Shri VaishnavVidyapeethVishwavidyalaya, Indore
Shri Vaishnav Institute of Science
Name of Program: B.Sc. (Major: Chemistry)
(2022-2025)

Semester III

COURSE CODE	CATEGORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSCCH301	DC	Organic Chemistry	60	20	20	30	20	4	0	4	6

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit.
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

The course Organic chemistry aims to provide the student with:

1. To understand the chemistry of saturated, unsaturated, and aromatic hydrocarbons.
2. To acquire the knowledge about Bayer's strain theory, Regioselectivity, and Thermodynamic aspects of organic reactions, and applications of Saytzeff rule.
3. To discuss the properties of Cycloalkanes, Cycloalkenes and Dienes.
4. To acquaint the students with practical knowledge and industrial applications of Organic chemistry.

Course Outcomes (COs):

1. Students will gain the basic knowledge of IUPAC nomenclature of alkanes, alkenes, dienes, and physical, chemical properties of the commercially important molecules.
2. Students can be able to understand Aromaticity, Kekule structure, Huckel's rule, and Aromatic electrophilic substitution reactions with mechanism.
3. They can understand the chemistry of Biomolecules with structures, properties, and biological importance of Carbohydrates and Amino acids.
4. They can learn the industrial utility of Organic chemistry and practical knowledge to become good chemist.

Syllabus

Unit I: Alkanes and Cycloalkanes

IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atom in alkanes, isomerism in alkanes, methods of preparation – Wurtz reaction, Kolbe reaction, Corey-House reaction, and decarboxylation of carboxylic acids. Physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation of alkanes: orientation,

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reactivity, and selectivity. Cycloalkanes - nomenclature, preparation methods, chemical reactions. Bayer's strain theory and its limitations. Ring strain in small rings (Cyclopropane and Cyclobutane). The case of cyclopropane ring, banana bonds.

Unit II: Alkenes and Cycloalkenes

IUPAC nomenclature of alkenes, methods of formation, mechanism and regioselectivity of dehydration of alcohols and dehydrohalogenation of alkyl halides. Saytzeff rule, Hofmann elimination, physical properties, and relative stabilities of alkenes. Chemical reactions of alkenes – hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration-oxidation, oxymercuration-reduction. Epoxidation, ozonolysis, hydration, hydroxylation, and oxidation with $KMnO_4$, Polymerization of alkenes, Industrial applications of ethylene and propene. Methods of formation, physical properties, and chemical reactions of cycloalkenes.

UNIT III: Dienes and Alkynes

Nomenclature and classification of dienes: isolated, conjugated, and cumulated dienes, Structure of allenes and butadiene, methods of formation, chemical reaction – 1, 2 and 1, 4 additions, Diels-Alder reaction, and polymerization. Nomenclature, structure and bonding in alkynes, methods of formation, chemical reactions of alkynes, acidity of alkynes, hydroboration-oxidation, metal-ammonia reductions, oxidation, and polymerization.

UNIT IV: Arenes and Aromaticity

Nomenclature of benzene derivatives, Structure of benzene - Kekule structure, stability and carbon-carbon bond lengths of benzene, resonance structure, MO picture. Aromaticity: The Huckle rule, aromatic ions. Aromatic electrophilic substitution – general pattern of the

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mechanism, role of σ and π complexes, Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio, Birch reduction.

UNIT V: Biomolecules

[A] Carbohydrates: Introduction, classification, Osazone formation, epimerization, step-up and step-down reactions of monosaccharides, simple structures of glucose and fructose, Fischer's proof of configuration of D-glucose.

[B] Amino acids: Introduction of amino acid, Classification, and properties of amino acids, Zwitter ion, Isoelectric point, Strecker's and Gabriel phthalimide synthesis of amino acids.

