SOPHIA COLLEGE FOR WOMEN (EMPOWERED AUTONOMOUS)

Affiliated to

UNIVERSITY OF MUMBAI

Syllabi for the Common Courses

Based on the National Education Policy 2020

Vocational Skill Course

Course Code: SVSC

F.Y.B.Sc.

2023-24 (NEP)

Programme Outline: Vocational Skill Course
FYBSc (SEMESTER I)

Course Code	Name of the Course	Credits
SVSC101	Food Additives & Food Adulteration	2
SVSC102	Introduction to Cosmeticology	2
SVSC103	Introductory Laboratory skills and Techniques in Biology	2
SVSC104	Principle and Analytical Techniques of Biomolecules	2
SVSC105	Optimization Techniques	2
SVSC106	Financial Mathematics	2
SVSC107	Cultivation of Microorganisms	2
SVSC108	Control of Microorganisms	2
SVSC109	Basic Instrumentation Techniques and Research	2
SVSC110	Digital Electronics and its Applications	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 - Project 20 Marks

4. Activity 2 - Students will be examined in their practical work - 20 Marks

5. 10 marks will be given for class participation.

NAME OF THE COURSE	FOOD ADDITIVES AND FOOD ADULTERATION
CLASS	FYBSc
COURSE CODE	**SVSC101**
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 have knowledge and understanding about food groups, food additives and food adulterants.
CO 2.	To gain skills to test food for presence of additives and adulterants.
CO 3.	To spread awareness about consumer rights and regulations for food safety.

COURSE LEARNING OUTCOMES:

CLO 1.	Identify food groups and their nutritive value.
CLO 2.	perform qualitative and quantitative analysis of food for presence of additives and adulterants
CLO 3.	Apply the knowledge of food safety regulations and consumer rights in case she is faced with any such challenge in the future

UNIT 1	THEORY (15 LECTURES)
1.1	**Food groups (2 lectures)** Introduction to food groups - Composition and nutritive value.

1.2	**Food Additives [4L]** 1.2.1 Definition, direct and indirect additives, class of food additives 1.2.2 Role and function of food additives, interaction of food additives and effect on food characteristics 1.2.3 Coding of food additives 1.2.4 Detection of additives
1.3	**Food Adulteration [6L]** 1.3.1 Definition and types of adulteration 1.3.2 Means of adulteration, reasons for adulteration. 1.3.3 Methods of detection of adulterants in the following foods: milk,oil,sugar,spices and condiments, processed food, fruits and vegetables.(Qualitative and quantitative) 1.3.4 Difference between food additives and adulterants.
1.4	**Present law and regulations (wrt food adulteration and additives) [2L]** 1.4.1 Highlights of Food safety and standards authority of India (FSSAI) 1.4.2 Role of Voluntary agencies AGMARK,ISI
1.5	**Consumer Protection [1L]** Consumer's problem rights and responsibilities and Consumer Protection Act 2019
UNIT 2	PRACTICALS (30 LECTURES)
2.1	**Detection of food groups** 2.1.1 Test to identify carbohydrates :Molisch's test, Fehling's test, Benedict's test, Tollen's test and Iodine test 2.1.2 Test to identify proteins: Biuret test, Xanthoproteic test, Millions test, Ninhydrin test 2.1.3 Test to identify fats and oils: Translucent spot test, solubility test to distinguish between fats and oils, acrolein test, Hubble's test
2.2	**Qualitative Detection of food additives** Detection of food additives: Aspartame(ninhydrin test),nitrite, magnesium, silicate, salicylic acid, borates, saccharin(Nessler's reagent test), food colors (curcumin, caramel, annatto, chlorophyll), pyrogallate, alginate and pectin
2.3	**Qualitative Detection of adulterants in food** 2.3.1 Milk: sugar, starch, hydrogen peroxide, formalin, nitrate, benzoic and salicylic acid, borax and boric acid. Acidity test 2.3.2 Honey: Water, sugar/jaggery, glucose/high fructose corn syrup. Acidity test 2.3.3 Tea: Spent leaves, added colouring material, iron fillings 2.3.4 Coffee: Cereal/starch, scorched persimmon stones, chicory, iron fillings, colouring matter 2.3.5 Ghee/Butter: Mashed potatoes/ sweet potatoes. Acid value 2.3.6 Edible oil: Other oils in edible oil 2.3.7 Vegetables & Fruits: Malachite green on chillies or green vegetables, Rhodamine B on sweet potatoes, wax polish on apples 2.3.8 Cereals : Rhodamine B in ragi, turmeric in sella rice, bran in wheat flour.

