Shri Vaishnav VidyapeethVishwavidyalaya, Indore

DEGREE PROGRAM

B. Sc VI Sem.

SUBJECT CODE	Category	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*				
BSPH602	DC	Atomic, Molecular and Nuclear Physics	60	20	20	30	20	3	1	4	6

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 Objectives:-

1. To develop the comprehensive understanding of laws of physics related toAtomic, Molecular and Nuclear Physicsand ability to apply them for laying the foundation for research and development.
2. To work ethically as member as well as leader in a diverse team.

Course Outcomes:-

1. Student will be able to understand and solve the problems related toAtomic, Molecular and Nuclear Physics,
2. Student will be able to determine physical parameter experimentally with optimal usage of resources and complete the assignments in time.

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Dr. UTTAM SHARMA
Associate Professor & Head
Shri Vaishnav Institute of Science

Atomic, Molecular and Nuclear Physics

UNIT-I

Atoms in Electric and Magnetic Fields: - Electron Angular Momentum, Electron Spin and Spin Angular Momentum, Stern-Gerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyro magnetic Ratio and Bohr Magneto Pauli's Exclusion Principle. Symmetric and Anti symmetric Wave Functions. Periodic table, Fine structure, Spin orbit coupling. Total Angular Momentum, Vector Model L-S and J-J couplings

UNIT-II

Molecular Spectra: - Rotational Energy levels, Selection Rules and Pure Rotational Spectra of a Molecule, Vibrational Energy Levels, Selection Rules and Vibration Spectra. Rotation Vibration Energy Levels, Selection Rules and Rotation-Vibration Spectra, Determination of Inter-nuclear Distance, Raman Effect and Quantum Theory of Raman Effect, Complimentary Character of Raman and infrared Spectra

UNIT-III

Structure of nuclei: - basic properties of nuclei, binding energy. Quadra pole moment, Nuclear forces α -decay: - range of α-particles, Geiger-Nuttal law and α-particle spectra. Gamow theory of alpha decay, β-decay: - energy spectra and neutrino hypothesis. B-decay: - energy spectra and neutrino hypothesis, Nuclear reactions: - types of reactions and conservation laws. Concept of compound and direct reactions, Compound Reaction rate, Q-value of nuclear reaction, Nuclear Fission and Fusion.

UNIT-IV

Nuclear models: - Liquid drop model and Semi empirical mass formula, Shell model, Linear accelerator, Cyclotron, Betatron, Synchro-cyclotron. Detectors and Counters: Ionization chamber, Proportional Counter, GM Counter., Wilson cloud chamber, Scintillation detectors. Semiconductor detectors, Bain bridge mass spectrograph.

UNIT-V

Elementary particles - fundamental interactions, Classification of elementary particles, Particles and antiparticles, baryons, hyperons, leptons, and mesons., Elementary particle quantum numbers: baryon number, lepton number, strangeness, electric charge, hypercharge and isospin.

Suggested books:

1. Concepts of modern physics by Arthur beiser (McGraw -hill book company, 1987)
2. Concepts of nuclear physics by Bernard l.cohen.(new Delhi: Tata McGraw hill, 1998).
3. Introduction to the physics of nuclei and particles by r.a. Dunlap.(Singapore: Thomson Asia, 2004).
4. Nuclear physics by Irving Kaplan. (Oxford & ibh, 1962).
5. Introductory nuclear physics by Kenneth s. Krane. (John Wiley & sons, 19

ShriVaishnavVidyapeethVishwavidyalaya Indore

ShriVaishnav Institute of Computer Applications

Name of 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	Teacher Assessment	End Sem University Exam	Teacher Assessment				
BSCS603	Compulsory	Java Technologies	60	20	20			3	1	0	4

Course Education Objectives (CEOs):

- Students must be able to understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- Students must be able to understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- Students must have the ability to write a computer program to solve specified problems.
- Students must be able to use the Java SDK environment to create, debug and run simple Java programs.

Course Outcomes (COs):

After the successful completion of the course students will be able to perform the following tasks:

- Write, compile, and execute Java programs that may include basic data types and control flow constructs using Integrated Development Environments (IDEs) such as Eclipse, NetBeans, and JDeveloper.
- Write, compile and execute Java programs using object oriented class structures with parameters, constructors, and utility and calculations methods, including inheritance, test classes and exception handling.
- Write, compile, and execute Java programs using arrays and recursion, manipulating Strings and text documents.
- Write, compile, and execute Java programs that include GUIs and event driven programming.
- Write a final project that may be selected from among the following: applets for inclusion in web pages; applets to access enterprise data bases in robust, enterprise three level applications; secure communications over the internet; or an approved project chosen by the student.

UNIT – I

Importance and features of Java, *Language Construct of java including* Keywords, constants, variables and looping and decision making construct, Classes and their implementation, Introduction to JVM and its architecture including set of instructions. Overview of JVM Programming. Internal and detailed explanation of a valid .class file format. Instrumentation of a .class file, Byte code engineering libraries, Overview of class loaders and Sandbox model of security.

UNIT - II

Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, class inheritance. Arrays and String: Creating an array, one and two dimensional arrays, string array and methods, Classes: String and String Buffer classes, Wrapper classes: Basic types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages.

UNIT – III

Exception Handling: Fundamentals, exception types, uncaught exceptions, throw, final, built in exception, creating your own exceptions.

Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, messaging, thread classes, Runnable interface, inter thread Communication, suspending, resuming and stopping threads.

Input/output Programming: Basics, Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files.

Using Standard Java Packages (lang, util, io, net). Networking: Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Data-gram Programming, RMI (Remote Method Invocation).

UNIT – IV

Event Handling: Different Mechanism, the Delegation Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes, Working with windows, Graphics and Text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video, Java Applet.

The Collection Framework: The Collection Interface, Collection Classes, Working with Maps & Sets

JDBC: Introduction to DBMS & RDBMS, DBC API, JDBC Application Architecture, Obtaining a Connection, JDBC Models: Two Tier and Three Tier Model, ResultSet, Prepared Statement, Callable Statement.

UNIT – V

RMI (Remote Method Invocation): Introduction, Steps in creating a Remote Object, Generating Stub & Skeleton, RMI Architecture, RMI packages.

Java Bean: Introduction, Bean Architecture, Using the Bean Development Kit, Creating simple bean-properties, methods and events, Packing beans- the manifest & the jar, Java bean package, Introduction to NetBean.

Swing : Introduction to JFC (Java Foundation Classes), Features of Swing, Comparison with AWT, Advanced Control .

TEXT BOOKS:

1. Patrick Naughton and HerbertzSchildt, “Java-2: The Complete Reference”, TMH, 5theditio, 2002.
2. Bill Venners, “Inside Java Virtual Machine”, TMH, 2nd edition.
3. Rick Darnell, “HTML 4 unleashed”, Techmedia Publication, 2000
4. Shelley Powers, “Dynamic Web Publishing”, 2nd edition, Techmedia, 1998.
5. Paul Dietel and Harvey Deitel, “Java How to Program”, PHI, 8th edition, 2010.

REFERENCES:

1. E. Balagurusamy, “Programming with Java: A Primer”, TMH, 1998.
2. Horstmann, “Computing Concepts with Java 2 Essentials”, John Wiley.
3. Decker and Hirshfield, “Programming Java: A Introduction to Programming Using JAVA”, Vikas Publication, 2000.
4. N.P. Gopalan and J. Akilandeswari, “Web Technology- A Developer’s Perspective”, PHI, 2nd edition
5. Eric Jendrock, Jennifer Ball, Debbei Carson, “The Java EE5 Tutorial”, Pearson, 3rd edition, 2007.
6. Daniel Liang, “Introduction to Java Programming”, Pearson, 7th edition, 2010.

ShriVaishnavVidyapeethVishwavidyalaya Indore

ShriVaishnav Institute of Computer Applications

Name of 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	Teacher Assessment	End Sem University Exam	Teacher Assessment				
BSCL606	Compulsory	Java Lab				30	20			4	2

Course Education Objectives (CEOs):

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- Students must have the ability to write a computer program to solve specified problems.
- Students must be able to use the Java SDK environment to create, debug and run simple Java programs.

Course Outcomes (COs):

After the successful completion of the course students will be able to perform the following tasks:

- Write, compile, and execute Java programs that may include basic data types and control flow constructs using Integrated Development Environments (IDEs) such as Eclipse, NetBeans, and JDeveloper.
- Write, compile and execute Java programs using object oriented class structures with parameters, constructors, and utility and calculations methods, including inheritance, test classes and exception handling.
- Write, compile, and execute Java programs using arrays and recursion, manipulating Strings and text documents.
- Write, compile, and execute Java programs that include GUIs and event driven programming.
- Write a final project that may be selected from among the following: applets for inclusion in web pages; applets to access enterprise data bases in robust, enterprise three level applications; secure communications over the internet; or an approved project chosen by the student.

List of Experiments:

1. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that. Integer.
2. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
3. Write a Java program for sorting a given list of names in ascending order.
4. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (use StringTokenizer class).

5. Write a Java program that reads a file and displays the file on the screen, with a line number before each line.
6. Write a Java program that displays the number of characters, lines and words in a text file.
7. Write a Java program for creating multiple threads
    a) Using Thread class.
    b) Using Runnable interface.
8. Write a Java program that illustrates how run time polymorphism is achieved.
9. Write a java program that illustrates the following
    a) Creation of simple package.
    b) Accessing a package.
    c) Implementing interfaces.
10. Write a java program that illustrates the following
    a) Handling predefined exceptions.
    b) Handling user defined exceptions .
11. APPLETS
    a) Working with Frames and various controls.
    b) Working with Dialogs and Menus.
    c) Working with Panel and Layout.
    d) Incorporating Graphics.
    e) Working with colours and fonts.
12. SWINGS
    Jpanel- Jframe – Jtoolbar—JwindowFramework

TEXT BOOKS:

1. Patrick Naughton and HerbertzSchildt, “Java-2: The Complete Reference”, TMH, 5theditio, 2002.
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Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BSMA604	DC	Computer Science & Programming	3	1	0	4	60	20	20	0	0

Course Educational Objective:

- To introduce the students with the Fundamentals of the Computer Science & Programming.

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

- Understand and solve problems of the Boolean algebra.
- Write and execute program written in C programming language
- Design Algorithms and Flow Charts.

Syllabus:

UNIT – I

Boolean algebra – Basic Postulates and Definition. Tow-element Boolean algebra. Boolean function. Truth table. Standard form of Boolean function –DNF and CNF. Minterms and maxterms. Principle of Duality. Some laws and theorem of Boolean algebra.

UNIT – II

Simplification of Boolean expressions –Algebraic method and Karnaugh Map method. Application of Boolean algebra– Switching Circuits, Circuit having some specified properties, Logical Gates– AND, NOT, OR, NAND, NOR etc.

UNIT – III

Computer Fundamentals: Historical Development, Computer Generations, Computer Anatomy – Different Components of a Computer System.

Number Systems: Binary to Decimal and Decimal to Binary. Binary Arithmetic. Octal and Hexadecimal systems. ASCII, EBCDIC and UNICODE. Concepts of bit, byte, word and nibble.

UNIT – IV

Introduction to C Programming: Algorithms, flowcharts, history, features, identifiers, input/ output functions, control structures- if, for, do-while, while and switch-case, arrays.

UNIT – V

Library and user defined functions, recursion. String handling, pointers, structures. Basics of file handling in C.

Text Books:

1. Let us C – Y. Kanetkar (BPB Publications)
2. Programming in C – V. Krishnamoorthy and K. R. Radhakrishnan (Tata Mcgraw Hill).
3. C by example: Noel Kalicharan (Cambridge University Press).
4. Programming in ANSI C – E. Balagurusamy (Tata McGraw Hill).
5. Computer System Architecture by Morris Mano
6. Digital computer organization by Malvino and Leach.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM	MST	Q/A	END SEM	Q/A				
BSMA 605	BS	**Any one of the following groups : Group A : A Course of Calculus Group B : Discrete Mathematics**	60	20	20	-	-	3	1	-	4

Group A: A Course of Calculus

Course Objective

To introduce the students with the Fundamentals of the Advanced Calculus.

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Course Outcomes

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

1. *understand and decide convergence and divergence of a series.*
2. *know properties of the power series.*
3. *solve higher order ordinary differential equations.*
4. *apply Laplace Transform to find solution of the ODE.*
5. *solve partial differential equations.*

Course Content:

UNIT – I

Concept of Point-wise and Uniform convergence of sequence of functions and series of functions with special reference of Power Series. Statement of Weierstrass M-Test for

Uniform convergence of sequence of functions and of series of functions. Simple applications. Statement of important properties like boundedness, continuity, differentiability and integrability of the limit function of uniformly convergent sequence of functions and of the sum function of uniformly convergent series of functions. Determination of Radius of convergence of Power Series.

UNIT – II

Statement of properties of continuity of sum function power series. Term by term integration and Term by term differentiation of Power Series. Statements of Abel's Theorems on Power Series. Convergence of Power Series. Expansions of elementary functions such as ex, sin x, log(1+x), $(1+x)^n$. Simple problems.

UNIT – III

Fourier series on (-π, π): Periodic function. Determination of Fourier coefficients. Statement of Dirichlet's conditions of convergence and statement of the theorem on convergence of Fourier Sine and Cosine series.

UNIT – IV

Third and Fourth order ordinary differential equation with constant coefficients. Euler's Homogeneous Equation. Second order differential equation : (a) Method of variation of parameters. (b) Method of undetermined coefficients. (c) Simple eigenvalue problem. Simultaneous linear differential equation with constant coefficients.

UNIT – V

Laplace Transform and its application to ordinary differential equation. Laplace Transform and Inverse Laplace Transform. Statement of Existence theorem. Elementary properties of Laplace Transform and its Inverse. Application to the solution of ordinary differential equation of second order with constant coefficients. Partial Differential Equation (PDE) : Introduction, Formation of PDE, Solutions of PDE, Lagrange's method of solution.

Text:

1. Basic Real & Abstract Analysis – Randolph J. P. (Academic Press).
2. A First Course in Real Analysis – M. H. Protter & G. B. Morrey (Springer Verlag, NBHM).
3. A Course of Analysis – Phillips.
4. Problems in Mathematical Analysis – B. P. Demidovich (Mir).
5. Problems in Mathematical Analysis – Berman (Mir).

6. Calculus of One Variable – Maron (CBS Publication).

7. Introduction to Real Analysis – Bartle & Sherbert (John Wiley & Sons.)

9. Mathematical Analysis – Parzynski.

10. Introduction to Real Variable Theory – Saxena & Shah (Prentice Hall Publication).

11. Real Analysis – Ravi Prakash & Siri Wasan (Tata McGraw Hill).

12. Mathematical Analysis – Shantinarayan (S. Chand & Co.).

13. Theory & Applications of Infinite Series – Dr. K. Knopp.

14. Advanced Calculus – David Widder (Prentice Hall).

15 Charles Chapman Pugh: Real mathematical analysis; Springer; New York; 2002

16 Sterling K. Berberian: A First Course in Real Analysis; Springer; New York; 1994

17 Steven G. Krantz: Real Analysis and Foundations; Chapman and Hall/CRC;. 2004

18 Stephen Abbott: Understanding Analysis; Springer; New York, 2002

19 T. M. Apostol: Mathematical Analysis, Addison-Wesley Publishing Co. 1957

20 W. Ruddin: Principles of Mathematical Analysis, McGraw-Hill, New York, 1976

21 J. F. Randolhp: Basic Real and Abstract Analysis, Academic Press; New York, 1968

22 Robert G Bartle, Donald R Sherbert: Introduction to real analysis; John Wiley Singapore; 1994

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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

Group B : Discrete Mathematics

Course Objective

To introduce the students with the Fundamentals of the Discrete Mathematics.

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Course Outcomes

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

1. *understand and represent integers.*
2. *know the concept of the congruences and apply them.*
3. *use the Recurrence Relations and Generating functions.*
4. *apply the principles of the Boolean Algebra.*

Course Content:

UNIT – I

Integers: Principle of Mathematical Induction. Division algorithm. Representation of integer in an arbitrary base. Prime integers. Some properties of prime integers. Fundamental theorem of Arithmetic. Euclid's Theorem. Linear Diophantine Equations. (Statement of Principle of Mathematical Induction, Strong form of Mathematical induction. Applications in different problems. Proofs of division algorithm. Representation of an integer uniquely in an arbitrary base, change of an integer from one base to another base. Computer operations with integers – Divisor of an integer, g.c.d. of two positive integers, prime integer, Proof of Fundamental theorem, Proof of Euclid's Theorem. To show how to find all prime numbers less than or equal to a given positive integer. Problems related to prime number. Linear Diophantine equation – when such an equation has solution, some applications).

UNIT – II

Congruences : Congruence relation on integers, Basic properties of this relation. Linear Congruences, Chinese Remainder Theorem. System of Linear Congruences. (Definition of Congruence – to show it is an equivalence relation, to prove the following **:** $a \equiv b \pmod m$ implies (i) $(a+c) \equiv (b+c) \pmod m$ (ii) $ac \equiv bc \pmod m$ (iii) $an \equiv bn \pmod m$, for any polynomial $f(x)$ with integral coefficients $f(a) \equiv f(b) \pmod m$ etc. Linear

Congruence, to show how to solve these congruences, Chinese remainder theorem – Statement and proof and some applications. System of linear congruences, when solution exists – some applications).

UNIT – III

Application of Congruences : Divisibility tests. Computer file, Storage and Hashing functions. Round-Robin Tournaments. Check-digit in an ISBN, in Universal Product Code, in major Credit Cards. Error detecting capability. (Using Congruence, develop divisibility tests for integers base on their expansions with respect to different bases, if d divides (b-1) then n = (akak- 1a1b) is divisible by d if and only if the sum of the digits is divisible by d etc. Show that congruence can be used to schedule Round-Robin tournaments. A university wishes to store a file for each of its students in its computer. Systematic methods of arranging files have been developed based on Hashing functions $h(k) \equiv k \pmod{m}$. Discuss different properties of this congruence and also problems based on this congruence. Check digits for different identification numbers – International standard book number, universal product code etc. Theorem regarding error detecting capability).

UNIT – IV

Congruence Classes : Congruence classes, addition and multiplication of congruence classes. Fermat's little theorem. Euler's Theorem. Wilson's theorem. Some simple applications. (Definition of Congruence Classes, properties of Congruence classes, addition and multiplication, existence of inverse. Fermat's little theorem. Euler's theorem. Wilson's theorem – Statement, proof and some applications).

UNIT – V

Recurrence Relations and Generating functions : Recurrence Relations. The method of Iteration. Linear difference equations with constant coefficients. Counting with generating functions. **Boolean Algebra :** Boolean Algebra, Boolean functions, Logic gates, Minimization of circuits.

Text:

1. C. L. Liu: Discrete Mathematics

2. Schaum's outline series: Discrete Mathematics