

SANKALCHAND PATEL UNIVERSITY VISNAGAR

Faculty of Science & Humanities



Structure, Teaching Scheme and Syllabus of Bachelor of Science (Mathematics)

Program Code: SC104

With effect from: 2023-24

Semester-II

Branch Name:	B.Sc. Mathematics
Program Code:	SC104
Course Name:	Sequence, Series & Complex Number
Course Code:	12-MAM203-1C
Pre-requisite Course:	Basics Mathematics up to 12 th Science.

Course Objectives:

- To understand the applications of De'Moivre's theorem and Complex number.
- To understand the concept of Sequence and series.
- To be able to understand the partial differential equations.
- To understand Idea of linear homogeneous functions, Euler's theorem

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	50	25	-	25	100

Course Contents :

Unit	Topic	Total Hours	Weightage
1	(a) De'Moivre's theorem and its applications, (b) Roots of a complex number (c) Application of Expansion of $\sin n\theta, \cos n\theta, n \in \mathbb{N}$ in terms of sine and cosine of Multiples of θ . (d) Expansion of $\sin n\theta, \cos n\theta$ and $\tan n\theta$ in terms of sine, cosine and tangent. Respectively.	17	38%
2	(a) Exponential, Circular and hyperbolic function, Logarithmic and inverse functions. (b) Sequence and series: Definition of sequence, series. Definition of convergence Of sequence and series, partial sum. Application of comparison test, ratio test, Root test.	17	38%
3	Partial Differentiation: Definition of partial derivative involving two variables only up to first and second order. Idea of linear homogeneous functions, Euler's theorem (statement only) and its application, Use of partial derivatives in problems relating to utility functions and cost minimization under constraints.	11	24%

Text Books:

1. Differential Calculus, by Shantinakaran.
2. Business Statistics, by Sudhir Prakashan, Ahmedabad.

Reference Books:

1. Complex Variables and Application, by Ruel V. Churchill & James Ward Brown, McGraw-Hill Publishing Company, New Delhi.
2. Complex Analysis, by J.V.DESHPANDE, Tata McGRAW-Hill Publishing Co. Ltd. New Delhi.

List of Open Source Software/learning website:

1. <https://youtu.be/6X8Mae-5EAM>
2. <https://www.youtube.com/watch?v=T7rcF1mrIw&list=PLT3bOBUU3L9iRoyhs8V1Io-xEsjfq4zI0>
3. https://www.youtube.com/watch?v=JrEXsjr_IaK

Practical

1. Application of De'Moivre's theorem.
2. Application of Expansion of $\sin n\theta, \cos n\theta, n \in \mathbb{N}$ in terms of sine and cosine of Multiples of θ .
3. Application of Expansion of $\sin n\theta, \cos n\theta$ and $\tan n\theta$ in terms of sine, cosine and tangent Respectively.
4. Application of Sequence and series.
6. Application of Partial differential equation.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Use De'Moivre's theorem and solve its applications.	3 Applying
CLO2	Discuss Expansion of $\sin n\theta$, $\cos n\theta$ and $\tan n\theta$ in terms of sine, cosine and tangent Respectively.	2 Understanding
CLO3	Create various sequence and series and Find either it is converge or diverge.	6 Creating, 1 Remembering
CLO4	Solve partial differential equation by using Euler's Theorem.	3 Applying
CLO5	Define of partial derivative involving two variables	1 Remembering
CLO6	Problems relating to utility functions and cost minimization under constraints Using Partial differential equations.	3 Applying

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2	PSO3	PSO4
CLO1		2		1	1		1		2								1	1		
CLO2	1	1		1					1								2	1		
CLO3		2	3	1	1				1	1							2	1		1
CLO4	2	1		1	1												1			
CLO5		1		1	1				1								1	1		
CLO6		1		1	1				1								1			1

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Mathematics
Program Code:	SC104
Course Name:	Integration & Successive Differentiation
Course Code:	12-MAM204-1C
Pre-requisite Course:	Basics Mathematics up to 12 th Science.

