

REFERENCES:

1. Ecology by Subramnyam, 2nd ed. Narosa, 2006

2. Ecology, Chemistry and Management of Environmental Pollution by Dash M C, Mac Millan India, 2004

NAME OF THE COURSE	MATHEMATICAL TECHNIQUES IN PROJECT SCHEDULING
CLASS	FYBSc
COURSE CODE	**SSEC205**
NUMBER OF CREDITS	2 (01 Theory +01 Practical)
NUMBER OF LECTURES PER WEEK	3 (01 Theory +02 Practical)
TOTAL NUMBER OF LECTURES PER SEMESTER	45 (15 Theory + 30 Practical)
EVALUATION METHOD TOTAL MARKS PASSING MARKS	CONTINUOUS ASSESSMENT 50 20

COURSE OBJECTIVES:

CO 1.	To understand the techniques of planning and evaluation of projects.
CO 2.	To be acquainted with skills in strategy planning and decision making.
CO 3.	To understand and apply the techniques for the optimization of the use of resources

COURSE LEARNING OUTCOMES:

CLO 1.	The learner will be able to draw project networks for probabilistic and deterministic time estimates and obtain the critical path.
CLO 2.	The learner will be able to create timely updates of the project schedule and analyse for the optimal conditions
CLO 3.	The learner will be able to understand the need and apply techniques for optimal use of resources

UNIT 1	CPM, PERT & TIME COST MANAGEMENT (15 LECTURES)
1.1	Concept of project as an organized effort with time management.
1.2	Diagrammatic representation of activities in a project, Gantt Chart and Network Diagram, Determination of Critical path.
1.3	Probability consideration in project scheduling, Project cost analysis. Updating.
UNIT 2	PRACTICALS IN CPM, PERT & TIME COST MANAGEMENT (15 PRACTICALS)
2.1	Drawing Network and finding the critical path.

2.2	Project evaluation and scheduling
2.3	Updating with time cost management techniques

REFERENCES:

1. Schaum Series book in O.R. Richard Broson. 2nd edition Tata Mcgraw Hill Publishing Company Ltd.

2. Operations Research: Methods and Problems: Maurice Sasieni, Arthur Yaspan and Lawrence Friedman,(1959), John Wiley & Sons.

3. Mathematical Models in Operations Research : J K Sharma, (1989), Tata McGraw Hill Publishing Company Ltd.

4. Principles of Operations Research with Applications to Management Decisions: Harvey M. Wagner, 2nd Edition, Prentice Hall of India Ltd.

5. Operations Research: S.D.Sharma.11th edition, KedarNath Ram Nath& Company.

6. Operations Research: H. A.Taha.6th edition, Prentice Hall of India.

7. Kantiswarup, P.K. Gupta, Manmohan : Operations Research, Twelth edition, Sultan Chand & sons

8. Bronson R. : Theory and problems of Operations research, First edition, Schaum's Outline series

9. Vora N. D. : Quantitative Techniques in Management, Third edition, McGraw Hill Companies.

10. Bannerjee B. : Operation Research Techniques for Management, First edition,   Business Books

NAME OF THE COURSE	FINANCIAL MATHEMATICS
CLASS	FYBSC
COURSE CODE	**SSEC206**
NUMBER OF CREDITS	2 (01 Theory + 01 Practical)
NUMBER OF LECTURES PER WEEK	3 (01 Theory + 02 Practical)
TOTAL NUMBER OF LECTURES PER SEMESTER	45 (15 Theory + 30 Practical)
EVALUATION METHOD TOTAL MARKS PASSING MARKS	CONTINUOUS ASSESSMENT 50 20

COURSE OBJECTIVES:

CO 1.	To enable the learner to recognise the different methods of calculating interest.
CO 2.	To enable the learner to understand and calculate the Nominal interest, Effective interest and depreciation.
CO 3.	To enable the learner to understand and utilise the various Annuity types in investments.
CO 4.	To enable the learner to recognise and apply appropriate methods for solving problems relating to real life situations

COURSE LEARNING OUTCOMES:

CLO 1.	The learner will be able to recognise the different methods of calculating interest.
CLO 2.	The learner will be able to understand and calculate the Nominal interest, Effective interest and depreciation.
CLO 3.	The learner will be able to understand and utilise the various Annuity types in investments.
CLO 4.	The learner will be able to recognise and apply appropriate formulas for solving problems relating to real life situations.