List of Practical: Practical: (Credits: 2, Laboratory periods: 04)

1. Thin layer chromatography – Principle and theory. Experiment of TLC of Spinach leaves

2. Column chromatography – Principle and theory. Separation of the mixture of dyes by using Column chromatography

3. Paper chromatography – Principle and theory. Separation of the mixture of dyes by using Paper chromatography

4. Systematic identification of organic compounds – Solids (Urea, Glucose, Salicylic acid, Benzoic acid, 4-amino benzene sulphonic acid) Preliminary tests (Combustion, ignition, and solubility), test for saturation and unsaturation, identification, and confirmatory tests of

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
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functional groups.

5. Systematic identification of organic compounds – Liquids (Benzaldehyde, Aniline, Acetophenone, 1-Butyl alcohol, Ethyl acetate) Preliminary tests (Combustion, ignition, and solubility), test for saturation and unsaturation, identification, and confirmatory tests of functional groups.

6. Systematic organic preparation – simple, single step organic synthesis (preparation of 4-nitro acetanilide from aniline)

7. Friedel-Crafts acylation reaction on Benzene with acetyl chloride and $AlCl_3$ catalyst

8. Claisen-Schmidt reaction: Synthesis of Benzalacetone from Benzaldehyde

9. Reimer-Tieman reaction: Synthesis of 2-hydroxy-1-naphthaldehyde from 2-naphthol

10. Rearrangement reaction: Synthesis of acetophenone oxime and its rearrangement to acetanilide

List of Textbooks:

1. Robert Thorn Morrison and Robert Neilson Boyd, Textbook of Organic Chemistry, Prentice Hall of India Pvt Ltd, New Delhi, 6th Edition, 1992.

2. Bhupinder Mehta, Manju Mehta, Organic Chemistry, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

3. James B Hedrickson Donald J. Cram and George S. Hammond, Organic Chemistry, McGraw-Hill, Kogakusha,Ltd., 3rd Edition.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSCCH301	DC	Organic Chemistry	60	20	20	30	20	4	0	4	6

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

4. Arun Bahl, B. S. Bahl, Advanced Organic Chemistry, S. Chand & Company Ltd., New Delhi, 1st Edition, 2003.

5. I.L.Finar, Organic Chemistry Vol-I & Vol-II, Pearson Education Ltd, New Delhi, 5th Edition, 2016.

6. G.Marc Loudon, Organic Chemistry, Oxford University Press, 4th Indian edition, 2010.

7. P.S.Kalsi, Text book of Organic Chemistry, MacMillan, India Pvt. Ltd., 1999.

Reference Books:

1. Pine, S., Hendrickson, J. B., Cram, D.J., Hammond, S. Organic Chemistry, 8th Edition, Mc Graw-Hill, New York. 2012
2. John Mcmurry, Brooks Cole, Organic Chemistry, 6th Edition, John-Wiley International Edition.
3. Graham, T.W., Solomons, S., and Craig B. Fryhle, Organic Chemistry, 8th Edition, John-Wiley International Edition.
4. Francis A. Carey and Richard J. Sundberg, Advanced Organic Chemistry Part-A & B, 7th Edition, Mc Graw-Hill, 2015.

Textbooks for practical:

1. Vogel, A.I., Tatchell, A.R., Furnis, B.S., and Hannaford, A.J., Textbook of Practical organic chemistry, 5th Edition, Pearson, 2005.

2. Mann, F.G., and Saunders, B.C., Practical organic chemistry, 10th Edition, Longman, 2017.

3. Sethi, A., Lab Experiments in Organic Chemistry, 2nd Edition, New Age International publishers, 2018.

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DEGREE PROGRAM
B.Sc. Phys. III Sem
Major/ Minor

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BSCPH301	DC	Solid State and Electronics Principles	60	20	20	00	00	4	0	0	4

Course Objectives	1. To develop theoretical basis of semiconductors and solid state mechanics. 2. To understand the Principal and Working of semiconductor devices. 3. To know and design the electronic circuits. 4. To be able to solve Numerical problems based on the course. 5. To develop the ability to complete the tasks in time.
Course Outcomes	1. Students will have theoretical understanding of semiconductors. 2. Students will be able to the understand the principal and working of semiconductor devices. 3. Students will be able design of basic electronic circuits. 4. Students will be able to solve Numerical problems based on the course. 5. Students will be able to complete the tasks in time.

Abbreviation		
Th	Theory	**Teacher Assessment (Theory) shall be based on following components: Quiz / Assignment/ Project / Participation in class (Given that no component shall be exceed 10 Marks).**
T	Tutorial	**Teacher Assessment (Practical) shall be based on following components: Viva / File / Participation in Lab work (Given that no component shall be exceed 50% of Marks).**
P	Practical	

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NATIONAL EDUCATION POLICY
DEGREE PROGRAM
B.Sc. Phys. III Sem
Major/ Minor

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BSCPH301	DC	Solid State and Electronics Principles	60	20	20	00	00	4	0	0	4

UNIT I: Crystal Structure and bonding: Crystalline and amorphous solids. Translational symmetry. Lattice and basis. Unit cell. Reciprocal lattice. Fundamental types of lattices (Bravias Lattice). Miller indices Lattice planes. Simple cubic. Face centered cubic. Body centered cubic lattices. Laue and Bragg's equations. Determination of crystal structure with X-rays, X- ray spectrometer. Ionic, Covalent, Metallic.

UNIT II: Semiconductors: Intrinsic and extrinsic semiconductors, mobility and charge density of charge carriers, Fermi Level. Temperature dependence of electron and hole concentrations. Doping: impurity states, n and p type semiconductors, conductivity, Hall Effect. Hall Coefficient. Semiconductor devices: Metal-semiconductor junction, p-n junction, majority and minority carriers.

UNIT III: Zener and tunnel diodes, light emitting diode, Schottky diode, solar cell Diode, load line concept, rectification, Half wave and full wave rectifier, ripple factor, voltage stabilization, IC voltage regulation, Transistors, Characteristics of a transistor in CB, CE and CC mode, h-parameters.

UNIT IV: FETs: Field effect transistors, n-channel FET, p-channel FET, JFET, MOSFET. Amplifiers. Small signal amplifiers; General Principle of operation, classification, distortion, RC coupled amplifier, gain frequency response, input and output impedance, multistage amplifiers. Transformer coupled amplifiers, Equivalent circuits at low, Medium and high frequencies, emitter follower.

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DEGREE PROGRAM

B.Sc. Phys. III Sem

Major/ Minor

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BSCPH301	DC	Solid State and Electronics Principles	60	20	20	00	00	4	0	0	4

UNIT V: Oscillators, Feedback in amplifiers, principle, its effects on amplifiers, characteristics Principle of feedback amplifier, Barkhausen criteria, Hartley, Colpitt and Wein bridge oscillators.

References:

1. Introduction to Solid State Physics, C. Kittel, VIII Edition, John Wiley and Sons, New York, 2005.
2. Intermediate Quantum theory of Crystalline Solids. A. O. E. Animalu, Prentice-Hall
3. of India private Limited, New Delhi 1977.
4. Solid State Electronic devices. B. G. Streetman, I Edition Prentice Hall. India.
5. Microelectronics, J. Millman and A. Grabel McGraw Hill New York.
6. The Physics and Chemistry of Nanosolids: Frank J. Owens, and Charles P. Poole Jr., Wiley Inter Science, 2008.
7. Physics of Low Dimensional Semiconductors: An introduction: J.H. Davies. Cambridge University Press, U.K., 1998.

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DEGREE PROGRAM

B.Sc. Phys. III Sem

Major/ Minor

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BSCPH301 (P)	DC	Physics Laboratory III	00	00	00	30	20	0	0	4	2

Course Objectives

1. To gain practical knowledge by performing various experiments of Electronics.
2. Providing a hands-on learning experience in electronics.
3. To understand the electronic circuits and to find characteristics of different devices.
4. Perform the experiments as per standard procedure and understand the applications.
5. To develop the ability to complete the tasks in time.

Course Outcomes

1. Students will gain practical knowledge by performing various experiments of Electronics.
2. They will have a hands-on learning experience in electronics.
3. They will understand the electronic circuits and characteristics of different devices.
4. Will develop the ability to complete the tasks in time.
5. They will also learn to work as a Team.

Abbreviation	
Th	Theory
T	Tutorial
P	Practical

Teacher Assessment (Theory) shall be based on following components: Quiz / Assignment/ Project / Participation in class (Given that no component shall be exceed 10 Marks).

Teacher Assessment (Practical) shall be based on following components: Viva / File / Participation in Lab work (Given that no component shall be exceed 50% of Marks).

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NATIONAL EDUCATION POLICY
DEGREE PROGRAM
B.Sc. Phys. III Sem
Major/ Minor

Subject Code	Category	Subject Name	Teaching and Evaluation Scheme								
			Theory			Practical		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BSCPH301 (P)	DC	**Physics Laboratory III**	00	00	00	30	20	0	0	4	2

List of experiment

1. To find V-I characteristics of P-N junction diode.
2. To find V-I characteristics of Zener diode.
3. To find V-I characteristics of Tunnel diode.
4. To find V-I characteristics of photo diode.
5. To find input/output characteristics of common base PNP/NPN transistor.
6. To find input/output characteristics of common emitter PNP/NPN transistor.
7. To determine energy band gap using PN junction diod.
8. To study frequency of Hartley oscillator.
9. To study frequency of Wein bridge oscillator.
10. To find the characteristics of different types of LED.
11. To study of Regulated power supply using Zener.
12. To study of Regulated power supply using transister.

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Name of the Program: B. Sc. (Mathematics)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BSCMT 301	DC	Differential equations I	60	20	20	-	-	3	0	-	3

Course Objective

To introduce the students with the fundamentals of the Differential Equation

Course Outcomes

After the successful completion of this course students will be able to:

1. *Know the basic concepts of differential equations.*
2. *Find the solution of the differential equations.*
3. *Solve the problems of linear differential equations and homogeneous linear differential equations.*
4. *Apply the differential equations to real world problems.*

Course Content:

UNIT – I

Formation of differential equations, Variable separable form, Linear Differential equations, Bernoulli's equation, Exact differential equation, Equation reducible to exact differential equation.

UNIT – II

Differential equation of first order and higher degree, Solvable for x, y, p. Clairaut's equation and singular solution, Geometrical meaning of differential equation, Orthogonal trajectory.

UNIT – III

Linear differential equations with constant coefficients.

UNIT – IV

Equations reducible to linear equation with constant coefficients, Cauchy homogeneous linear equation, Legendre linear equation, Method of variation of parameter, Method of undetermined coefficients.

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Name of the Program: B. Sc. (Mathematics)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BSCMT 301	DC	Differential equations I	60	20	20	-	-	3	0	-	3

UNIT – V

Simultaneous linear differential equations with constant coefficient, Applications of linear differential equations to: Simple hormonic motion, Simple pendulum, Oscillation of a spring.

Reference Book:

1. Differential Equations – Lester R. Ford (McGraw Hill).
2. Differential Equations – S. L. Ross (John Wiley).
3. Differential Equations – H. T. H. Piaggio.
4. A Text Book of Ordinary Differential Equations – Kiseleyev, Makarenko &Krasnov (Mir).
5. Differential Equations – H. B. Phillips (John Wiley & Sons).
6. Differential Equations with Application & Programs – S. Balachanda Rao, H. R. Anuradha (University Press).
7. Text Book of Ordinary Differential Equations (2nd Ed.) – S. G. Deo, V. Lakshmikantham & V. Raghavendra (Tata McGraw Hill).
8. An Elementary Course in Partial Differential Equation – T. Amarnath (Narosa).
9. Higher Engineering Mathematics: B.S. Grewal, Khanna Publisher.

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BSCMT 302	DC	Vector Analysis and Geometry	60	20	20	-	-	3	0	-	3

Course Objective

To introduce the students to the fundamentals of the Algebra of Vectors and Geometry.

Course Outcomes

After the successful completion of this course students will be able to:

1. *Understand the algebra of vectors.*
2. *Interpret and apply the concept of vectors in real life.*
3. *Learn the basics of solid geometry.*
4. *Solve the problems related to cones and cylinders.*

Course Content:

UNIT – I
Vectors, Product of four vectors, Reciprocal vectors, Vector differentiation, Velocity and acceleration.

UNIT – II
Del operator, Gradient, Divergence and Curl, Higher order derivatives, Physical interpretation of divergence and curl.

UNIT – III
Vector Integration, Line integral, Circulation and work, Surface integral, Volume integral, flux, Theorems of Gauss, Green, Stoke (without proof) and problems based on them.

UNIT – IV
Equation of cone with given base, generators of cone, condition for three mutually perpendicular generators.

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Name of the Program: B. Sc. (Mathematics)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BSCMT 302	DC	Vector Analysis and Geometry	60	20	20	-	-	3	0	-	3

UNIT – V

Right circular cone, equation of cylinder and its properties.

Reference Book:

1. Elementary Treatise on Coordinate Geometry of Three Dimension: R.J.T. Bell. MacMillan, India.
2. Theory and Problems of Advance Calculus: R. Murray, Spiegel, Schaum Publishing Co. New York.
3. Vector Analysis: R. Murray, Spiegel, Schaum Publishing Co. New York.
4. A Textbook of Vector Calculus: Shanti Narayan, S. Chand & Co. New Delhi.
5. A Textbook of Vector Algebra: Shanti Narayan, S. Chand & Co. New Delhi.
6. The Elements of Coordinate Geometry: S.L. Loney, Mac Millan & Co.
7. A Textbook of Analytical Geometry of Two Dimensions: P.K. Jain, Khalil Ahmed, Mac Millan India Ltd.
8. A Textbook of Analytical Geometry of Three Dimensions: P.K. Jain, Khalil Ahmed, Willey Eastern Ltd.

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SEMESTER IV

SUBJECT CODE	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
		THEORY			PRACTICAL		Th	T	P	CREDITS
		END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BBAI501	**Human Values and Professional Ethics**	60	20	20	-	-	3	1	-	4

Legends: L-Lecture; T-Tutorial/Teacher Guided Student Activity; P-Practical; C-Credit;
***Teacher Assessment** shall be based on following components: Quiz / Assignment / Project/ Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:
The objective of the course is to disseminate the theory and practice of moral code of conduct and familiarize the students with the concepts of "right" and "good" in individual, social and professional context

Course Outcomes:

1. Help the learners to determine what action or life is best to do or live.
2. Right conduct and good life.
3. To equip students with understanding of the ethical philosophies, principles, models that directly and indirectly affect business.

Course Content:

UNIT I: Human Value

1. Definition, Essence, Features and Sources
2. Sources and Classification
3. Hierarchy of Values
4. Values Across Culture

UNIT II: Morality

1. Definition, Moral Behaviour and Systems
2. Characteristics of Moral Standards
3. Values Vs Ethics Vs Morality
4. Impression Formation and Management

BBAI501 Human Values and Professional Ethics (for UG Programs)

UNIT III: Leadership in Indian Ethical Perspective

1. Leadership, Characteristics
2. Leadership in Business (Styles), Types of Leadership (Scriptural, Political, Business and Charismatic)
3. Leadership Behaviour, Leadership Transformation in Terms of Shastras (Upanishads, Smritis and Manu-smriti).

UNIT IV: Human Behavior – Indian Thoughts

1. Business Ethics its meaning and definition, need.
2. Types, Objectives, Sources, Relevance in Business organizations.
3. Theories of Ethics, Codes of Ethics.

UNIT V: Globalization and Ethics

1. Sources of Indian Ethos & its impact on human behavior
2. Corporate Citizenship and Social Responsibility – Concept (in Business),
3. Work Ethics and factors affecting work Ethics.

Suggested Readings

1. Beteille Andre (1991), Society and Politics in India, Athlone Press.
2. Chakraborty S. K. (1999), Values and Ethics for Organizations, oxford university press.
3. Fernando, A.C.(2009), Business Ethics - An Indian Perspective, Pearson Education :India.
4. Fleddermann, Charles D. (2012), "Engineering Ethics", Pearson Education / Prentice Hall.
5. Boatright, John R (2012), "Ethics and the Conduct of Business", Pearson Education, New Delhi.
6. Crane, Andrew and Matten Dirk (2015), Business Ethics, Oxford University Press Inc.: New York.
7. Murthy, C.S.V.(2016), Business Ethics – Text and Cases, Himalaya Publishing House Pvt. Ltd.: Mumbai.
8. Naagrajan, R.R (2016), Professional Ethics and Human Values, New Age International Publications: New Delhi.

Shri Vaishnav Vidyapeeth Vishwavidyalaya Indore

Shri Vaishnav Institute of Computer Applications

Name of the Program : B.Sc. (Computer Science)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BSCS304	Major/Minor	Fundamentals of Data Structure	60	20	20	0	0	4	0	0	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A – Quiz/Assignment/Attendance, MST - Mid Sem Test.

***Teacher Assessment** shall be based on following components:
Quiz/Assignment/project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Educational Objectives(CEOs):

- To understand the students with the applications of Standard data structure in real world problems.
- To provide knowledge of creation of new data structures.
- To familiarize the students with the analysis and design a particular problem.

Course Outcomes (Cos):students will be able to

- Demonstrate familiarity with major algorithms and data structures.
- Analyze performance of algorithms.
- Choose the appropriate data structure and algorithm design method for a specified application.
- Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs
- Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.
- Understand and apply fundamental algorithmic problems including Tree traversals, Graph traversals, and shortest paths.
- Demonstrate understanding of various searching algorithms.

UNIT 1

Introduction and Overview: Introduction, Basic Terminology, Elementary Data Organization, Overview of Data Structures Types, Data Structure Operations, Algorithms: Complexity, Time-Space Tradeoff, Frequency count: Simple algorithms. Abstract data type (ADT), Fundamental and derived data types, Primitive data structures.

Name of the Program : B.Sc. (Computer Science)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BSCS304	Major/Minor	Fundamentals of Data Structure	60	20	20	0	0	4	0	0	4

UNIT 2

Arrays: Definition, Terminology, One dimensional array: Memory allocation, Operations, Application, Multidimensional Arrays: Two dimensional Arrays, Sparse matrices, Three dimensional and n-dimensional Arrays, Pointer Arrays.

UNIT 3

Stacks: Introduction, Definition, Representation of stacks, Operations on stacks, Applications of stacks.
Linked List: Definition, Singly Linked List: Representation, Operations; Circular Linked List, Header Linked Lists, Doubly Linked List: Operations, Circular Doubly Linked List: Operations, Application of Linked Lists: Sparse Matrix Manipulation, Polynomial Representation; Dynamic Storage Management; Memory Representation: Fixed, Variable block storage, Deallocation Strategy.

UNIT 4

Queues: Introduction, Definition, Representation of Queues: Arrays Representation, Linked list Representation; Various Queue structures: Circular Queue, Deques, Priority Queue; Applications of Queues.
Trees: Concepts, Representation of Binary Trees in Memory, Operations on Binary Tree, Types of Binary Trees.
Graphs: Introduction, Graph terminologies, Sequential Representation of Graphs: Adjacency Matrix, Path Matrix; Adjacency List Representation, Shortest Path Algorithms: Dijkstra's Technique, Bellman-Ford Algorithm, Floyd-Warshall Algorithm; Minimum Spanning Tree Algorithms: Kruskal's Algorithm, Prim's Algorithm; Operations on Graphs, Traversing and Searching a Graph, Application of Graph Structures.

UNIT 5

Searching: Sequential and Binary Search, Indexed Search, Hashing Schemes, Hashing functions: Division/Remainder methods, Mid Square method, Folding method; Hash Collision: linear probing, Chaining, Bucketing.

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BSCS304	Major/Minor	Fundamentals of Data Structure	60	20	20	0	0	4	0	0	4

Sorting: Selection sort, Bubble sort, Insertion sort, Quick sort, Merge sort, Radix sort, Shell sort, Heap sort, Comparison of time complexities.

TEXT BOOKS:

[T1] Seymour Lipschutz, Data Structures, *TheMcGraw Hill Companies*

[T2] Horowitz, Sahni, Anderson-Freed; Fundamentals of Data Structures in C; *Universities Press*

REFERENCE BOOKS:

[R1] NarasimhaKarumanchi, Data Structures and Algorithms Made Easy,*CareerMonk Publications*

[R2] Thomas H. Cormen , Charles E. Leiserson, Ronald L. Rivest, Clifford Stein; Introduction to Algorithms, *The MIT Press*

[R3] Debasis Samanta, Classic Data Structures, *Prentice Hall India*

Shri Vaishnav Vidyapeeth Vishwavidyalaya Indore

Shri Vaishnav Institute of Computer Applications

Name of the Program : B.Sc. (Computer Science)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
BSCL307	Major/Minor	Data Structure Lab	0	0	0	30	20	0	0	4	2

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A – Quiz/Assignment/Attendance, MST - Mid Sem Test.

***Teacher Assessment** shall be based on following components:
Quiz/Assignment/Project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Learning Objectives (CEOs):

- To familiarize the students with programming and to encourage them to develop their logic.
- To make students well versed with C++ language to solve problems efficiently.
- Using simple and well drawn illustrations develop their programming skills using modular programming.

Course Outcomes (Cos): Student will be able to:

- Develop algorithms for problems.
- Apply the programming concepts to solve the given problems.
- Write the programs using modular programming.
- Understand and write programs using various data structures very efficiently.
- To choose a suitable data structure for a given problem.
- Write the programs using pointers and to manage memory.
- Implement programs of file handling.

Note: Program should be fully documented with sample I/O. Data Flow charts should be developed wherever necessary.

Write an Algorithm and Program using functions for:

1. Traversing the elements of an Array
2. Inserting an element in an Array
3. Deleting an element from an Array
4. Merging of two Arrays
5. Linear Search

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
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BSCL307	Major/Minor	Data Structure Lab	0	0	0	30	20	0	0	4	2

6. Binary Search
7. Insertion Sort
8. Bubble Sort
9. Selection Sort
10. Implementing PUSH & POP operations of a Stack
11. Array Implementation of a Queue and Circular Queue
12. Converting infix notation into post fix notation
13. Insertion in single and double Linked List
14. Deletion from single and double Linked List

TEXT BOOKS:

[T1] Seymour Lipschutz, Data Structures, *TheMcGraw Hill Companies*

[T2] Horowitz, Sahni, Anderson-Freed; Fundamentals of Data Structures in C; *Universities Press*

REFERENCE BOOKS:

[R1] NarasimhaKarumanchi, Data Structures and Algorithms Made Easy,*CareerMonk Publications*

[R2] Thomas H. Cormen , Charles E. Leiserson, Ronald L. Rivest, Clifford Stein; Introduction to Algorithms, *The MIT Press*

[R3] Debasis Samanta, Classic Data Structures, *Prentice Hall India.*