



પરિપત્ર:

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટીની સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ સંલગ્ન કોલેજોનાં આચાર્યશ્રીઓને સવિનય જણાવવાનું કે સાયન્સ વિદ્યાશાખા હેઠળનો NEP-૨૦૨૦ અંતર્ગત સ્કીલ એન્હાન્સમેન્ટ કોર્સનો સેમેસ્ટર-૩નો અભ્યાસક્રમ આ સાથે સામેલ છે. આ બાસ્કેટમાં સાયન્સનાં વિષયો આપવામાં આવેલ છે.

માનનીય કુલપતિશ્રીની મંજૂરી અનુસાર સદર અભ્યાસક્રમ શૈક્ષણિક વર્ષ જુન, ૨૦૨૪ થી અમલવારી કરવાની રહે છે. સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ સંલગ્ન કોલેજો દ્વારા તેની અમલવારી કરવા જણાવવામાં આવે છે.

નોંધ: તા.૨૨/૦૮/૨૦૨૪નાં પરિપત્ર નં: ૧૧૬૦/ ૨૦૨૪માં ૧. Mushroom Cultivation ૨. Advanced SciLab (FOSS)નાં અભ્યાસક્રમમાં ફેરફાર કરવામાં આવેલ છે અન્ય અભ્યાસક્રમમાં કોઈ ફેરફાર કરવામાં આવેલ નથી.



18/6/2025

ખાસ ફરજ પરના અધિકારી
(એકેડેમિક)

ક્રમાંક/બીકેએનએમયુ/એકેડેમિક/૨૮૧/૨૦૨૫

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી,

સરકારી પોલીટેકનિક કેમ્પસ,

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી રોડ,

ખડીયા, જૂનાગઢ-૩૬૨૨૬૩

તા.૧૮.૦૬.૨૦૨૫

પ્રતિ,

- ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી સંલગ્ન સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમો ચલાવતી તમામ કોલેજોના આચાર્યશ્રીઓ તરફ....

નકલ સાદર રવાના:-

- માન.કુલપતિશ્રી/કુલસચિવશ્રીનાં અંગત સચિવશ્રી.
- પરીક્ષા નિયામકશ્રી, ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી, જૂનાગઢ

નકલ રવાના જાણ તથા યોગ્ય કાર્યવાહી અર્થે:

- સીસ્ટમ મેનેજરશ્રી, આઈ.ટી.સેલ વિભાગ (વેબસાઇટ ઉપર પ્રસિદ્ધ થવા અર્થે.)



BHAKTA KAVI NARSINH MEHTA UNIVERSITY
JUNAGADH



BOARD OF STUDIES
FACULTY OF SCIENCE
BASKET FOR SKILL ENHANCEMENT COURSE
(SEMESTER- III)

EFFECTIVE FROM JUNE, 2024

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
Skill Enhancement Course (SEC)
Syllabus for Faculty of Science as per NEP
Effective from June 2024
SEMESTER-3

INDEX		
Sr. No	Topic	Page No.
1.	CMS with WordPress	2
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8.	Instrumentation and Analysis with Multimeter and CRO	25
9.	Conversational Skills-1	28
10.	Separation Techniques - Electrophoresis	31

Course Level	5.0	Internal Marks	12
Programme	B.Sc (Honours)	External Marks	25
Semester	3	Practical Internal	13
Course Type	Skill Enhancement Course-3	Practical External	-
Course Credit	02	Prac. Ext. Exam Time	-
Teaching Hours	Theory-15 Practical-30	Total	50
Course Code		Exam Duration	1 Hour
Course Title	CMS with WordPress		

Course Objectives: On successful completion of the course, the students will be able to:

- To impart basic knowledge about content management and blogging
- To impart the know how about web site development
- To demonstrate the learners how to use advanced techniques in web site designing

Course Learning Outcomes: On successful completion of the course, the students will be able to:

- Being able to create own blogging site
- Having technical know-how to design and develop organized web content

Course Contents

Sem	Unit No.	Syllabi	Teaching Hours
3	1	• Content Management System: ○ Introduction, Features, Advantages, Disadvantages, Applications ○ Basics of Blogging • WordPress: ○ Introduction, Features, Advantages, Disadvantages ○ Installation of WordPress. ○ WordPress Directory & file structure. ○ Dashboard overview ○ working with page, category, post, tags, and media ○ User Roles and Responsibilities ○ Modifying Settings (General, Reading, Writing, Discussion, Media, Permalinks) ○ Database Structure	05
	2	• Theme: ○ Introduction, installation and activation	10

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		○ Common WordPress themes and Template files • Widget: ○ Introduction ○ Widget Areas and Widget Management ○ Available Widgets (Archive, Calendar, Categories, Custom Menu, Meta, Pages, Recent Comments, Recent Posts, RSS, Search, Tag Cloud, Text) • Plugins: ○ Introduction, installation and activation ○ Useful Plugins (SEO Yoast, Google Analytics, WooCommerce, Page Builder)	
	3	Practical	30

Suggested Reading:

1. Teach Yourself VISUALLY Word Press, 3rd Edition, George Plumley
2. Build Your Own WordPress Website: An Ultimate Guide for Small Business Owners, Paperback by WordPress Genie