UNIT 1	INTEREST RATES AND ANNUITIES (15 LECTURES)

1.1	Interest Rates - ;
	   i. forms of interest (simple, Compound)
	
	   ii. significance of the interest rates and calculations
	
	 Present value. Future Value and Net Present Value.

1.2	Annual Equivalent rates, Calculating Coupon interests on bonds/debentures if interest calculated half yearly or quarterly.
1.3	Annuities – Immediate annuity, due annuity, deferred annuity, general annuity, simple applications (upto 3 periods).
UNIT 2	APPLICATIONS OF INTEREST RATES AND ANNUITIES (15 PRACTICALS)
2.1	Practical applications – economic theories, applications on various financial products
2.2	Applications of Annual Equivalent rates and Coupon interests on bonds/debentures.
2.3	Applications of Annuities and different types of annuties

REFERENCES:

1. Mathematics for Economics and Finance Methods and Modelling by Martin Anthony and Norman Biggs, Cambridge University Press, Cambridge low-priced edition, 2000

2. Business Mathematics By D. C. Sancheti and V. K. Kapoor, Sultan Chand & Sons, 2006

3. Mathematics for Business Economics: By J. D. Gupta, P. K. Gupta and Man Mohan, Tata Mc-Graw Hill Publishing Co. Ltd., 1987

4. Mathematical Basis of Life Insurance By S.P. Dixit, C.S. Modi and R.V. Joshi, Insurance Institute of India,

5. Investments By J.C. Francis & R.W. Taylor, Schaum's Outlines, Tata Mc-Graw Hill Edition 2000,

6. Indian Mutual Funds Handbook: By Sundar Shankaran, Vision Books, 2006,

7. Fundamentals of Statistics - D. N. Elhance.

8. Modern Business Statistics - (Revised}-B. Pearles & C. Sullivan –Prentice Hall of India.

9. Business Mathematics & Statistics: B Aggarwal, Ane Book Pvt. Limited.

10. Business Mathematics: D C Sancheti& V K Kapoor, Sultan Chand & Sons.

11. Mathematics for Economics and Finance, Martin Anthony, Norman Biggs, Cambridge low price editions,2000.

12. Mathematics of Finance 2nd Edition Schaum's Outline Series Peter Zima, Robert Brows Tata McGraw-Hill Publishing Company Ltd.

NAME OF THE COURSE	MICROBES & HUMAN HEALTH
CLASS	FYBSc
COURSE CODE	**SSEC207**
NUMBER OF CREDITS	2 (01 Theory + 01 Practical)
NUMBER OF LECTURES PER WEEK	3 (01 Theory + 02 Practicals)
TOTAL NUMBER OF LECTURES PER SEMESTER	45 (15 Theory + 30 Practical)
EVALUATION METHOD TOTAL MARKS PASSING MARKS	CONTINUOUS ASSESSMENT
	50
	20

COURSE OBJECTIVES:

CO 1.	To provide an overview of defence mechanisms in the human body.
CO 2.	To outline the progress of infection to disease.
CO 3.	To explain the interactions of the human immune system with a pathogenic microorganism.
CO 4.	To train students to use various techniques of detecting microbial virulence factors

COURSE LEARNING OUTCOMES:

CLO 1.	The learner will be able to list differences between various types of infections.
CLO 2.	The learner will be able to specify the purpose of different types of virulence factors in pathogenic bacteria.
CLO 3.	The learner will be able to study the defence mechanisms as well as factors which affect the infection process in human body
CLO 4.	The learner will be able to identify the types of immune responses

UNIT 1	THEORY (15 LECTURES)
1.1	Important terminologies Infection and disease: Primary and secondary infections, Contagious

	infections, Opportunistic pathogens, Zoonoses and Vector borne infections.
1.2	Factors affecting infection: Hosts: Natural, Species and Racial resistance. Individual resistance.
1.3	Microbial virulence factors in adherence, invasion, colonization and disease.