	2.3.9 Spices and condiments: saw dust in spices, lead chromate in turmeric, papaya seeds in pepper, grass seeds in cummin, artificial colour in chili powder/saffron
2.4	**Quantitative determination of additives** 2.4.1 Benzoic acid in carbonated beverages 2.4.2 Acetic acid in synthetic vinegar 2.4.3 Boric acid in milk
2.5	**Project work** 2.5.1 Each student will select five packaged food items and identify the additives present in it and their type 2.5.2 Students will undertake a case study on impact of adulteration on public health or a food additive that caused health issues (preferably in the last 15 years)

REFERENCES:

1. A first course in food analysis- A.Y.Sathe, New Age International Ltd,1999

2. Food safety, case studies- R V Bhat, NIN,1992

3. https://www.fssai.gov.in

4. https://indianlegalsolution.com/law on food adulteration

5. https://vikaspedia.in

NAME OF THE COURSE	INTRODUCTION TO COSMETICOLOGY
CLASS	FYBSc
COURSE CODE	**SVSC102**
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 learn the basics of cosmetics
CO 2.	To gain knowledge on basic principles of cosmetic chemistry, composition, formulation and function of various cosmetic components.
CO 3.	To learn how to prepare various formulations and their qualitative analysis

COURSE LEARNING OUTCOMES: The learner will be able to

CLO 1.	Identify and classify cosmetic products
CLO 2.	Predict the components of the product and their function
CLO 3.	Prepare various cosmetic formulations
CLO 4.	Carry out qualitative analysis of cosmetic products

UNIT 1	THEORY (15 LECTURES)
1.1	**Basics of cosmetics** Definition of cosmetics, historical background, classification, functions and properties.
1.2	**Skin Products** Structure of skin, composition and functions of face powders, talcum powders, compact powders: Face cream, cold cream, sunscreen
1.3	**Hair Products**

	Structure of hair, hair dyes and its types: temporary, semi-permanent and permanent, hair sprays and shampoo	
1.4	**Coloured products** Structure of nail, nail polish, nail polish remover and lipsticks	
1.5	**Hygiene Products** Antiperspirants and deodorants, toothpaste, tooth powders and mouthwash	
UNIT 2	PRACTICALS (30 LECTURES)	
2.1	**Preparation of cosmetic formulation** 2.1.1 Preparation of talcum powder 2.1.2 Preparation of toothpaste/tooth powder 2.1.3. Preparation of nail polish/ nail polish remover 2.1.4. Preparation of hair colour/ shampoo 2.1.5.Preparation of Lip Balm /lipsticks 2.1.6. Preparation of Hand Wash/sanitizer.	
2.2	**Qualitative Analysis of cosmetic products** 2.2.1. Estimation of Mg in talcum powder 2.2.2. Estimation of acetone in nail polish remover (demonstration) 2.2.3. Estimation of Zn in deodorants complexometrically	
2.3	**Assay of shampoo/body wash**	

REFERENCES:

1. Cosmetic Formulation: Principles and Practice - Heather A.E. Benson, Michael S. Roberts, Vania Rodrigues Leite-Silva, Kenneth Walters

2. Perfumes, Cosmetics and soaps, ninth edition, – W. A. Poucher.

3. Naturals and Cosmetics – by Dr. Satish Sakharwade

4. Manufacture of Perfumes, Cosmetics & Detergents – Giriraj Prasad

5. Cosmetics: Science & Technology – Sagarin.

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

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

8. Practical Organic Chemistry by A.I. Vogel

9. Practical Organic Chemistry by O.P. Agrawal.

10. Practical Organic Chemistry by F. G. Mann & B. C. Sounders

11. Comprehensive Practical Organic Chemistry Qualitative Analysis by V. K. Ahluwalia

12. Cosmetics-Formulation, manufacture and Quality Control by P.P Sharma Vandana Publications Pvt. Ltd

NAME OF THE COURSE	PRINCIPLE AND ANALYTICAL TECHNIQUES OF BIOMOLECULES
CLASS	FYBSc
COURSE CODE	**SVSC103**
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.	Students will learn the concepts of Molarity and Normality.
CO 2.	Students will be acquainted with different qualitative and quantitative based techniques and assays
CO 3.	Students will develop the ability of critically learning the concepts of biomolecules

COURSE LEARNING OUTCOMES:

CLO 1.	Familiarize oneself with working principle of different instruments used in life science
CLO 2.	Demonstrate the separation of biomolecules using different techniques.
CLO 3.	Make calculations related to preparation of different concentration of solutions

UNIT 1	Fundamentals of Handling/Working of instruments and Analytic Techniques (15 Lectures)
1.1	Introduction of instruments, spectroscopy and photometric techniques.
1.2	Concepts of Molarity and Normality.
1.3	Quantitative biochemical measurements.

1.4	Qualitative and quantitative analysis of biomolecules.
1.5	Extraction techniques Cell lysis techniques – Physical, chemical Solvent extraction of lipids.
1.6	Separation and analytical techniques 1. Precipitation 2. Filtration 3. Dialysis 4. Centrifugation 5. Chromatography 6. Electrophoresis Using the above techniques to isolate/ analyze particular molecules using a typical example.

Practical of VSCI (SVSC103P)

A. Analytical Techniques

- Colorimetry:

  a. Basic Concept of Solution Preparation:

      i. Preparation of Simple Inorganic Salt Solutions: Molarity and Percent Solution

      ii. Preparation of dilutions from a stock solution.

  b. Determination of Lambda max

  c. Verification of Beer-Lambert's law.

- pH metry:

  a. Usage and Calibration of pH meter.

  b. Making of own pH indicator papers.

B. Separation Techniques

- Separation of biomolecules using a semi permeable membrane (dialysis).

- Isoelectric Precipitation of proteins.

- Separation of the given sample using sucrose gradient.

- Separation of amino acids using paper chromatography technique.

REFERENCES:

1. Nelson D.L. and Cox M.M., Lehninger-Principles of Biochemistry, 2017, 7th Edition, *W H Freeman & Co Publishers.*

2. Plummer M. and Plummer D.T., Introduction to Practical Biochemistry, 1988, 3rd Edition, *McGraw Hill Publication*

3. Taylor D.J., Green N.P.O., Stout G.W., Ed. Soper R., Biological Science, 2005, 3rd Edition, *Cambridge University Press.*

NAME OF THE COURSE	FUNDAMENTALS OF HANDLING/WORKING OF INSTRUMENTS AND ANALYTIC TECHNIQUES
CLASS	FYBSc
COURSE CODE	**SVSC104**
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.	Students will learn laboratory discipline and good lab practices
CO 2.	Students will be able to reflect how microbial growth could be controlled.
CO 3.	Students will acquire knowledge of different parameters necessary for optimal microbial growth, culturing and preservation

COURSE LEARNING OUTCOMES:

CLO 1.	Gain expertise in laboratory practises and journal writing
CLO 2.	Elucidate the functioning of microscopes and reason out why specimens must be stained.
CLO 3.	Perform microbiological techniques under sterile conditions.

UNIT 1	Fundamentals of Handling/Working of instruments and Analytic Techniques
1.1	Laboratory Practices and Basic Microbiology Laboratory discipline. Good Laboratory Practices. Instrument Safety.
1.2	Fundamental microbial techniques 1. Micrometry of biological specimen. 2. Sterilization of laboratory material (principle of use of autoclave).

	3. Media preparation and pouring plates.
	4. Understanding the functioning of common microbiological equipment.
	5. Introduction to Stains and Dyes.
	6. Staining and culturing of microbial culture.

1.3	Microbial growth requirements and its control
	Requirements for growth–
	  1. Physical – Temperature, pH, Osmotic pressure
	
	  2. Chemical – Carbon, nitrogen, sulphur, phosphorus oxygen, trace elements growth factors
	
	  3. Culture Media
	
	  4. Anaerobic growth.
	
	  5. Kinetics of growth
	
	  6. Growth curve and generation time
	
	  7. Batch and continuous cultures
	
	  8. Isolation of microorganisms
	
	  9. Preservation of microorganisms.

1.4	Control of microbial growth
	  1. Physical
	
	  2. Chemical
	
	  3. Antimicrobial.

Practical of VSCII (SVSC104P)

A. Introduction of Laboratory practices and Journal writing

Good Lab Practices and Writing a Science Lab Report.

B. Microscopy
- Parts of Microscope

- Micrometry: Measurement of cell size under a microscope (concept of mm and μm). Example: measurement of pollen grain from different flowers, starch grains (iodine).

C. Microbiology
- Demonstration of different sterilization techniques used in the laboratory.

- Demonstration of media preparation and pouring plates.

- Microbial staining technique:

a. Monochrome staining of bacteria, yeast, animal cell (from cheek), plant cells (onion peel)

b. Differential staining: Gram staining.

- Isolation of Pure Culture of Bacteria by Streak Plate Method.

- Effect of temperature on growth kinetics in yeast.

- Demonstration of AST (by disc diffusion method) and Minimum Inhibitory Concentration (MIC) for a bacterial culture.

REFERENCES:

1. Aneja K.R., Experiments in Microbiology, Plant Pathology and Biotechnology, 2017,5th Edition, *New Age International Publishers.*

2. Hardin J., Bertoni J.P., Kleinsmith L.J., Becker's World of the Cell: International Edition, 2011, 8th Edition, *Pearson Publisher.*

3. Madigan M, Martinko J., Bender K., Buckley D., Stahl D., Brock Biology of Microorganisms, 2017, 14th Edition, *Pearson Publishers*

4. Reba Kanungo, Ananthanarayan and Paniker's Textbook of Microbiology,2017,10thEdition, *Universities Press Publishers*

5. Tortora G.J., Funke B.R., Case C. L., Microbiology: An Introduction,2016,12thEdition, *Pearson Publication*

6. Willey J., Sherwood L., Woolverton C., Prescott, Harley and Klein's, Microbiology, 2008, 7th Edition*, McGraw Hill Higher Education*

NAME OF THE COURSE	OPTIMIZATION TECHNIQUES
CLASS	FYBSC
COURSE CODE	**SVSC105**
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 understand the transportation model and formulate the unique linear programming issue.
CO 2.	To create a preliminary response to the transportation issue.
CO 3.	To understand the techniques and determine the optimal solution to the transportation issue in its various forms.
CO 4.	To disseminate, formulate and resolve the job sequencing and assignment problems.
CO 5.	To recognise and use the techniques for a variety of daily tasks.

COURSE LEARNING OUTCOMES:

CLO 1.	The learner will understand the transportation model with its LPP.
CLO 2.	The learner will be able to find a preliminary solution to the model.
CLO 3.	The learner will understand the techniques and apply them to optimize the solution
CLO 4.	The learner will be able to disseminate and solve the job sequencing and assignment models

UNIT 1	TRANSPORTATION, ASSIGNMENT & JOB SEQUENCING (15 LECTURES)
1.1	Definition, Mathematical Formulation Concepts of Feasible solution, Basic feasible solution, Optimal and multiple solutions.
1.2	Initial Basic Feasible Solution using North-West Corner rule, Matrix Minima Method, Vogel's Approximation Method.
1.3	MODI Method for optimality.

1.4	Mathematical formulation. Solution by Hungarian Method. Unbalanced Assignment problems.
1.5	Processing n Jobs through 2 and 3 Machines ,2 jobs through m Machines.
UNIT 2	PRACTICALS IN TRANSPORTATION, ASSIGNMENT & JOB SEQUENCING (15 PRACTICALS)
2.1	Transportation Model – formulation, IBFS, Optimal Solution, Unbalanced transportation models
2.2	Assignment – formulation, solution, unbalanced model, travelling salesman problem
2.3	Job sequencing through 2 and 3 machines

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	**SVSC106**
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 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	CULTIVATION OF MICROORGANISMS
CLASS	FYBSc
COURSE CODE	**SVSC107**
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 list differences in nutritional modes of microorganisms
CO 2.	To introduce the concept of pure culture
CO 3.	To train students to use various techniques of inoculation for growing microorganisms from provided samples.
CO 4.	To outline the processes and purposes of the procedures that are used in handling, maintaining, and studying microorganisms.
CO 5.	To explain the importance of media for culturing microbes in the laboratory.

COURSE LEARNING OUTCOMES:

CLO 1.	The learner will be able to prepare microbiological media using basic ingredients.
CLO 2.	The learner will be able to identify the purpose of enriched, selective, and differential media
CLO 3.	The learner will be able to select an appropriate growth medium or method for experimental work.
CLO 4.	The learner will be able to apply the knowledge of inoculation methods for isolating a variety of bacteria
CLO5	The learner will be able to study and identify isolates based on features of their colonies formed on solid media
CLO6	The learner will be able to preserve different types of microbial cultures for the desired duration

UNIT 1	THEORY (15 LECTURES)
1.1	World of microorganisms

1.2	Nutritional requirements – Macro and Micronutrients, growth factors.
1.3	Nutritional types of microorganisms
1.4	Culture media: Types with examples
1.5	Methods of Inoculation
1.6	Pure culture techniques
1.7	Cultivation of anaerobes
1.8	Preservation of microbial cultures
1.9	List of Microbial Culture Collection Centres
UNIT 2	PRACTICALS (30 LECTURES)
2.1	Preparation of Culture Media: a. Liquid medium (Nutrient Broth) b. Solid Media (Nutrient agar & Sabouraud's agar)
2.2	Preparation of slant, butts & plates
2.3	Methods of Inoculation and Study of Growth Characteristics: a. Liquid Medium b. Solid Media (Slants, Butts and Plates)
2.4	Isolation of pure cultures and study of colony characteristics.

REFERENCES:

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

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

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

NAME OF THE COURSE	CONTROL OF MICROORGANISMS
CLASS	FYBSc
COURSE CODE	**SVSC108**
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 understanding of the key concepts related to microbial control
CO 2.	To compare the physical methods of microbial control
CO 3.	To explain the purpose advantages and limitations of using a variety of methods based on use of high temperature
CO 4.	To highlight different types of radiations and filters used in microbiology laboratory
CO5	To give an overview of mode of action, uses, limitations of the common chemical disinfectants and sterilizing gases.
CO6	To train the students to choose appropriate method for killing or inhibiting microorganisms
CO7	To provide hands-on training in disinfection and safe disposal of waste in a laboratory setting
CO8	To provide hands-on training in sterilizing glassware and microbiological media using various methods and perform aseptic transfers of media.
CO9	To demonstrate the use of membrane filters in bacteria proof filtration.
CO10	To provide training in performing experiments to study the effects of UV light, osmotic pressure, and oligodynamic action of heavy metals on the growth of microorganisms.

COURSE LEARNING OUTCOMES:

CLO 1.	The learner will be able to define and differentiate among the major terms for microbial control, citing examples of each
CLO 2.	The learner will be able to describe dry heat and moist heat methods and their chief applications for sterilization and disinfection.
CLO 3.	The learner will be able to apply the concept of sterilization by filtration for practical use.
CLO 4.	The learner will be able to differentiate between ionizing and nonionizing radiations used for the purpose of destroying microbial contaminants

CLO 5.	The learner will be able to summarize the modes of action and practical uses of alcohols, phenolics, quaternary ammonium compounds, halogens and heavy metal solutions as disinfectants/ antiseptics.
CLO 6	The learner will be able to identify preferred physical methods / uses of chemical disinfectants in various scenarios
CLO 7	The learner will be able to disinfect surfaces and dispose off laboratory waste safely, demonstrating their understanding of laboratory safety.
CLO 8	The learner will be able to demonstrate the ability to sterilize glassware and microbiological media using various methods and perform aseptic transfers of media.
CLO 9	The learner will be able to analyze the antimicrobial activity of a disinfectant by the disc diffusion method, the effects of UV light, osmotic pressure, and oligodynamic action of heavy metals on microorganisms

UNIT 1	THEORY (15 LECTURES)
1.1	Concept of sterility, Need for control, Definition of Antimicrobial agents Methods of microbial control:
1.2	Physical: a. Moist heat, Dry heat b. Radiation c. Filtration d. Low temperature e. Desiccation and Osmotic pressure
1.3	Chemical: a. Phenolics b. Alcohols c. Heavy metals d. Halogens e. Quaternary ammonium compounds f. Chlorhexidine g. Sterilizing gases- ETO, Formaldehyde
UNIT 2	PRACTICAL (30 LECTURES)
2.1	Introduction to Laboratory equipments
2.2	Disinfection & Safe Disposal of waste

2.3	Sterilization of glassware and microbiological media
2.4	Aseptic transfer of media
2.5	Demonstration of use of membrane filter and efficiency of sterilization
2.6	Effect of UV light on microorganisms. (Demonstration)
2.7	Effect of Osmotic pressure on microorganisms
2.8	Oligodynamic action of heavy metals
2.9	Testing antimicrobial activity of a disinfectant by disc diffusion method.

REFERENCES:

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

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

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

NAME OF THE COURSE	BASIC INSTRUMENTATION TECHNIQUES FOR RESEARCH
CLASS	F Y BSc
COURSE CODE	**SVSC109**
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.	Develop entry-level skills in instrumentation
CO 2.	Learn maintenance and calibration of instruments.

COURSE LEARNING OUTCOMES:

CLO 1.	Demonstrate the knowledge of operation of an instrument.
CLO 2.	Demonstrate the knowledge of fundamentals, terms, and units of physical quantities.

UNIT 1	Theory (15 LECTURES)
1.1	Measurement and Experimentation
UNIT 2	Practical (15 LECTURES)
2.1	Practical

REFERENCES:
1. A Text Book of Electrical Technology Vol. I & II by B.L. Theraja & A.K.Theraja
2. Basic Electrical Engineering by V.N. Mittle (TMH). 3. Electrical Technology by Edwar Hughes (Pearson Education, New Delhi).
3. Basic Electrical Engineering by Chakraborty (McGraw Hill).
4. Basic Electrical Engineering by V.K. Mehata, Rohit Mehata
5. Fundamental of Physics by Halliday & Resnick, Willey publication
6. Engineering Practical Physics by S. Panigrahi, B. Mallick, S. Publisher

NAME OF THE COURSE	DIGITAL ELECTRONICS & ITS APPLICATIONS
CLASS	F Y BSc
COURSE CODE	**SVSC110**
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	CONTINUOUS ASSESSMENT 50
PASSING MARKS	20

COURSE OBJECTIVES:

CO 1.	The course objective is to make students of all the branches of Engineering to understand the efficacy of electronic principles which are pervasive in engineering applications

COURSE LEARNING OUTCOMES:

CLO 1.	Appreciate the significance of electronics in different applications
CLO 2.	Compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates

UNIT 1	Theory (15 LECTURES)
1.1	Introduction to Number systems, Boolean Algebra
UNIT 2	Practical (15 LECTURES)
2.1	Practical

REFERENCES:
1. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, 2008.
2. D.P. Kothari, I. J. Nagrath, "Basic Electronics", McGraw Hill Education (India) Private Limited, 2014.
3. Digital Electronics: Principles, Devices and Applications by Anil K. Maini publisher John Wiley & Sons, Ltd, 2007.
   https://www.shahucollegelatur.org.in/Department/Studymaterial/sci/it/BCA/FY/digielec.pdf
4. Practical Digital Electronics for Technicians by Will Kimber
5. Digital Electronics: Principles, Devices and Applications by Anil K. Maini publisher John Wiley & Sons, Ltd, 2007.