Website References:

1. <https://www.tutorialspoint.com/wordpress/>
2. <https://www.wpbeginner.com/category/wp-tutorials/>
3. <https://www.siteground.com/tutorials/wordpress/>
4. <https://learn.wordpress.com/>

INTERNAL EVALUATION SCHEME		
NO	Particulars	Marks
1	Mid Semester Exam (Mandatory)	13
2	Class Test	03
3	Open book exam/test	03
4	Open note exam/test	03
5	Self-test/ Online test	03
6	Essay/Article writing	03
7	Quizzes/Objective test	03
8	Class assignment	03
9	Home assignment	03
10	Reports Writing	03
11	Research/Dissertation	03
12	Case Studies	03

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13	Viva/Oral exam	03
14	Group Discussion	03
15	Role Play	03
16	Paper presentation/Seminar	03
17	Language Lab work	03
18	Interview	03
19	Craft work	03
20	Co-curricular work	03
21	Field Assignment	03
22	Poster Presentation	03
23	Attendance	03
24	Project Work	03
	Total	25

Note: Sr.No.1 is mandatory. Select any Four from Sr.No.2 to 24. Each Contains three marks. Student should secure 09 Marks for passing in internal Exam

Paper Style

Ques. No.	Particulars	From which Unit	Marks
1	Questions (Any Two Out Of Four)	1	10
2	Questions (Any Two Out Of Four)	2	10
3	Questions (Any One Out Of Two)	From Each Unit	05
		Total Marks	25

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Course Level	5.0		Internal Marks	25
Programme	B.Sc (Honours)		External Marks	25
Semester	3		Practical Internal	-
Course Type	Skill Enhancement Course-3		Practical External	-
Course Credit	02		Prac. Ext. Exam Time	-
Teaching Hours	30		Total	50
Course Code			Exam Duration	1 Hour
Course Title	LIFE SPAN DEVELOPMENT			

Course Objectives: On successful completion of the course, the students will be able to:

- To become acquainted with development stages from birth to old age.
- To develop awareness of importance aspects of development during the whole life span.
- To understand the issues faced and adjustment required at each stage across the life span

Course Learning Outcomes: After completion of the course of the study:

- The students will be aware of how a child Develops from conception to Childhood and its developmental functions according to the stage.

Course Contents

Sem	Unit No.	Syllabi	Teaching Hours
3	1	Stages of Prenatal Development • Meaning of Conception and pregnancy • Stages of Prenatal Period/ Pregnancy • Outline of Prenatal Development • Factors affecting prenatal development	15
	2	Infant Stage and Childhood (Birth to 2 Years) • Concept and Development task of infant stage • Childhood - Early Childhood (2-6 years): Concept, Characteristic and Developmental Task - Late Childhood (6-12 years) : Concept and Developmental Task	15

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Suggested Reading:

1. Kumar R. ,1988, Child Development in India- Ashish Publishing House, New Delhi
2. Godhasara, 2016, Child Development An Overview- Cyber Tech, Publications new Deldi- ISBN-978-93-5050-472-2
3. Agraval,bansal,1999, shishusvasthay – shyamprakashanjayapur –ISBN-81-87247-14-2
4. Barushi,1992, matrulakaavambalvikas, sahityprakashanagara
5. Rajahans , 1986, balvikasavammanaviysambansh- hindigranth, akadamibihar

INTERNAL EVALUATION SCHEME		
NO	Particulars	Marks
1	Mid Semester Exam (Mandatory)	13
2	Class Test	03
3	Open book exam/test	03
4	Open note exam/test	03
5	Self-test/ Online test	03
6	Essay/Article writing	03
7	Quizzes/Objective test	03
8	Class assignment	03
9	Home assignment	03
10	Reports Writing	03
11	Research/Dissertation	03
12	Case Studies	03
13	Viva/Oral exam	03
14	Group Discussion	03
15	Role Play	03
16	Paper presentation/Seminar	03
17	Language Lab work	03
18	Interview	03
19	Craft work	03
20	Co-curricular work	03
21	Field Assignment	03
22	Poster Presentation	03
23	Attendance	03
24	Project Work	03
	Total	25

Note: Sr.No.1 is mandatory. Select any Four from Sr.No.2 to 24. Each Contains three marks. Student should secure 09 Marks for passing in internal Exam

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Paper Style

Ques. No.	Particulars	From which Unit	Marks
1	Questions (Any Two Out Of Four)	1	10
2	Questions (Any Two Out Of Four)	2	10
3	Questions (Any One Out Of Two)	From Each Unit	05
		Total Marks	25

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Course Level	5.0		Internal Marks	25
Programme	B.Sc. (HONORS)		External Marks	25
Semester	III		Practical Internal	---
Category of Course	5.0		Practical External	---
Course Credit	2		Prac. External Exam Duration	2 Hours
Teaching Hours	4 Hours/Batch/Week		Total (SEE + CCE)	50
Course Code	SEC - 3		Exam Duration	2 Hours
Course Title	Advanced SciLab [FOSS]			

Course Objectives:

- Understand the concept of matrix inversion using SciLab.
- Implement SciLab code to compute the inverse of a given matrix using Gauss Elimination.
- Implement SciLab code to compute the inverse of a given matrix using Gauss Jordon.
- Understand the procedure of applying Gauss elimination method to solve system of simultaneous linear algebraic equations.
- Understand the procedure of applying Gauss Jordon method to solve system of simultaneous linear algebraic equations.
- Understand the concept of eigenvalues and eigenvectors.
- Learn how to compute eigenvalues and eigenvectors of a given matrix.
- Implement SciLab code to find eigenvalues and eigenvectors.
- Understand the process of diagonalization and implement SciLab code to diagonalize a given 3x3 matrix.
- Introduce the Cayley-Hamilton theorem and learn how to find the inverse of a matrix using this theorem.
- Implement SciLab code to compute the inverse based on the Cayley-Hamilton theorem.
- Understand parametric curves and their representations.
- Learn how to plot graphs of specific curves.
- Implement SciLab code to draw graphs of cycloid, catenaries and the given spiral.

Course learning outcomes: After completion of the course, a student will be able to do the following:

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- Understand the fundamental concepts of matrices, including matrix addition, subtraction and multiplication.
- Learn techniques for finding the inverse of a square matrix using both Gauss Elimination and Gauss-Jordan methods.
- Apply SciLab programming skills to compute matrix inverses.
- Verify the correctness of the computed inverses by checking matrix multiplication with the original matrix.
- Learn the steps involved in Gauss elimination and Gauss-Jordan method.
- Interpret the solutions obtained in the context of the original problem.
- Understand the significance of eigenvalues and eigenvectors in Linear Algebra.
- Learn how to compute eigenvalues and eigenvectors for a given matrix.
- Apply SciLab programming to find eigenvalues and eigenvectors.
- Understand the concept of diagonalization.
- Apply SciLab code to diagonalize a 3x3 matrix.
- Understand the Cayley-Hamilton theorem and its application.
- Implement SciLab code to compute the inverse based on Cayley Hamilton theorem.
- Learn how to draw graphs of cycloids, catenaries and spirals by using SciLab.

Practical No.	Title / Aim of Practical
1.	To find the inverse of a matrix using Gauss elimination method.
2.	To solve system of simultaneous linear equations by Gauss elimination method.
3.	To find inverse of given matrix using Gauss Jordan method.
4.	To solve system of simultaneous linear equations by Gauss Jordan method.
5.	To find Eigen values and Eigen vectors of given matrix.
6.	Diagonalize the given square matrix of order 3×3 .
7.	To find inverse of given matrix using Cayley Hamilton theorem.
8.	To draw graphs of (A) Cycloid and (B) spiral $r = \exp(-\theta/10)$
9.	To draw graphs of (A) Catenaries and (B) $\log_{10} x$, $\log_e x$, 10^x , e^x
10.	To draw graph of circle, parabola, ellipse, hyperbola for any general equation of type $ax^2 + by^2 + gx + fy + c = 0$ and describe (or plot) centre, focus, directrix, asymptotes etc. (whichever applicable) of given conic.

Suggested References:

1. "Introduction to SciLab: For Engineers and Scientists" by Sandeep Nagar, Apress publisher, 1st edition, ISBN: 978-1484231916
2. "SciLab by Example" by Dr. S. C. Coutinho, PHI Learning Pvt. Ltd., 1st edition, ISBN: 978-8120347269
3. "SciLab Textbook Companion for Numerical Methods" by S. K. Gupta and Anjali Gupta, New Age International Pvt. Ltd., 1st edition, ISBN: 978-8122427640
4. "SciLab: A Practical Introduction to Programming and Problem Solving" by Tejas Sheth and Satish Annigeri, CRC Press, 1st edition, ISBN: 978-1466587721
5. "SciLab for Real Dummies" by Dr. S. C. Coutinho, PHI Learning Pvt. Ltd., 1st edition, ISBN: 978-8120350429

Visit: <https://scilab.in/spoken-tutorial>

Evaluation of 50 Marks (2 Credit Paper)

Continuous and Comprehensive Evaluation (CCE)- Formative- 25 Marks	Semester End Evaluation (SEE)- Summative-25 Marks
<u>Practical's (25 Marks)</u> 1. Performance 15 Marks 2. Viva-voce 10 Marks	<u>Practical's (25 Marks)</u> 1. Performance 15 Marks 2. Viva-voce 05 Marks 3. Journal 05 Marks
Total 25 Marks	Total 25 Marks

Paper Style for SEE:

Que. No.	Particulars	Marks
1	Answer any THREE out of FIVE (each of 5 Marks)	15
2	VIVA	05
3	JOURNAL	05
	Total Marks	25

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Course Level	5.0	Internal Marks	25
Programme	B.Sc (Honours)	External Marks	25
Semester	3	Practical Internal	-
Course Type	Skill Enhancement Course-3	Practical External	-
Course Credit	02	Prac. Ext. Exam Time	-
Teaching Hours	30	Total	50
Course Code		Exam Duration	1 Hour
Course Title	MUSHROOM CULTIVATION		

Course Objectives: On completion of the course, the students will be able to:

- Recall various types and categories of mushrooms.
- Demonstrate various types of mushroom cultivating technologies.
- Examine various types of food technologies associated with mushroom industry.
- Value the economic factors associated with mushroom cultivation
- Devise new methods and strategies to contribute to mushroom production.

Pedagogy: Lectures/ Use of Multimedia / Assignments/ Hands-on experiments/ Demonstrations/ Field visit.

Course Contents

Sem	Unit No.	Syllabi	Teaching Hours
3	1	Mushrooms: • History, Scope, Vegetative characters, Nutritional values of mushrooms. Types of Mushrooms: Edible Mushrooms: Button mushroom (<i>Agaricus bisporus</i>), Oyster mushroom (<i>Pleurotus sajor-caju</i>) and paddy straw mushroom (<i>Volvariella volvcea</i>). Poisonous Mushrooms: <i>Amanita phalloides</i> .	15
	2	Mushroom cultivation: • Mushroom bed preparation- Preparation of mother culture, media preparation, inoculation, incubation and spawn production. • Spawning, spawn running, harvesting and Cultivation of oyster mushroom using paddy straw/agricultural wastes.	15

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Suggested Reading:

1. Marimuthu, T. et al. (1991). Oster Mushroom. Department of Plant Pathology. Tamil NaduAgricultural University, Coimbatore.
2. Nita Bhal. (2000). Handbook on Mushrooms. 2nd ed. Vol. I and II. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Pandey R.K, S. K Ghosh, 1996. A Hand Book on Mushroom Cultivation. Emkey Publications.
4. Pathak, V. N. and Yadav, N. (1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.
5. Tewari Pankaj Kapoor, S. C. (1988). Mushroom Cultivation. Mittal Publication, New Delhi.
6. Tripathi, D.P. (2005) Mushroom Cultivation, Oxford & IBH Publishing Co. PVT.LTD, New Delhi.

INTERNAL EVALUATION SCHEME		
NO	Particulars	Marks
1	Mid Semester Exam (Mandatory)	13
2	Class Test	03
3	Open book exam/test	03
4	Open note exam/test	03
5	Self-test/ Online test	03
6	Essay/Article writing	03
7	Quizzes/Objective test	03
8	Class assignment	03
9	Home assignment	03
10	Reports Writing	03
11	Research/Dissertation	03
12	Case Studies	03
13	Viva/Oral exam	03
14	Group Discussion	03
15	Role Play	03
16	Paper presentation/Seminar	03
17	Language Lab work	03
18	Interview	03

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19	Craft work	03
20	Co-curricular work	03
21	Field Assignment	03
22	Poster Presentation	03
23	Attendance	03
24	Project Work	03
Total		25

Note: Sr.No.1 is mandatory. Select any Four from Sr.No.2 to 24. Each Contains three marks. Student should secure 09 Marks for passing in internal Exam

Paper Style

Ques. No.	Particulars	From which Unit	Marks
1 (A)	Describe in detail (Any One) (1) (2)	1	06
1 (B)	Write a Short Note (Any One) (1) (2)		04
2 (A)	Describe in detail (Any One) (1) (2)	2	06
2 (B)	Write a Short Note (Any One) (1) (2)		04
3	Do as Directed (Any Five from Seven) (1) (2) (3) (4) (5) (6) (7)	From 1 & 2	05
Total		25	

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Course Level	5.0		Internal Marks	-
Programme	B.Sc (Honours)		External Marks	-
Semester	III		Practical	25
Category of Course	Skill Enhancement Course-3		Theory	25
Course Credit	2		Practical Exam Duration	2 Hrs
Teaching Hours	15T +30P = 45		Total	50
Course Code			Theory Exam Duration	1 hrs
Course Title	Principles of Inorganic Qualitative and Gravimetric Analysis			

Course Objectives:

- Enable learner to develop a skill of carrying out qualitative analysis of inorganic material using various primary and solubility tests and also quantitatively analyse the metals in solution very precisely using gravimetric analytical method.
- The learners will be able to carry out various laboratory skills like preparation of diluted solutions, precipitation, digestion, decantation, filtration, washing, use of police band, scratching, removal of various ionic impurities, weighing, drying, burning the ashless filter paper using burner flames.
- This analysis will enable them learn various weighing machines and understand the importance accuracy in weighing up to 0.0001 gram.

Course Learning Outcomes: After completion of the course:

- The learners will be able to carry out qualitative analysis of elements forming inorganic salts and identify the radicals present in unknown pure salt mixture. They will be able to identify the types of radicals that are formed, their solubilities in water and chemical nature. Learners will be able to distinguish their properties in dried and solution states and determine their group using various solubility tests using the principles of IP and K_{sp}. The concepts of interfering radicals and its effects in qualitative analysis of salts will be clearer to them.
- The learner will be able to carry out quantitative analysis of metal present in a given solutions with or without a particular impurity using gravimetric analysis with an accuracy

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Sem	Unit No.	Syllabi	Teaching Hours
3	1	Principle of Inorganic Qualitative Analysis and Gravimetric Analysis Introduction, Preparation of Original Solution (OS), Concept of classification of cations (IP and Ksp) and role of Group reagents Explanation with chemical equations for the following A. Dry test for positive radicals (1) Charcoal test, (2) Cobalt nitrate test & (3) Flame test. B. Dry test for negative radicals (including use of various reagent papers)	7T
	2	Principle of Gravimetric analysis: Factors affecting gravimetric analysis, Co-Precipitation and Post precipitation, Completeness of precipitation, Effect of acid and Temperature on solubility, Purity of ppt, Super saturation, Coagulation. Operation in gravimetric analysis like Solution formation, Precipitation, Filtration, Washing, Drying, Incineration, Weighing.	8T

Credit Practical: Gravimetric analysis

Sem	Syllabi	Teaching Hours
3	Gravimetric Analysis: Minimum six Gravimetric analysis exercises with three containing impurities of Cu or Fe and three pure solutions may be given. 1. Estimation of nickel (II) in a mixture of solution containing NiSO ₄ , CuSO ₄ and free H ₂ SO ₄ as Ni(DMG) ₂ complex using Dimethylglyoxime (DMG). 2. Estimation of copper as CuSCN 3. Estimation of Fe ⁺² as Fe ₂ O ₃ in a solution containing a (mixture of CuSO ₄ and) FeSO ₄ NH ₄ SO ₄ by precipitating iron as Fe(OH) ₃ . 4. Estimation of Al (III) from the solution mixture containing CuSO ₄ AlSO ₄ and H ₂ SO ₄ as Al ₂ O ₃ or by precipitating with oxine and weighing as Al(oxine) ₃ (aluminium oxinate) 5. Estimation of Ba as BaSO ₄ in a mixture of solution containing BaCl ₂ , FeCl ₃ and HCl. 6. Estimation of Mn in a mixture of solution containing MnCl ₂ , CuCl ₂ and HCl as Mn ₂ P ₂ O ₇ . 7. Estimation of Zn in a mixture of solution containing ZnSO ₄ , CuSO ₄ and H ₂ SO ₄ as Zn ₂ P ₂ O ₇ .	30P

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Suggested Reading:

1. Principles of Inorganic chemistry – Puri, Sharma & Kalia
2. Concise Inorganic Chemistry - J. D. Lee
3. Advanced Inorganic Chemistry- Cotton and Wilkinson
4. Basic Inorganic Chemistry - Gurdeep & Chatwal
5. Vogel's quantitative chemical analysis
6. Engineering Chemistry by Jain and Jain
7. Industrial Chemistry by B.K. Sharma
8. Handbook of practical chemistry by shubhash and satish
9. Thin Layer Chromatography by Egal Stall
10. Chromatographic separation by Tata McGraw Hill
11. A Textbook of Quantitative Inorganic Analysis by A. I. Vogel
12. Inorganic qualitative analysis by Vogel and Gehani Parekh
13. Reigel's Handbook of Industrial Chemistry by James A. Kent
14. Fundamental of Analytical Chemistry by Skoog and West
15. Mikes, O. & Chalmes, R.A. Laboratory Hand Book of Chromatographic & Allied
16. Methods, Elles Harwood Ltd. London.
17. Ditts, R.V. Analytical Chemistry – Methods of separation.
18. Jack T. Ballinger; Gersshon J. Shugar. Chemical Technicians' Ready Reference Hand bok, 5th Edition, 2011, ISBN:9780071745925, The McGraw-Hill com, Incpanies
19. Vogel's inorganic qualitative analysis

INTERNAL EVALUATION SCHEME		
NO	Particulars	Marks
1	Mid Semester Exam (Mandatory)	13
2	Class Test	03
3	Open book exam/test	03
4	Open note exam/test	03
5	Self-test/ Online test	03
6	Essay/Article writing	03
7	Quizzes/Objective test	03
8	Class assignment	03
9	Home assignment	03
10	Reports Writing	03
11	Research/Dissertation	03
12	Case Studies	03
13	Viva/Oral exam	03
14	Group Discussion	03
15	Role Play	03

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16	Paper presentation/Seminar	03
17	Language Lab work	03
18	Interview	03
19	Craft work	03
20	Co-curricular work	03
21	Field Assignment	03
22	Poster Presentation	03
23	Attendance	03
24	Project Work	03
	Total	25

Note: Sr.No.1 is mandatory. Select any Four from Sr.No.2 to 24. Each Contains three marks. Student should secure 09 Marks for passing in internal Exam

Paper Style

Ques. No.	Particulars	From which Unit	Marks
1	Any two out of 3 questions (5 marks each)	1	10
2	Any two out of 3 questions (5 marks each)	2	10
3	Any one out of 2 questions (5 marks each)	One Question from Each Unit	05
	Total Marks		25

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Course Level	UG (5.0)	Internal Marks	-
Programme	B.Sc (Honours)	External Marks	25
Semester	III	Practical Internal	-
Category of Course	Skill Enhancement Course-3	Practical External	-
Course Credit	01	Prac. External Exam Duration	-
Teaching Hours	30	Total	25
Course Code		Exam Duration	1 Hrs.
Course Title	Microbiological Analysis of Air, Water & Soil to Pollution Control (Theory)		

Course Objectives: By completing the course, students have to:

- Course objective is to improve the skill and enhance the knowledge in the field of microbiology.
- To explore the role of microbes in the air, water and soil.

Course Learning Outcomes: After completion of the course:

- Have developed a very good understanding and skills of the analysis of air, water and soil.
- Have developed a very good understanding of how analysis of water, air and soil contribute to control of environmental pollution.

Course Content

Sem	Unit No.	Syllabus	Teaching Hours
3	1	Aero- microbiology • Aero- microbiology: Bioaerosols, Air borne microorganisms (bacteria, Viruses, fungi) and their impact on human health and environment, • Significance in food and pharma industries and operation theatres, allergens.	8
	2	Water- microbiology • Water borne pathogens, water borne diseases. • Sample Collection, Treatment and safety of drinking(potable)water, methods to detect potability of water samples: (a) standard qualitative procedure: presumptive/MPN tests, confirmed and completed tests for faecal coliforms (b) Membrane filter technique and (c) Presence/absence tests	8

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	3	Control Measures - Control Measures: Fate of bioaerosols, inactivation mechanisms – UV light, HEPA filters, desiccation, Incineration. - Precipitation, chemical disinfection, filtration, high temperature, UV light	7
	4	Soil Microbiology - Soil- microbiology: Soil borne pathogens, soil borne diseases, Sampling of soil, sample collection and analysis. - Isolation and identification of pathogens. Soil testing methods. Soil treatment.	7

Suggested Reading:

1. Medigan, M.T., Martinko, J. M. and Parker, J. Brock Biology of Microorganisms. Pearson Education Inc., New York
2. Alexander, M John. Microbial ecology. Wiley & Sons, Inc., New York.
3. Alexander, M John. Introduction to soil microbiology. Wiley & Sons Inc., New York.
4. Barker, KH, and Herson, D.S. Bioremediation. Mc Craw Hill Inc., New York.
5. Chapelle, F.H. Ground Water Microbiology and Geochemistry. New York: John Wiley & Sons, 2000.
6. K.R. Aneja. Laboratory Manual of Microbiology and Biotechnology New Age Publications. 2014

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Course Level	UG (3.0)	Internal Marks	25
Programme	B.Sc. Microbiology	External Marks	-
Semester	III	Practical Internal	-
Category of Course	SEC-3	Practical External	-
Course Credit	01	Prac. External Exam Duration	1 Hrs.
Teaching Hours	30	Total	25
Course Code	SECMBP301	Exam Duration	-
Course Title	Microbiological Analysis of Air, Water & Soil to Pollution Control (Practical)		

Course Objectives:

1. Course objective is to improve the skill and enhance the knowledge in the field of microbiology.
2. Main objective is to understand the role of microbes in the air, water and soil.

Course Learning Outcomes: After completion of the course:

1. Have developed a very good understanding and skills of the analysis of air, water and soil.
2. Have developed a very good understanding of how analysis of water, air and soil contribute to control of environmental pollution.

Suggested Practical

Sr. No	Practical content	Teaching Hrs
1.	Chemical analysis of water: Chloride, Hardness, Nitrite Nitrogen, Alkalinity, Acidity, TDS, TSS, TS	30
2.	Isolation and Determination of air flora and air density from indoor & outdoor sources.	
3.	Isolation and identification of coli forms from Water by Presumptive, Confirmed & Completed test.	
4.	Isolation and cultivation of bacteriophage of <i>E.coli</i> from the given sewage sample	
5.	Field Visit to Sewage treatment plant / Forest / Sanctuary / Soil Research Laboratory / Environmental laboratory/ GPCB Station and preparation of report	
6.	Study the prevention and control of organism using UV light.	
7.	Study the filtration techniques to study the control of organisms.	

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Suggested reading

1. Patel. R.J., Patel. K.R., Experimental Microbiology, Vol-I, Aditya Publications, Ahmedabad, India.
2. Patel. R.J., Patel. K.R., Experimental Microbiology, Vol-II, Aditya Publications, Ahmedabad, India.
3. Dubey. R.C., Maheshwari. D.K., Practical Microbiology, S.Chand & Company Ltd., New Delhi
4. Konika Sharma., manual of Microbiology – Tools & Techniques, Ane Books, Delhi.

INTERNAL EVALUATION SCHEME		
INTERNAL ASSESSMENT		
No.	Particulars	Weightage
1	Internal test (Theory or practical)	13
2	Assignment/practical assignment	5
3	Field visit report/ class presentation	5
4	Attendance	2
	Total	25

Paper Style:

Ques. No.	Particulars	From which Unit	Marks
Que.1	Question 1 (1) (2)	1 & 2	05 05
	Or		
	Question 1 (1) (2)		05 05
Que.2	Question 2 (1) (2)	3 & 4	05 05
	Or		
	Question 2 (1) (2)		05 05
Que.3	Question 1	From Any Unit	05
	Or		
	Question 2		
Total		25	

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Course Level	5.0	Internal Marks	25
Programme	B.Sc (Honours)	External Marks	25
Semester	III	Practical Internal	--
Category of Course	Skill Enhancement Course-3	Practical External	--
Course Credit	02	Prac. External Exam Duration	--
Teaching Hours	30	Total	50
Course Code		Exam Duration	2 hrs
Course Title	Medical Diagnostics		

Course Objectives:

- This course is designed to familiarize the students regarding various dimensions of Medical lab technology and career opportunities available in these fields.
- To develop practical understanding among the students associated with Medical lab through classroom discussion/ participation and projects.
- To develop transferrable skills among the students for managing Laboratory works efficiently so that they could be ready to join the Laboratory functions in any organization.

Course Learning Outcome: Upon completion of the course, students should be able to:

- Learn fundamental practical skills in Medical Diagnostics for further studies and /or employment.
- Learn about the clinical significance of different tests.
- Be competent in diagnosis and management of common health problems of the individual and the community, commensurate with his/her position as a member of the health team at the primary, secondary or tertiary levels, using his/her clinical skills based on history, physical examination and relevant investigations.

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COURSE CONTENT		
Units	Syllabi	Teaching Hours
Unit 1	• Introduction to Medical Diagnostics and its Importance • Diagnostic Methods Used for Analysis of Blood: Blood composition, pulse rate & blood pressure, ABO blood group & Rh factor, estimation of Hemoglobin by Sahli's Method, RBC and WBC count, bleeding time & clotting time, DLC (differential leucocyte count), Red cell indices- MCV, MCH, MCHC. • Physical and chemical diagnostic for Urine Analysis: Normal and abnormal urine constituents.	15
Unit 2	• Non-infectious Diseases: Causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit • Infectious Diseases: Causes, types, symptoms, diagnosis and prevention of Tuberculosis and Hepatitis • To study Medical Imaging Techniques – X-ray, PET Scan (Positron emission tomography), MRI (Magnetic Resonance Imaging), CT Scan, ECG, EEG, ECHO Tests.	15

REFERENCE BOOKS:

1. Preventive and Social Medicine Park, K.
2. Textbook of Medical Laboratory Technology.....Godkar P.B. and Godkar D.P.
3. A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses..
Cheesbrough M.
4. Textbook of Medical Physiology.....Guyton A.C. and Hall J.E.
5. Pathologic Basis of Disease.....Robbins and Cortan
6. Lab Manual on Blood Analysis and Medical Diagnostics... ..Prakash G.

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Paper Style:

Ques. No.	Particulars	From which Unit	Marks
Que.1	Question 1 (1) (2)	1	05 05
	Or		
	Question 1 (1) (2)		05 05
Que.2	Question 2 (1) (2)	2	05 05
	Or		
	Question 2 (1) (2)		05 05
Que.3	Question 1	1 & 2	05
	Or		
	Question 2		
Total		25	

Course Level	5.0	Internal Marks	
Programme	B.Sc (Honours)	External Marks	
Semester	III	Practical Internal	25
Category of Course	Skill Enhancement Course-3	Practical External	25
Course Credit	02	Prac. External Exam Duration	2 HOURS
Teaching Hours	30	Total	50
Course Code		Exam Duration	2 HOURS
Course Title	Instrumentation and Analysis with Multimeter and CRO		

Course Objectives:

- The course aims to provide students with a comprehensive understanding of Multimeter and cathode ray oscilloscopes (CRO), focusing on their fundamental principles, components, and functionalities. Students will gain proficiency in operating these instruments to measure and analyse electrical parameters and signals across various electronic devices.
- Through practical, hands-on sessions, the course will enhance students' skills in using these tools effectively for troubleshooting and experimentation. Additionally, it will cover the diverse applications of these instruments in electronics and electrical engineering, teaching students to critically evaluate their performance, including their sensitivity, merits, and demerits, to make informed decisions in their professional practices.

Course Learning Outcomes:

- Upon completion of the course, students should be able to:
- Describe the functions, components, and types of Multimeter and CRO.
- Use a Multimeter as a voltmeter, ammeter, and ohmmeter, as well as using a CRO to observe and measure electronic signals.
- Demonstrate the ability to apply their knowledge and skills in practical settings, effectively using these instruments in real-world applications.
- Analyze the sensitivity and accuracy of the instruments and understand their practical implications in measurements.

Course Contents:

Unit No.	Syllabi	Teaching Hours
1	Multimeter 1. Introduction 2. Multimeter 3. Multimeter as Voltmeter 4. Multimeter as Ammeter 5. Multimeter as Ohmmeter 6. Applications of Multimeter 7. Sensitivity of Multimeter 8. Merits and Demerits of Multimeter 9. Hands on experiment and use of Multimeter	15
2	Cathode Ray Oscilloscope 1. Introduction 2. Cathode Ray Oscilloscope 3. Cathode Ray Tube 4. Deflection Sensitivity of CRT 5. Various Controls of CRO 6. Applications of CRO 7. Hands on experiment and use of CRO	15

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Suggested Reading:

Text Books:

1. Principles of Electronics by V.K.Mehta & Rohit Mehta, Publishers: S.Chand.
2. B.Sc. Practical Physics by C.L.Arora, Publishers: S.Chand.

Reference Books:

1. Modern Engineering Physics by A.S.Vasudeva, Publishers: S.Chand
 2. Modern Physics by R. Murugesan & Kiruthinga Sivaprasath, Publishers: S.Chand
- Electricity and Magnetism by D.C. Tayal Publisher: Himalaya Publishing House

INTERNAL EVALUATION SCHEME		
NO	Particulars	Marks
1	Mid Semester Exam (Mandatory)	13
2	Class Test	03
3	Open book exam/test	03
4	Open note exam/test	03
5	Self-test/ Online test	03
6	Essay/Article writing	03
7	Quizzes/Objective test	03
8	Class assignment	03
9	Home assignment	03
10	Reports Writing	03
11	Research/Dissertation	03
12	Case Studies	03
13	Viva/Oral exam	03
14	Group Discussion	03
15	Role Play	03
16	Paper presentation/Seminar	03
17	Language Lab work	03
18	Interview	03
19	Craft work	03
20	Co-curricular work	03
21	Field Assignment	03
22	Poster Presentation	03
23	Attendance	03
24	Project Work	03
	Total	25

Note: Sr.No.1 is mandatory. Select any Four from Sr.No.2 to 24. Each Contains three marks. Student should secure 09 Marks for passing in internal Exam.

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Paper Style

Sr. No.	Particulars	Marks
1	Understanding of Practical	15
2	Reading	10
	Total Marks	25

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Course Level	5.0	Internal Marks	25
Programme	Science	External Marks	25
Semester	3	Practical Internal	-
Course Type	Skill Enhancement Course-3	Practical External	-
Course Credit	02	Prac.Ext.Exam Time	-
Teaching Hours	30	Total	50
Course Code		Exam Duration	1 Hour
Course Title	Conversational Skills-1		

Course Objectives:

- To introduce conversational skills in students.
- To develop basic proficiency in English conversational skills.
- To make students able to understand usage of English language in conversations.
- To enable students for writing in formal situations.

Course Learning Outcomes: After completion of the course:

- Students will be able to understand usage of conversational skills.
- Students will be able to make conversations in English.
- Students will be able to understand usage of English language in conversations.
- Students will be able to write in formal situation.

Course Contents

Sem	Unit No.	Syllabi	Teaching Hours
3	1	• Speaking Situations (Greetings & Courtesy, day time, bed time, after getting up) • Relationships • Classroom conversation & statements (personal introduction, festivals, seasons) • Dialogue writing	15

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	2	• Conversational Skills Situations: learning about occupations and activities & sentence formation • Describing Personality and Appearance (clothing, like-dislikes) • Telephonic conversation and time expression, Leave taking (Favorite things, Weather, concern for person) • Paragraph development • Picture description	15
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Suggested Reading:

1. How to talk to Anyone by Leil Londes
2. Business Communication by Urmila Rai and S.M. Rai. Himalaya Publishing House
3. Practical English Usage by Michael Swan
4. English Grammar & Composition by Wren & Martin

INTERNAL EVALUATION SCHEME		
NO	Particulars	Marks
1	Mid Semester Exam (Mandatory)	13
2	Class Test	03
3	Open book exam/test	03
4	Open note exam/test	03
5	Self-test/ Online test	03
6	Essay/Article writing	03
7	Quizzes/Objective test	03
8	Class assignment	03
9	Home assignment	03
10	Reports Writing	03
11	Research/Dissertation	03
12	Case Studies	03
13	Viva/Oral exam	03
14	Group Discussion	03
15	Role Play	03
16	Paper presentation/Seminar	03

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17	Language Lab work	03
18	Interview	03
19	Craft work	03
20	Co-curricular work	03
21	Field Assignment	03
22	Poster Presentation	03
23	Attendance	03
24	Project Work	03
	Total	25

Note: Sr.No.1 is mandatory. Select any Four from Sr.No.2 to 24. Each Contains three marks. Student should secure 09 Marks for passing in internal Exam.

Paper Style

Ques. No.	Particulars	From which Unit	Marks
1	- Give appropriate response in following conversation. (5 Marks) - Write a dialogue on the following situations. (5 Marks) (1/2)	1	10
2	Develop paragraphs on the following (Guided) (2/3).	2	10
3	Describe the given picture in 10 sentences.	2	05
	Total Marks		25

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Course Level	U.G. (5.0)		Internal Marks	
Programme	Science		External Marks	50
Semester	III		Practical Internal	-
Category of Course	Skill Enhancement Course-03		Practical External	-
Course Credit	02		Prac. External Exam Duration	-
Teaching Hours	4 Hrs./ Week		Total	50
Course Code	SECFS301		Exam Duration	2 hrs.
Course Title	Separation Techniques - Electrophoresis			

Sr No.	Syllabus	Teaching Hours/ Week
1	Introduction, General Principles	4
2	Factors affecting electrophoresis	
3	Low voltage thin sheet electrophoresis & High voltage electrophoresis	
4	Sodium dodecyl sulfate (SDS) polyacrylamide gel electrophoresis (PAGE), Isoelectric focusing (IEF), Iso-electrophoresis.	
5	Preparative electrophoresis, Horizontal and Vertical Electrophoresis	

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SECFS301: Separation Techniques – Electrophoresis

Time: 3 Hours

Total Marks: 50

Total Scheme of evaluation

Internal Exam

Total Marks: 25

Semester	Total distribution of mark			
	Internal			
	Exam	Home Assignment	Class Assignment	Attendance
III	10	05	05	05

External Exam

Time: 2.5 Hours

Total Marks: 25

Instructions:

1. This question paper contains **Three** questions. **All** questions are compulsory.
2. Write answers to **all** the questions in main answer sheet.
3. Draw neat and labelled diagram wherever necessary.
4. Figures to the right side indicate full marks for the question.

Sr. No.	Questions	Marks
1	Answer any one in detail. (Any One)	10
2	Answer any one in detail. (Any One)	10
3	Answer any one in detail. (Any One)	05