1.4	Host defense against infection: An Overview
	
	  i. First line of defense: Skin, respiratory tract, gastrointestinal tract, genitourinary tract and eyes.
	  ii. Second line of defense: Fever, Inflammation and Phagocytosis
	 iii. Third line of defense: Brief introduction to Immunity (active passive, natural and acquired)

UNIT 2	PRACTICAL (30 LECTURES)

2.1	Study of virulence factors:
	
	  a. Hemolysin
	  b. Coagulase
	  c. Lecithinase
	  d. Capsule demonstration

2.2	Study of role of fomites in spread of diseases
2.3	Assignment: Types of WBCs and their significance

REFERENCES:

1. Pelczar Jr, M. J.; Chan, E.C.S. & Krieg, N. R. (1986). Microbiology 5th edn. *New York: Tata McGraw-Hill Education Pvt. Ltd.*

2. Tortora G.J., Funke, B.R., Case, C.L., (2020). Microbiology: an introduction. 13th Global edn. *Pearson*.

3. Willey, J., Sandman, K., Wood D. Prescott's Microbiology (ISE) (2019). 11th edn– *McGraw-Hill Education.*

4. Talaro, K. P., Chess K. (2012). Foundations in Microbiology 8th International edn, *NewYork: McGraw Hill.*

NAME OF THE COURSE	MICROBIAL TECHNOLOGY
CLASS	FYBSc
COURSE CODE	SSEC208
NUMBER OF CREDITS	2 (01 Theory + 01 Practical)
NUMBER OF LECTURES PER WEEK	3 (01 Theory + 02 Practicals)
TOTAL NUMBER OF LECTURES PER SEMESTER	45 (15 Theory + 30 Practical)
EVALUATION METHOD TOTAL MARKS PASSING MARKS	CONTINUOUS ASSESSMENT 50 20

COURSE OBJECTIVES:

CO 1.	To review the commercial application of microorganisms in food production and medicine
CO 2.	To train students to apply the knowledge of microbiology in agriculture and environment sustainability for the benefits of Society.
CO 3	To acquaint the learner with basic terms and methods related to genetic engineering
CO 4	To train learners to analyze the organisms presented in fermented foods by using Gram staining
CO 5	To train learners to use microbiological techniques such as crowded plate technique, and isolation of amylase producers to isolate and identify potential industrially important microorganisms.
CO 6	To train learners to prepare biofertilizers and assess their efficiency in enhancing plant growth
CO 7	To impart knowledge of the commercial applications of microbial enzymes through a survey on enzymes used in consumer products.

COURSE LEARNING OUTCOMES:

CLO 1.	The learner will be able to outline applications of microorganisms in production of food, additives and dairy industry.
CLO 2.	The learner will be able to describe chief applications of microbes as biofertilizer, biopesticides and animal feed.

CLO 3.	The learner will be able to cite examples of GMOs as tools for pharmaceutical products and bioremediation.
CLO 4	The learner will be able to apply microbial staining or culturing techniques to isolate and identify microorganisms involved in fermentation processes, production of antibiotics and enzymes.
CLO 5	The learner will be able to prepare and evaluate Azotobacter based biofertilizers and evaluate its efficiency in enhancing plant growth through potted plant experiments.
CLO 6	The learner will be able to conduct a survey and prepare a report on the use of microbial enzymes in commercial consumer products.

UNIT 1	THEORY (15 LECTURES)
1.1	Microbial technology and the four 'F' (Food, Feed, Fuel and Functional molecules) Applications of microorganisms in Food industry - Fermented food products, Alcoholic beverages, Dairy Products, Probiotics
1.2	Commercial Production of Microorganisms- Feed / SCP production, Biofertilizers, Biopesticides
1.3	Overview of products from Microorganisms: antibiotics, enzymes, vitamins, Polysaccharides, Fuel
1.4	Genetically engineered microorganisms and their applications in Human health (Insulin), Agriculture (BT cotton), Environment (Bioremediation of Oil spill)
UNIT 2	PRACTICAL (30 LECTURES)
2.1	Wine production from grapes / Bread making
2.2	Study of microorganisms in fermented food by Gram Stain (curd or idli batter)
2.3	Isolation of amylase producer
2.4	Detection of antibiotic producers (Crowded plate technique)
2.5	Preparation of biofertilizer and studying its efficiency
2.6	Assignment: Microbial enzymes in commercial consumer products (Survey and report)

REFERENCES:

1. Willey, J., Sandman, K., Wood D. Prescott's Microbiology (ISE) (2019). 11th edn– *McGraw-Hill Education.*

2. Madigan, M. T., Bender K., Buckley D. (2021). Brock Biology of Microorganisms. 16th Global edn- *San Francisco: Pearson International edition.*