Course Objectives:

- To understand the concept of Integration.
- To be able to understand successive differentiation.
- To understand Idea of logic and set theory.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	50	25	-	25	100

Course Contents:

Unit	Topic	Total Hours	Weightage
1	Integration: Reduction formula: $\int_0^{\frac{\pi}{2}} \sin^n \theta d\theta$, $\int_0^{\frac{\pi}{2}} \cos^n \theta d\theta$, $\int_0^{\frac{\pi}{2}} \sin^m \theta \cos^n \theta d\theta$, $m, n \in N$. Application of definite integrals to (a) Summation of the series (b) Rectification (c) Surface and volume revolution.	15	34%
2	Successive Differentiation: Successive Derivatives, Some standard results for n^{th} derivatives, Leibnitz's theorem and its examples. Cauchy's Mean Value Theorem. Taylor's Theorem (without proof), Maclaurians series (without proof) and its examples. Expansion of power series of $\sin x$, $\cos x$, e^x .	15	33%
3	Logic: Logical Statements, Truth table, Negation, Compound statements, Tautologies and Contradiction, Negation of Compound statements, Propositions, Conditional and Biconditional statements. Set Theory: Definition and methods of sets, types of sets, Venn diagrams, Operations on sets, De-Morgan's law, Finite and infinite sets.	15	33%

Text Books:

1. Mathematics, by Nirav Prakashan, Ahmedabad.

Reference Books:

1. Business Mathematics. BY. D.C.Sancheti & V.K.Kapoor, Sultan Chad & Sons Publication, New Delhi.
2. Business Mathematics. by. B.S.Shah Prakashsan, Ahmedabad.

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=f7X2ydH1ieA>
2. <https://www.youtube.com/watch?v=LEspaisjDFE>
3. <https://www.youtube.com/watch?v=ibLVMxPeALw>

Practical

1. Application of Integration.
2. Application of Leibnitz's theorem.
3. Application of Taylor's Theorem.
4. Application of Maclaurians series.
4. Example depend on Expansion of power series of $\sin x$, $\cos x$, e^x .
6. Example depends on logic and set theory.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Use Leibnitz's theorem and solve its applications.	3 Applying
CLO2	Discuss Reduction formula.	2 Understanding
CLO3	Create various examples and Find its n^{th} derivatives.	6 Creating, 1 Remembering
CLO4	Use Venn diagram in set theory.	3 Applying
CLO5	Find expansion of power series of $\sin x, \cos x, e^x$.	1 Remembering
CLO6	Explain De-Morgan's law in set theory.	4 Analysing

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2	PSO3	PSO4
CLO1	1	1		1	1		1		1	1							1			
CLO2		1		2	1				2								1			2
CLO3		1	2	1	1		1		1	2							1			1
CLO4		1		1	1				1								1	1		
CLO5	1		1	1	1		2		1	1							1			2
CLO6		2		1			1		2								1	1		

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Mathematics
Program Code:	SC104
Course Name:	Thermodynamics & Quantum Physics
Course Code:	12-PHE202-1C
Pre-requisite Course:	Basics Physics up to 12 th Science.

Course Objectives:

- To understand the basic concept of Thermal Physics.
- To know the basic concept of Entropy and kinetic theory of gases.
- To understand the use of Schrödinger equations in various fields.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	50	25	-	25	100

Course Contents:

Unit	Content	Lectures	Weightage
1	Heat and Thermodynamics: Characteristic functions, Enthalpy, The Helmholtz and Gibbs function, Two Mathematical Theorems, Maxwell's equations, The T-ds equations, Energy equation, The Thermal Expansivity, Compressibility, Joule-Kelvin effect (Porous plug Experiment), Liquefaction of Gases by Joule-Kelvin effect. Kinetic Theory of Gases: Maxwell's Distribution Law of Velocities, Deduction of Maxwell-Boltzmann law, Determination of the values of constants 'a' and 'b',	15	34%
2	Co-ordinate Transformation: Curvilinear Coordinates, Scale factors and basis vectors for orthogonal systems Schrodinger Equations: A free particle in one dimension, Generalization to three dimensions, The operator correspondence and the Schrodinger equation for a particle subject to forces, Normalization and Probability Interpretation, Non-Normalizable Wave functions and Box Normalization.	15	33%
3	Heat and Thermodynamics: Second law of thermodynamics, Carnot's Theorem, Thermodynamic Scale of Temperature, Identity of perfect Gas Scale and Absolute Scale, Thermodynamics of Refrigeration. Entropy: Entropy, Change in entropy in a reversible process, Change of entropy in an Irreversible process, Principle of increase of entropy or degradation of energy, Formulation of the second law in terms of entropy, Entropy and second law. Experimental Test of Maxwell's Law.	15	33%

Basic Reference book:

1. Heat Thermodynamics and Statistical Physics by Brijlal, Dr. Subrahmanyam, P.S.Hemne -S.Chand &Co.
2. University Physics by Sears, Zeemansky and Young. (6th Edition) Narosa Publication, New Delhi.
3. Quantum mechanics by Powell and Creaseman
4. Mathematical Physics by B.D.Gupta

B. Physics Practical:

1. Bar pendulum: Determination of 'K' and 'g'
2. Newton's rings: Determination of R and wave length using sodium light.
3. Melde's Experiment.
4. Determination of self inductance 'L' of inductor.
5. Study of Transformer.
6. P-N Junction diode as Full wave rectifier.

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=TnDCxw0y6YM>
2. <https://www.youtube.com/watch?v=3QMfZZs-Vm0>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe the kinetic theory of gases.	1 Remembering
CLO2	Discuss the Entropy	2 Understanding
CLO3	Illustrate the numerical part related to heat and thermodynamics.	3 Applying
CLO4	Explain kinetic theory of Gases.	4 Analyzing
CLO5	Justify Schrödinger equation for free particle in one dimension.	5 Evaluating
CLO6	Design the refrigerator on the base of thermodynamics.	6 creating

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2	PSO3	PSO4
CLO1	2																			
CLO2		1			3															
CLO3			3														1	1		
CLO4		2																		
CLO5					2															
CLO6	3																			

3:high 2: medium 1: Low

Branch Name:	B.Sc. Mathematics
Program Code:	SC104
Course Name:	Basics of Statistic
Course Code:	12-MAE202-1C
Pre-requisite Course:	

Course Objectives:

- To understand the basic concept of relative and axiomatic approach and its properties.
- To understand the concept of Random Variable and Generating Functions.
- To know about Chebyshev's Inequality (one sided and two sided).
- To understand the concept of Joint Distributions, Joint probability mass function and Joint probability density function.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	--	2	4	50	25	--	25	100

Course Contents:

Unit	Topic	Total Hours	Weightage
1	Probability Random Experiment, trial, sample point, sample space, definition of equally likely, mutually exclusive and exhaustive events. Definition of probability: classical, relative and axiomatic approach and its properties. Conditional probability, multiplicative law of probability, independence of events, law of total probability, Bayes theorem and its applications	15	33%
2	Random Variable and Generating Functions Random Variable (rv) with its types, probability mass function (pmf), probability density function (pdf), cumulative distribution function (cdf) with illustrations. Expectation of Random variables with properties, moments, factorial moments, measures of location, skewness, kurtosis, probability generating function (pgf), moment generating function (mgf), cumulant generating function (cgf), factorial moment generating function (fmgf) with their properties and uses.	15	33%
3	Probability Inequalities Boole's inequality, Bonferroni's inequality, Markov's inequality, Chebyshev's Inequality (one sided and two sided), concept of convex and concave functions, Jensen's inequality, Cauchy- Schwarz inequality. Joint Distribution Concept of Joint Distributions, Joint probability mass function and Joint probability density function. Marginal and conditional distributions, independence of random variables, Conditional expectation and conditional variance. Product moments.	15	34%

Reference Books:

1. Introduction to the Practice of Statistics, Moore, S. David; McCabe, P. George W. H. Freeman and Company, New York.
2. Basic Statistics, Agarwal, B. L., New Age International (P) Ltd.
3. Introduction to the theory of Statistics, Mood, A. M., Greybill, F.A., Boes,

D.C., Mc Graw Hill.

4. Fundamentals of Mathematical Statistics, S. C. Gupta and V. K. Kapoor, Sultan Chand and Sons, New Delhi.
5. Mathematical Statistics, P. Mukhopadhyay, New Central Book Agency (P) Ltd, Calcutta
6. An Introduction to Probability and Statistics, V. K. Rohatgi and A.K.Md. Ehsanes Saleh, Wiley Series.

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=Cqsmb5eVzQk>
2. <https://www.youtube.com/watch?v=82Ad1orN-NA>
3. <https://www.youtube.com/watch?v=L0zWnBrjhng>

Practical

1. Practical based on probability from the given data and bivariate table.
2. Practical based on Bayes theorem
3. Practical based on skewness and kurtosis.
4. Practical based on marginal and conditional distributions.
5. Practical based on moments of joint, marginal and conditional distributions.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe Random Experiment, trial, sample point and sample space.	1 Remembering
CLO2	Discuss the knowledge on probability mass function (pmf).	2 Understanding
CLO3	Use Expectation of Random variables with properties.	3 Applying
CLO4	Explain concept of convex and concave functions.	4 Analysing
CLO5	Know marginal and conditional distributions to Justify the application of its.	5 Evaluating
CLO6	Create example of Bayes theorem.	6 creating

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2	PSO3	PSO4
CLO1			1	2					1											
CLO2				2					2											
CLO3									2											
CLO4					1				2											
CLO5					2		2										1			1
CLO6			3		2				2								2			1

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Mathematics
Program Code:	SC104
Course Title:	Reaction of Organic Chemistry-II
Course Code:	12-MDC230-1C
Pre-requisite Course:	Basic Chemistry up to 12 science

Course Objectives:

- The capacity to job effectively and safely in a laboratory environment.
- Opportunities for student and faculty to interact with alumni and with professional chemists.
- To develop the fundamental analytical and industrial skills to work effectively in the different fields of chemistry.
- To develop idea for the new way of organic chemistry.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	--	2	4	50	25	--	25	100

Course Contents:

Unit	Topic	Total Hours	Weightage
1	AROMATIC HYDROCARBONS Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: Effect of substituent groups, Determination of orientation, Classification of substituent groups, Orientation in disubstituted benzenes, halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directing effects of the groups.	17	33%
2	REACTION MECHANISM Fission of Co-Valent bond (With atleast one example of each intermediates), Types of reagents, Types of organic reaction with mechanism. Substitution reactions (Nucleophilic & Electrophilic), Addition reactions (Nucleophilic & Electrophilic), Elimination reactions (E1 & E2)	17	33%
3	HALONITROARENES Reactivity, Structure and nomenclature of amines, physical properties, Separation of a mixture of primary, secondary, tertiary amines, Structure feature effecting basicity of amines, Preparation of alkyl and arylamines (reduction of nitro compound, nitriles), reductive amination of aldehydic and ketonic compounds, Gabriel-phthalimide reaction, Hofmann bromamide reaction.	11	34%

Reference Books:

- Organic reaction and mechanism, P.S.Kalsi, New Age international Publishers.
- Text book of organic Chemistry, P.S.Kalsi, New Age international Publishers.
- Organic Chemistry Vol. I & II, S.M.Mukherji, S.P.Singh, R.P.Kapoor.
- Reaction mechanism in Organic Chemistry, S.M.Mukhergi, S.P.Singh. 3rdedn, Macmillan.
- Reaction Mechanism and Reagents in Organic Chemistry, Gurdeep R. Chatwal 4thedn, Himalaya Publication House.
- Organic Chemistry, T.W.Graham Solomons, 4thedn, John Wiley, 1998.

List of Experiments:

1.	Organic Chemistry 1) Identification of an organic compound through the functional group analysis, Determination of melting point and boiling point, Preparation of suitable derivative. 2) Candidate should perform the analysis of at least 05 compounds.
2.	Volumetric Titrations 1) To determine the Normality, gram/liter and molarities of $H_2C_2O_4$, $2H_2O$ and H_2SO_4 present in the solution mixture of $H_2C_2O_4$, $2H_2O$ & H_2SO_4 by using X N NaOH and Y N $KMnO_4$ solutions. 2) To determine the Normality, gram/liter and molarity of $H_2C_2O_4$, $2H_2O$ and $K_2C_2O_4$ present in the solution mixture of $H_2C_2O_4$, $2H_2O$ & $K_2C_2O_4$ by using X N NaOH and Y N $KMnO_4$ solutions.

Reference Books:

1. Vogel's textbook of quantitative chemical analysis, 6th Edition, J Mendham, R C Denney, J D Barnes, M J K Thomas.
2. Practical Chemistry, O P Pandey, D N Bajpai, S Giri.
3. An Advanced course in Practical Chemistry, Ghoshal, Mahapatra, Nad.

List of Open-Source Software/learning website:

1. <https://www.organic-chemistry.org>
2. <https://swayam.gov.in>
3. <https://nptel.ac.in>
4. <http://onlinelibrary.wiley.com>
5. https://en.wikipedia.org/wiki/Main_Page

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Learn and understand about reactivity, structure, nomenclature and properties of halonitroarenes.	1-Remembering 2-Understanding
CLO2	Learn and understand about reaction mechanism, intermediates and nucleophilic substitution reaction.	1-Remembering 2-Understanding
CLO3	Learn and understand about aromaticity in organic molecules.	1-Remembering 2-Understanding
CLO4	Learn, understand and perform the organic spotting of unknown organic compound and volumetric titrations.	2-Understanding 3-Applying

Mapping of CLOs with POs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2	PSO3	PSO4
CLO1	2																			
CLO2		1			3							2								
CLO3								2												
CLO4			2								1									

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Mathematics
Program Code:	SC104
Course Name:	Cyber Security-II
Course Code:	12-MDC227-1C
Pre-requisite Course:	Basics of computer

Course Objectives:

1. Graduates will have solid basics in Mathematics, Programming, Computer Network, Network, Security, Cyber Security fundamentals and advancements to solve technical problems.
2. To be able to understand the basic concepts related to E-Commerce and digital payments. They will become familiar with various digital payment modes and related cyber security aspects, RBI guidelines and preventive measures against digital payment frauds.
3. To be able to understand the basic security aspects related to Computer and Mobiles. They will be able to use basic tools and technologies to protect their devices.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	--	2	4	50	25	--	25	100

Course Contents:

Unit	Topic	Total Hours	Weightage
1	E-Commerce and Digital Payments Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payment Settlement Act, 2007.	22	50%
2	Digital Devices Security , Tools and Technologies for Cyber Security End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Anti-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.	23	50%

Reference Books:

1. "Cyber Security (with CD): Understanding Cyber Crimes, Computer Forensics and Legal Perspectives" by Nina Godbole, Sunit Belapure.
2. "Cyber Laws & Information Technology" by Dr. Jyoti Rattan
3. Cyber Crimes & laws by Taxman and Technology decoded by N.S. Nappani.
4. Avi Silberschatz, Greg Gagne, and Peter Baer Galvin Operating System Concepts John Wiley & Sons, Inc.
5. Computer Forensics: Computer Crime Scene Investigation by John R. Vacca.
6. Robert M Slade, "Software Forensics: Collecting Evidence from the Scene of a Digital Crime", Tata McGraw Hill, Paperback, 1st Edition, 2004.

List of Open-Source Software/learning website:

1. <https://swayam.gov.in>
2. <https://nptel.ac.in>
3. https://en.wikipedia.org/wiki/Main_Page

List of Experiment

Sr. No	Experiments
1	Configuring security settings in Mobile Wallets and UPIs.
2	Checklist for secure net banking.
3	Setting, configuring and managing three password policy in the computer (BIOS, Administrator and Standard User).
4	Setting and configuring two factor authentication in the Mobile phone.
5	Security patches management and updates in Computer and Mobiles.
5	Managing Application permissions in Mobile phone.
6	Installation and configuration of computer Anti-virus.
7	Installation and configuration of Computer Host Firewall.
8.	Wi-Fi security management in computer and mobile.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand the broad set of technical, social & political aspects of Cyber Security.	2 Understanding
CLO2	Appreciate the vulnerabilities and threats posed by criminals, terrorist and nation states tonational infrastructure.	2 Understanding
CLO3	Understand the importance of ethical hacking tool.	2 Understanding
CLO4	Implementing ethical hacking tools in an organization.	3Applying
CLO5	Apply security principles to system design.	3 Applying
CLO6	Apply methods for authentication, access control, intrusion detection and prevention andconduct research in Cyber Security	3 Analysing and 3 Applying

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2	PSO3	PSO4
CLO1	1	1	1		2				1	2						2	1			
CLO2		2				2			2		1	1			1					
CLO3			1						1	2						2		1		
CLO4		1	2			1	2		2				1		2					
CLO5	1	1			2	1		2							1			1		
CLO6	1				1	1	2	2							1					1

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Mathematics
Program Code:	SC104
Course Name:	Digital Marketing
Course Code:	12-MDC226-1C
Pre-requisite Course:	

Course Objectives:

- To understand the basic concept of Digital Marketing.
- To understand the concept of Web Design.
- To know about Domain Registration and Hosting

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	--	2	4	50	25	--	25	100

Course Contents:

Unit	Topic	Total Hours	Weightage
1	Introduction to Digital Marketing. • What is marketing? • What is digital marketing? • Why are people going online? • Key concepts of digital marketing • Benefits of digital marketing • How digital marketing evolved • Who's using digital marketing? • How traditional and digital media differ? • Understand the future of digital marketing • What is search engine? • Types of search engine • How search engine works? • Why is google the world's best search engine? • Tools required in digital marketing • What is advertising? • What is online advertising? • What is Ad Words? • Career scope in Digital Marketing	11	25%
2	Website Design Guidelines. • What is Website? • What is www? • What are the different types of website? • Web page vs website • Difference between blog vs website • Components of website • Purpose of creating websites • How to build a web page? • Web design vs web development • What makes a website user-friendly? • Dynamic vs Static website • What are responsive websites?	11	25%

	Domain Registration and Hosting - What is domain & sub domain name? - Parts of domain name - How to choose a domain name? - What is Protocol? - What is IP address - What is web hosting? - How to buy domain and hosting? - Costs of a domain name Word Press Website Creation - What is Word Press? - Understanding Word Press and it's functioning? - Features of Word Press - Sites built with Word Press		
3	Search Engine Optimization - Introduction and Understanding of SEO? - How Search Engine works? - Basics of SEO - On-Page SEO vs Off-Page SEO - What is the main purpose of using keyword in SEO? - Some important SEO tools - What is google my business? Keyword Research and Planning - What is Keywords? - Types of Keywords - Why is keyword research important? - Understanding your target market - What is Keyword Density, and does it matter? - Know what your people want - How to use google keyword planner? - How to do the business analysis?	11	25%
4	Google Analytics - Introduction of Google Analytics - Data Analysing with Google Analytics - Checking User Behavior - Tracking Traffic from Different Source - Using Analytics Date for Retargeting Google AdSense - Money Making with AdSense - Easy Steps for AdSense - How to Approve AdSense Account - Placing Ads to Website	12	25%

Reference /Readings Books:

- Digital Marketing; by Vandana Ahuja; Oxford University Press
- Internet Marketing and e-Commerce; by Ward Hanson; Cengage
- Digital Marketing Analytics: Making Sense of Consumer Data in a Digital World; by Chuck Hemann Ken Burbary; Que Publishing
- The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns; by Ian Dodson; Wiley publication

List of Open Source Software/learning website:

- <https://www.youtube.com/watch?v=evRg1B9ya94>
- https://www.youtube.com/watch?v=ghZZB_7HFS8
- https://www.youtube.com/watch?v=spf_AhwMT_k
- <https://www.youtube.com/watch?v=TP-fvp1REls>

List of Experiments:

Note: The experiment list provided beneath is for reference only. The course teacher may change/formulate it as per his/her methodology and requirement.

1. Domain registration and hosting.
2. Design and development of word press website.
3. SEO tools.
4. Keyword planner tools.
5. Google analytics tools.
6. Google AdSense.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe digital marketing.	1 Remembering
CLO2	Discuss the knowledge on the different types of websites.	2 Understanding
CLO3	Use Data Analysing with Google Analytics.	3 Applying
CLO4	Explain Tracking Traffic from Different Source.	4 Analysing
CLO5	To know Google AdSense to Justify the application of its.	5 Evaluating
CLO6	Create website for digital marketing.	6 creating

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2	PSO3	PSO4
CLO1		2		1	3				2	1			3							
CLO2		2	2	2	1		1	2	2	1			2							
CLO3		2			3					2										
CLO4		1		2	1					2						2				
CLO5	2	2			1	2			3	1										
CLO6		2	2	2	1		1	2	2	1			2							

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Mathematics
Program Code:	SC104
Course Name:	Basic English - II
Course Code:	12-AEC202-1C
Pre-requisite Course:	Basics English Grammar and Composition up to 12 th Science.

Course Objectives:

- To inculcate human values among the students through poems and prose.
- To create an interest in literature and to develop language skills.
- The students will become familiar with formal vocabulary that is common in academic texts.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	--	--	2	25	25	--	--	50

Course Contents:

Unit	Topic	Total Hours	Weightage
1	VOCABULARY & GRAMMAR LINK Regular Verbs' meanings with past and past participle forms, One Word Substitutes, Modal Auxiliaries, Imperatives, Antonyms, Synonyms.	9	30%
2	SPEAKING Public Speaking: (Teacher has to give Tips to the students about How to deliver speech in front of public) Speeches: Reservation System in India, Elections, Importance of Reading, Science & Technology, Indian culture & Western culture (or more than these topics)	6	20%
3	READING & WRITING Translate the Accident/Incident Paragraphs given by your teacher from the English News Papers (Teacher has to give small paragraphs at least 5 to 6 paragraphs or more than that for the entire semester based on especially from the pages no. 3 & 4 of The Times of India)	6	20%
4	TEXT Fantasy a collection of short stories edited by V Sasikumar (Orient Black Swan) Lesson 6 to 10	9	30%

Text Books:

1. Fantasy a collection of short stories edited by V Sasikumar (Orient Black Swan)
2. Easy to learn English grammar by Dr. Jayesh Patel

Reference Books:

1. Very Useful Verbs book (Enka Publication)
2. Contemporary English Grammar Structure & Composition
3. Murphy R. Intermediate English Grammar (New Delhi: Cambridge University)
4. The Art of Public Speaking by Vijay Kumar.
5. The Times of India/The Indian Express
6. Business Correspondence and Report Writing by R.C Sharma & Krishna Mohan.

List of Open Source Software/learning website:

1. englishpage.com
2. epaper.timesofindia.com
3. epaper.indianexpress.com
4. <https://www.youtube.com/watch?v=QdAgyD4xhY>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Use context clues to find the meaning of a word and/or phrase in a reading text	1 Remembering
CLO2	Express their ideas in group discussions .	2 Understanding
CLO3	Use appropriate note-taking styles for reading and listening texts.	3 Applying
CLO4	Identify the types of words in the sentence.	4 Analyzing
CLO5	Explain sentences using collocation words.	2 Understanding
CLO6	Use cohesion mechanisms to distinguish different ideas.	3 Applying

Mapping of CLOs with Pos & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2	PSO3	PSO4
CLO1	3					2					2					3				
CLO2		2			2		1			2		1			2					
CLO3			3					1					3			2				
CLO4		2					3					2								
CLO5					2					2					3					
CLO6	1					1					1					2				

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Mathematics
Program Code:	SC104
Course Name:	National Service Scheme
Course Code:	12-VAC101-1C
Pre-requisite Course:	

Course Objectives:

- To understand the basic concept of NSS Regular Activities.
- To understand the Important of Soft Skills .
- To be able to understand the Leadership Skill, Communication Skill And Report Writing Skills.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
--	--	4	2	--	--	25	25	50

Course Contents:

Unit	Topic	Total Hours	Weightage
1	NSS Regular Activities and Special Camping Programme - NSS Regular Activities – A Detailed Study - Adoption of villages, Contracting Village / Area Leader, Identification of Problems - Adoption of Slums, NSS Volunteers for Slums Work - Some Suggestions For Selecting of Slums - Objective and Contribution of the Special Camping Programs - Suggestive List of Activities During Special Camping - Environment Enrichment and Conservation - Health, Family and Nutrition Program, Social Service program	30	50%
2	NSS Programmes and Soft Skills - Soft Skills – Basic Concepts - Importance of Soft Skills - Leadership Skills, Communication Skills and Writing Skills as Part of Soft Skills Development - Report Writing On the Basis of Your Institutional Activities - Basic Concepts and Components - Various NSS Programmes and Activities - National Calamities and National Emergencies, Urban Projects and Rural Projects - Institutional Work Campus Work , Orientation of NSS Volunteers	30	50%

Reference Books:

- 1) National Service Scheme manual – 1998 and 2006
- 2) Principles and Practices of Management by L.M. Prasad

List of Open Source Software/learning website:

1. <https://nss.nic.in>

Branch Name:	B.Sc. Mathematics
Program Code:	SC104
Course Name:	Instrumentation Measurement and analysis
Course Code:	12-SEC206-1C
Pre-requisite Course:	Basics Physics up to 12 th Science.

Course Objectives:

- To know application of various measurement instruments.
- To understand the working of practical appliances.
- To be able to know use various appliances in physics practical.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	--	--	2	25	25	--	--	50

Course Contents:

Unit	Topic	Total Hours	Weightage
1	Vernier Calipers : Introduction, Theory, Figure, Description of the instrument, Detail study of Least count, Errors, Positive Error, Negative Error, Determination of Magnitude of Positive and Negative Errors. Micrometer Screw : Introduction, Theory, Figure, Description of the instrument, Definition of pitch and its Determination, study of least count, Meaning of the Error and explanation of positive and negative Errors, Determination of positive and Negative Errors, Method of taking observation with the help of micrometer screw. Spherometer : Introduction, Theory, Figure, Description of the instrument, to determine the pitch of the screw, To Determine the Least count of the Spherometer, Zero Error, Derivation of Formula for the Radius of Curvature Of Curved Surface.	15	50%
2	Wheastone Bridge : Introduction, Theory with Figure, The Figure of Meter Bridge used in Laboratory, Construction of Meter Bridge. Construction of Galvanometer : Introduction, Theory, Sensitivity and Figure of merit of Galvanometer. Ammeter, Voltmeter, and Ohmmeter: Understanding the structure of the ammeter, voltmeter, and ohmmeter. Learning how to use those meters and using them to measure the current, voltage, and resistance of an electric circuit.	15	50%

Text Books:

1. Experimental book for Physics.

Reference Books:

1. Experimental book for Physics.

List of Open Source Software/learning website:

1. http://www.allaboutcircuits.com/vol_1/chpt_8/1.html

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe the instruments used in physics practicals.	1 Remembering
CLO2	Discuss the construction of various measuring devices.	2 Understanding
CLO3	Compare the vernier calipers, Micrometer screw and Spherometer	3 Applying
CLO4	Explain the various measuring devices.	4 Analyzing
CLO5	Discuss the working of various measuring devices.	2 Understanding
CLO6	Usage of the various meters in laboratory.	3 Applying

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2	PSO3	PSO4
CLO1	2																			
CLO2			2																	
CLO3			3																	
CLO4	1																			
CLO5					2															
CLO6					1															

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Mathematics
Program Code:	SC104
Course Title:	Chemistry of Cosmetics & Hygiene Products
Course Code:	12-SEC207-1C
Pre-requisite Course:	-

Course Objectives:

- The capacity to job effectively and safely in a laboratory environment.
- Opportunities for student and faculty to interact with alumni and with professional chemists.
- To develop the fundamental analytical and industrial skills to work effectively in the different fields of chemistry.
- To develop idea for the new way of green synthesis.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	--	--	2	25	25	--	--	50

Course Contents:

Unit	Topic	Total Hours	Weightage
1	Introduction of cosmetics & Hygiene products Introduction, requirements/function and characteristics of the following products: Shampoo, Anti-sunburn lotion, Face-powders, Lipsticks, Talcum powder, Cold-creams, Hair dyes, .Essential oils	15	50%
2	Chemistry of cosmetics Chemical synthesis of : Shampoo, Anti-sunburn lotion, Face-powders, Lipsticks, Talcum powder, Cold-creams, Hair dyes.	15	50%

Reference Books:

1. Pharmaceutics and cosmetics by Gupta-Gupta (A Pragati Edition)
2. Text book of cosmetics Garud-Sharma-Garud (A Pragati Edition)

List of Open-Source Software/learning website:

1. <http://www.chemistryexplained.com/Co-Di/Cosmetic-Chemistry.html>
2. <https://www.slideshare.net/tanujanautiyal/cosmetics-chemistry-by-dr-tanuja-nautiyal>
3. <https://www.tutorialsduniya.com/notes/chemistry-of-cosmetics-perfumes-notes/>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Introduction and importance of cosmetics.	2 Understanding
CLO2	Requirements and uses of cosmetics and essential oils.	2 Understanding
CLO3	Industrial synthesis of cosmetics.	3Applying 2 understanding

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2	PSO3	PSO4
CLO1	1				2															
CLO2			2								1									
CLO3	2						1													

3: High, 2: Medium, 1: Low

Branch Name:	B.Sc. Mathematics
Program Code:	SC104
Course Name:	Business Mathematics-II
Course Code:	12-SEC209-1C
Pre-requisite Course:	Basic maths of 12 th Science

Course Objectives:

- To understand co-ordinate points, Intersection of two lines, equation of straight line.
- To understand basic concept of centre of gravity.
- To understand basic concept of slope.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	--	--	2	25	25	--	--	50

Course Contents:

Unit	Topic	Total Hours	Weightage
1	Centre of Gravity , Moment of Inertia: Centre of Gravity, Centre of gravity of a continuous distribution of matter. Moment of Inertia.	15	50%
2	Co-ordinate Geometry: Co-ordinate of a point, slope and intercepts of a line joining two points, equation of a straight line, Derive the different forms of equation of a straight line.	15	50%
	$y = mx + c$ $\frac{y - y_1}{y_1 - y_2} = \frac{x - x_1}{x_1 - x_2}$		
	$y - y_1 = m(x - x_1)$ $\frac{x}{a} + \frac{y}{b} = 1$		

Text Books:

1. HSC, Gujarat State Board.

Reference Books:

1. Integral Calculus, Shanti Narayan, Dr. P.K.Mittal, S.Chand

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=nV3QffaUs4E&list=PLDN15nk5uLiAJn1kT4QtkOexxs3TC9hD>
2. <https://www.youtube.com/watch?v=YeJXJ9GcNsI>
3. <https://www.youtube.com/watch?v=NrKTfWghvl0>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe Centre of Gravity.	1 Remembering
CLO2	Explain Moment of Inertia.	4 Analysing
CLO3	Illustrate slope of line.	3 Applying
CLO4	Describe equation of a straight line.	1 Remembering
CLO5	Discuss Centre of gravity of a continuous distribution of matter.	2 Understanding
CLO6	Explain intercepts of a line joining two points.	4 Analysing

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Programme Outcomes (POs)																Programme Specific Outcome (PSOs)			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PSO1	PSO2	PSO3	PSO4
CLO1	1	1		1	1				2								1			1
CLO2		1			1				1								1			
CLO3	1	1		1			1			1								1		
CLO4		1		1	1		1		2								1			2
CLO5	1			2	1				2								1	1		
CLO6		1			1		1		1								1			

3: High, 2: Medium, 1: Low