3. Pelczar Jr, M. J.; Chan, E.C.S. & Krieg, N. R. (1986). Microbiology 5th edn. *New York: Tata McGraw-Hill Education Pvt. Ltd*

4. Tortora G.J., Funke, B.R., Case, C.L., (2020). Microbiology: an introduction. 13th Global edn. *Pearson*

NAME OF THE COURSE	INSTRUMENTATION & CIRCUIT DESIGN
CLASS	F Y BSc
COURSE CODE	**SSEC209**
NUMBER OF CREDITS	2 (01 Theory + 01 Practical)
NUMBER OF LECTURES PER WEEK	3 (01 Theory + 02 Practicals)
TOTAL NUMBER OF LECTURES PER SEMESTER	45 (15 Theory + 30 Practical)
EVALUATION METHOD	CONTINUOUS ASSESSMENT
TOTAL MARKS	50
PASSING MARKS	20

COURSE OBJECTIVES:

CO 1.	To study the basic principle and operation of the Cathode Ray Oscilloscope (CRO).
CO 2.	To analyze and interpret various waveforms of CRO.
CO 3.	To understand the block diagram of electronic circuits of CRO

COURSE LEARNING OUTCOMES:

CLO 1.	Students will generate, analyze, and interpret various waveforms of the electrical circuits using CRO
CLO 2.	Students will familiar with the basic operation of the CRO
CLO 3.	Students will design and develop their own experiments / electric circuits

UNIT 1	Theory (15 LECTURES)
1.1	CRO, Power supply, 555Timmer IC
UNIT 2	Practical (15 LECTURES)
2.1	Practical

REFERENCES:

1. Integrated Electronics, J. Millman and C.C. Halkias, 1991, Tata Mc-Graw Hill.
2. Electronic devices and circuits, S. Salivahanan and N. Suresh Kumar, 2012, Tata
3. Mc-Graw Hill.

4. Microelectronic Circuits, M.H. Rashid, 2ndEdn.,2011, Cengage Learning.

5. Modern Electronic Instrumentation & Measurement Tech., Helfrick &Cooper,1990,

6. Digital Principles & Applications, A.P. Malvino, D. P. Leach & Saha, 7th Ed.,2011,

7. Tata McGraw Hill

8. Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning

9. Pvt. Ltd.

10. OP-AMP and Linear Digital Circuits, R.A. Gayakwad, 2000, PHI Learning Pvt. Ltd

NAME OF THE COURSE	SEMICONDUCTOR DEVICES AND AMPLIFIER
CLASS	F Y BSc
COURSE CODE	**SSEC210**
NUMBER OF CREDITS	2 (01 Theory + 01 Practical)
NUMBER OF LECTURES PER WEEK	3 (01 Theory + 02 Practicals)
TOTAL NUMBER OF LECTURES PER SEMESTER	45 (15 Theory + 30 Practical)
EVALUATION METHOD	CONTINUOUS ASSESSMENT
TOTAL MARKS	50
PASSING MARKS	20

COURSE OBJECTIVES:

CO 1.	To study the basic principle, working, and operation of semiconductor devices.
CO 2.	To understand the function and applications of bipolar junction transistors.

COURSE LEARNING OUTCOMES:

CLO 1.	The students will be able to develop a typical model based on a bipolar junction transistor.
CLO 2.	The student will gain a robust conceptual understanding of the functionality of bipolar junction transistor circuits
CLO 3.	Students will be able to interpret various applications of diodes.

UNIT 1	Theory (15 LECTURES)
1.1	Semiconductor didoes, Bipolar Junction transistors
UNIT 2	Practical (15 LECTURES)
2.1	Practical

REFERENCES:

1. Electronic devices and circuits, S. Salivahanan and N. Suresh Kumar, 2012, Tata Mc-Graw Hill

2. Modern Electronic Instrumentation & Me Modern Electronic Instrumentation & Measurement Tech., Helfrick&Cooper,1990, PHI Learning

3. Digital Principles & Applications, A.P. Malvino, D. P. Leach & Saha, 7th Ed.,2011, Tata McGraw Hill

4. Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd. asurement Tech., Helfrick & Cooper,1990, PHI Learning

5. Digital Principles & Applications, A.P. Malvino, D.P. & Saha, 7th Ed.,2011, Tata McGraw Hill

6. Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd.