

# **Bachelor of Science**

(Information Technology)

3 Years Graduate Degree Programme

## **CURRICULA**

(Effective for 2020-21)



**Shri Vaishnav Institute of Management, Indore**

Approved by AICTE, New Delhi and Affiliated to DAVV, Indore

UGC-NAAC Accredited 'A' Grade Institute

Scheme No. 71, Gumasta Nagar, Indore-452009, Madhya Pradesh, India

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**Yearly Syllabus for Undergraduates**  
**As recommended by Central Board of Studies of Information Technology &**  
**Approved by H E the Governor of Madhya Pradesh**  
**Session 2017-18**  
**JULY 2017 Onwards**  
**Class: B.Sc. (Information Technology)**

Paper Code	First Year	Internal			Theory	Total	Practical	Grand Total	
		Three Months	Six Months	Total					
BSCIT11	Introduction to Information Technology & Computer Organization	10	10	20	40	80		100	
BSCIT12	Programming & Problem Solving through C & C++				40				
BSCIT13P	Practical on BSCIT11 & BSCIT12						50	50	
<b>Second Year</b>									
BSCIT21	Operating System Concepts & Computer Network	10	10	20	40	80		100	
BSCIT22	Internet Programming Using JAVA				40				
BSCIT23P	Practical on BSCIT21 & BSCIT22						50	50	
<b>Third Year</b>									
BSCIT31	DBMS & RDBMS Using Oracle	10	10	20	40	80		100	
BSCIT32	Information Technology Trends				40				
BSCIT33P	Practical on BSCIT31 & BSCIT32						50	50	
<b>Grand Total</b>							<b>450</b>		

Remark: (i) Each theory paper contain five objective type question of 1 mark and  
(ii) Five short answer type question of 2 marks and  
(iii) Five long answer type question of 5 marks, with internal choice in (ii) and (iii)

**B.Sc. (IT) First Year  
First Paper  
Introduction to Information Technology & Computer Organization**

**Maximum Marks: 40**

**Unit-I**

Introduction to Computer: Types and Classification. Basic Anatomy of Computer: Block Diagram. CPU: Function of each Unit. Memory: Primary, Cache, Flash, Storage Classification: Sequential, Random. Storage devices: Pen drive, Hard disk, and Optical Disk, Blue Ray Disc. Input/output Peripherals: Input devices - Keyboard; Locator Device - Mouse, Joy Stick, Digitizing Tablet; Pick Device: Light Pen, Touch Screen, Track Ball; Voice Recognition: Microphone; Scanning: MICR, OCR, OMR, Barcode Reader; Vision Capturing: Webcam, Digital Camera, Point of Sale, Touch Pad, Smart Card; Printers: Dot Matrix, Laser and Inkjet Printers, Plotters.

**Unit-II**

Computer Software: What is Software? Relationship between Hardware and Software, Logical System Architecture showing relationship between hardware, Types of Software: System Software, Application Software, Firmware, Functions of System Software, and Type of System Software: Operating Systems, Language Translators, Utility Programs, Communications Software. Application Software, Commonly Used Application Software: Word Processing, Spreadsheet, Database, Graphics Personal Assistance, Education, Entertainment Software. Open Source Terminologies: Open Source Software, Freeware, Shareware, Proprietary Software, FLOSS, GNU, FSF, OSI.

**Unit-III**

Word Processing: Introduction to Word Processing. MS Word: features, Creating, Saving and Operating Multi document windows. Editing Text: selecting, Inserting, deleting moving text. Previewing documents, printing document. Formatting Documents: Paragraph formats, Aligning Text and Paragraph, Borders and Shading, Headers and Footers.

Introduction to Excel:

Worksheet basic, Creating worksheet, entering data into worksheet, heading information, data types: dates, alphanumeric values, saving & quitting worksheet.

Toolbars and Menus, keyboard shortcuts, Working with single and multiple workbooks coping, renaming, moving, adding and deleting. Working with formulas & cell referencing, Auto sum, coping formulas.

PowerPoint Presentations: Introduction to PowerPoint, Slide Show, Formatting, Creating a Presentation, Inserting Smart Art & Hyperlinks, Adding Objects, Applying Transition, Animation effects. Adding Table, Charts & Media files.

**Unit-IV**

Number systems - Decimal Number system, Binary number system and Hexa-decimal number system, 1's & 2's complement Representation of Positive and Negative Numbers; Binary Fixed- Point Representation, Arithmetic operation on Binary numbers, Overflow & underflow. Floating Point Representation, Codes, ASCII, Logic Gates: AND, OR, NOT and their Truth tables, NOR, NAND & XOR gates. Counters, Registers, Shift Registers.

**Unit-V**

Storing data and Program in Memory, Memory Hierarchy in a Computer, Internal Organization of Semiconductor Main Memory Chips, Semiconductor Memory RAM and ROM, Auxiliary Memory, Peripheral Devices, Secondary Storage Memory, Magnetic Memories and Hard Disk, Optical Disks and CD Memories.

Output Devices: VDU, CRT Monitor, LCD Displays, Touch Screen Displays, Print Devices Multiprocessor and Multi core Architecture, Flynn Classification SISD, SIMD, MISD, MIMD.

**TEXT BOOK:**

1. Computer Fundamentals - B. Ram - New Age International Publishers
2. Digital logic and Computer Design by Malvino leach
3. Fundamentals of Computer by P. K. Sinha
4. W. Hayes, Computer Architecture, McGraw-Hill
5. Microsoft Office - Complete Reference - BPB Publication

**REFERENCE BOOKS:**

1. William Stallings, "Computer Organization & Architecture", Pearson.
2. BARTEE, "Digital Computer Fundamentals" TMH Publication
3. MORRIS MANO, "Computer System Architecture" PHI

**Instruction to paper Setter:**

Question paper should be framed in both English and Hindi version.

**Lab for B.Sc. (IT) First Year based on paper-I****Suggested list of practical in MS-Word & Excel:**

1. Create a banner of college using MS- Word
2. Design a greeting card using WORD ART
3. Create your biodata and use page borders and shading in MS-Word
4. Create a document, insert header, footer, page title, page number using MS-Word
5. Implement Mail-merge
6. Insert table in MS-Word document
7. Create a marksheet using MS-Excel
8. Creation and printing of types of graphs in Excel
9. Built-in functions in Excel

**PowerPoint Presentation:**

Creating & editing of presentation; Inserting SmartArt, Object, Tables, Charts & Media files. Use of Transition & Animation in the presentations. Set up a slide Show

Student must do 50 Practical exercises on WORD, EXCEL & POWERPOINT in their practical notebook/Print file.

**B.Sc. (IT) First Year**  
**Second Paper**  
**Programming & Problem Solving through C & C++**

**Maximum Marks: 40**

**Unit I**

History of C, C Character Set, Keywords and Identifiers, Tokens, Basic Structure of C Program, Types of Constants, Data Types, Variables, Type Casting, Operators and Expressions, Input and Output Management in C. Control Statements: if, if...else, switch....case, while, do...while, for Loops, Nested Loops, break and continue, exit statements and goto statement. Functions: Definition, Library Functions User Defined Functions, Function Prototype, Function Definition, Function Call, Types of User Defined Functions.

**Unit II**

Arrays: Array Definition, One Dimensional Array, Two Dimensional Array, Arrays and Functions. String Handling: String Library Functions: *strlen*, *strcat*, *strcmp*, *strcpy*, *strrev*.  
Pointer: Introduction to Pointer, Understanding Pointers, Declaring Pointer Variables, Pointer and Function (Call By Value and Call By Reference), Pointer and Arrays, Pointer and Strings, Pointer and Structure, Pointer to Pointer. Storage Class: Types of Storage Class: auto, register, static, extern.

**Unit III**

Object Oriented: Procedure-Oriented Programming versus Object-Oriented Programming, Basic concepts of OOPs, Advantages of OOPs, Object Oriented Languages. Introduction to C++ Structure of C++ program. Classes and Objects Specifying a Class, Defining Member Functions, Inline Functions, Default Arguments, Function Overloading, Friend and Virtual Functions. Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Array of Objects, Objects as Function Arguments, Returning Objects, Pointers to Members.

**Unit IV**

Constructors and Destructors Constructors, Parametric Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructor, Destructors. Operator Overloading and Type Conversions Definition, Overloading Unary Operators, Binary Operators, Binary Operators using Friends, Rules for Overloading Operators. Inheritance Defining Derived Classes, Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes. Inheritance Defining Derived Classes, Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes.

**Unit V**

Pointers, Virtual Functions and Polymorphism Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions. Operations C++ Streams, C++ Stream Classes, Managing Output with Manipulators. Working with Files Classes for File Stream Operations, Opening and Closing a File, Detecting EOF, File Pointers, Updating a File, Error Handling During File Operations.

**Text Books:**

1. E. Balagurusamy, "Programming in ANSI C", TMH, 5th Ed., ISBN 0-07-068182-1
2. A first course in Programming with C, T. Jeypooan
3. Object Oriented Programming with C++ By E. Balagurusamy, TMH.

**References Books:**

1. Programming in C++ By Robert Lafore.
2. ISRD-Object Oriented Programming with C++, TMH
3. C++ the complete reference By Herbert Schildt, TMH
4. Mastering C++, Venugopal, TMH
5. Let Us C, Yashavant P. Kanetkar

**Instruction to Paper Setter:** Question Paper should be framed in both English and Hindi version.

**Lab for B.Sc. (IT) First Year based on paper-II****Practical:**

1. A program to find simple and compound interest for the rate of interest.
2. A program to find corresponding temperature in Fahrenheit from a given temperature in Celsius.
3. A Program to accept decimal number and display equivalent number in Octal and Hexadecimal.
4. A program to swap the contents of two variables.
5. Program to accept the distance between two cities in kilometers and print the distance in meter, feet, inches and centimeter.
6. Program to accept the two sides and angle included by these two sides to find area and third side of a Triangle.
7. A program to check whether a given number is even or odd.
8. A program for check whether a given year is leap year.
9. A program to find largest among any five given numbers with minimum condition.
10. A program to find roots of Quadratic equation  $ax^2+bx+c$ .
11. A program to print all the prime number between 10 to 100.
12. A Program to print multiplication Table of a number.
13. A program to print number, square and cube of the first 10 natural number.
14. A program to find the factorial of an integer number.
15. A program to generate and print Fibonacci sequence.
16. A program to find the GCD of two Positive integers by successive division.
17. A Program to find the number of Armstrong number between 123 to 425.
18. A program to print truth table from  $X * Y + Z$ .
19. A Program to generate a menu driven program using switch statement to 1) Add 2) Edit 3) Delete 4) Exit an element from a list of given n numbers stored in array..
20. A Program to find sum of two matrices having size  $m*n$  and  $p*q$ .
21. A Program to Transport the matrix of size  $M*N$ .
22. A Program to delete an element from list of N numbers.
23. A Program to find sum of each row and column of matrix and also find largest and smallest element in the given matrix.
24. A program to count number of characters including uppercase and lowercase letter, digits, punctuations, space and words that are entered in a given string.
25. A Program to accept the containing 10 number and pass it to function to print it.

**Note: Student must write/run 50 programmes on their practical file & Computer lab.**

**Department of Higher Education, Govt., of M P**

**B.Sc. Annual Examination System wise syllabus**

**Recommended by Central Board of studies**

**Session: 2017-18**

Max. Marks	: 42.5
Class	: B. Sc.
Year	: First
Subject	: Mathematics
Paper	: First
Title	: Algebra and Trigonometry

Unit-1	Rank of Matrix, Normal and Echelon form of a matrix. Characteristic equations of a matrix. Eigen values, Eigen vectors, Linear Independence of row and column matrix.
Unit-2	Cayley Hamilton theorem and its use in finding inverse of a matrix. Application of matrix to solve a system of linear (homogenous and non-homogenous) equations, theorems on consistency and inconsistency of a system of linear equations. Solving linear equations up to three unknowns.
Unit-3	Relation between the roots and coefficients of a general polynomial equation in one variable, transformation of equations. Reciprocal equations. Descarte's rule of sign.
Unit-4	Logic – Logical connectives, Truth Tables, Tautology, Contradiction, Logical Equivalence, Algebra of Propositions, Boolean Algebra – definition and properties, switching circuits and its applications, logic gates and circuits.
Unit-5	De – Moivre's theorem and its applications, direct and inverse circular and hyperbolic functions, expansion of trigonometric functions, logarithm of complex quantities, Gregory's series, summation of trigonometrical series.

**Text Books:**

1. S. L. Loney - Plane Trigonometry Part-11.
2. K.B. Datta - Matrix and Linear Algebra. Prentice Hall of India Pvt. Ltd. New Delhi 2000.
3. Chandrika Prasad - A Text Book on Algebra and Theory of Equations, Pothishala Pvt. Ltd., Allahabad.
4. C. L. Liu- Elements of Discrete Mathematics (Second Edition). McGraw Hill, International Edition, Computer Science Series, 1986.

**Reference Books:**

1. H.S. Hall and S.R. Knight- Higher Algebra H.M Publication. 1994.
2. N. Jacobson- Basic Algebra Vol. I and II W. H. Freeman.
3. I. S. Luther and I. B. S. Passi- Algebra Vol. I and II Narosa Publishing House.
4. N. Saran and R. S. Gupta- Analytical Geometry of Three Dimension. Pothishala Pvt. Ltd. Allahabad.



**Department of Higher Education, Govt. of M. P.**  
**B.Sc. Annual Examination System wise syllabus**  
**Recommended by Central Board of studies**

**Session: 2017-18**

Max. Marks	:	42.5
Class	:	B.Sc.
Year	:	First
Subject	:	Mathematics
Paper	:	Second
Title	:	Calculus and Differential Equations

Unit-1	Successive differentiation. Leibnitz theorem. Maclaurin's and Taylor's series expansions. Asymptotes.
Unit-2	Curvature, tests for concavity and convexity, points of inflexion, multiple points, tracing of curves in cartesian and polar coordinates.
Unit-3	Integration of transcendental functions, Definite Integrals, Reduction formulae, Quadrature, Rectification.
Unit-4	Linear differential equations and equations reducible to the linear form. Exact differential equations, first order and higher degree equations solvable for x, y and p, Clairaut's equation and singular solutions, geometrical meaning of a differential equation. Orthogonal trajectories.

Unit-5	Linear differential equation with constant coefficients. Homogeneous linear ordinary differential equations. Linear differential equations of second order. transformation of equations by changing the dependent variable independent variable, method of variation of parameters.

**Text Books:**

1. Gorakh Prasad- Differential Calculus. Pothishala Private Ltd., Allahabad.
2. Gorakh Prasad- Integral Calculus. Pothishala Private Ltd., Allahabad.
3. D. A. Murray- Introductory Course in Differential Equations. Orient Longman (India) 1967.

**Reference Books:**

1. G. E. Simmons- Differential Equations, Tata McGraw Hill. 1972.
2. E. A. Codington- An Introduction to ordinary differential Equation. Prentice Hall of India. 1961.
3. H. T. H Piaggio- Elementary Treatise on Differential Equations and their Application, C. B.S. Publisher & Distributors, Delhi. 1985.
4. S. G. Deo- Differential Equations. Narosa Publishing House.
5. N. Piskunov - Differential and Integral Calculus. Peace Publishers. Moscow.

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**Session: 2017-18**

Max. Marks	:	42.5
Class	:	B.Sc.
Year	:	First
Subject	:	Mathematics
Paper		Third
Title		Vector Analysis and Geometry

Unit-1	Scalar and vector product of three vectors, product of four vectors. Reciprocal: vectors, vector differentiation. Gradient. Divergence and curl.
Unit-2	Vector Integration, Theorems of Gauss. Green. Stoke (without proof) and problems based on them.
Unit-3	General equation of second degree, tracing of conics, system of conics, polar equation of a conic.
Unit-4	Equation of cone with given base, generators of cone, condition for three mutually perpendicular generators. Right circular cone, equation of cylinder and its properties.
Unit-5	Central conicoids, Paraboloids, plane sections of conicoids. Generating lines.

**Text Books:**

1. N. Saran and S. N. Nigam- Introduction to Vector Analysis. Pothishala Pvt. Ltd. Allahabad.
2. Gorakh Prasad and H. C. Gupta-Text Book on Coordinate Geometry. Pothishala Pvt. Ltd. Allahabad.
3. N. Saran and R.S. Gupta- Analytical Geometry of Three Dimension. Pothishala Pvt. Ltd. Allahabad (Unit IV).

**Reference Books:**

1. R. J. T. Bell- Elementary Treatise on Coordinate Geometry of Three Dimensions. Macmillan India Ltd., 1994(Unit-V).
2. Murray R. Spiegel-Theory and Problems of Advance Calculus. Schaum Publishing Company. New York.
3. Murray R. Spiegel-Vector Analysis. Schaum Publishing Company. New York.
4. Shanti Narayan-A Text Book of Vector Calculus, S. Chand & Co., New Delhi.
5. Shanti Narayan- A Text Book of Vector Algebra. S. Chand & Co., New Delhi.
6. S. I. Loney-The Elements of Coordinate Geometry. Macmillan and Company. London.
7. P. K. Jain and Khalil Ahmad- A text book of Analytical Geometry of Two Dimensions. Macmillan Indian Ltd., 1994
8. P. K. Jain and Khalil Ahmad- A text book of Analytical Geometry of Three Dimensions. Willey Eastern Ltd., 1999.

**Under Graduate (UG) Annual Syllabus as Recommended by Central Board of Studies  
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(w. e. f. session 2017-2018)**

**Class: B.Sc. First Year**  
**Max. Marks: 40 + (CCE) 10 = 50**

**Subject : Physics**

**Paper : 1**

**Title of Paper : Mathematical Physics, Mechanics and Properties of Matter**

**Unit-I: Mathematical Physics [15 Lectures]**

Addition, subtraction and product of two vectors; Polar and axial vectors and their examples from physics: Triple and quadruple product (without geometrical applications): Scalar and vector fields: Differentiation of a vector; Repeated integral of a function of more than one variable; Unit tangent vector and unit normal vector; Gradient, Divergence and Curl: Laplacian operator; Idea of line, surface and volume integrals; Gauss', Stokes' and Green's Theorems.

**Unit-II: Mechanics [115 Lectures]**

Position, velocity and acceleration vectors, Components of velocity and acceleration in different coordinate systems. Newton's Laws of motion and its explanation with problems, various types of forces in nature (explanation). Pseudo Forces (e.g. Centrifugal Force), Coriolis force and its applications. Motion under a central force. Derivation of Kepler's laws. Gravitational law and field. Potential due to a spherical body. Gauss & Poisson's equation of Gravitational self-energy. System of particles. Centre of mass and reduced Mass. Elastic and inelastic collisions.

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**Unit-III: General Properties of Matter** **[15 Lectures]**

Elastic moduli and their relations, Determination of  $Y$  of rectangular thin bar loaded at the centre; Torsional oscillations, Torsional rigidity of a wire, to determine by torsional oscillations. Surface Tension, Angle of Contact Capillary Rise Method; Energy required to raise a liquid in capillary tube; factors affecting surface tension; Jaeger's method for Determination of surface tension: Applications of Surface Tension. Concept of Viscous Forces and Viscosity; Stead) and Turbulent Flow, Reynolds's number; Equation of Continuity; Bernoulli's Principle; Application of Bernoulli's equation - (i) Speed of Efflux (ii) Venturimeter (iii) Aspirator Pump(iv) Change of plane of motion of a spinning ball.

**Unit-IV: Oscillations** **[15 Lectures]**

Concept of Simple, Periodic & Harmonic Oscillation with illustrations; Differential equation of harmonic oscillator; Kinetic and potential energy of Harmonic Oscillator; Oscillations of two masses connected by a spring; Translational and Rotational motion, Moment of Inertia and their Product, Principal moments and axes, Motion of Rigid Body, Euler's equation.

**Unit-V:** **[15 Lectures]**

*Relativistic Mechanics:* Michelson-Morley experiment and its outcome; Postulates of Special Theory of Relativity; Lorentz Transformations. Simultaneity and order of events; Lorentz contraction; Time dilation; Relativistic transformation of velocity, frequency and wave number: Relativistic addition of velocities: Variation of mass with velocity.

*Earlier Developments in Physics up to 18th Century:* Contributions of Aryabhata.  
Archimedes, Nicolus Copernicus, Galileo Galilei, Huygens, Robert Hooke.

**Reference Books:**

1. University Physics: Sears and Zeemansky, XI<sup>th</sup> edition, Pearson Education
2. Concepts of Physics: H.C. Varma, Bharati Bhavan Publishers
3. Problems in Physics: P. K. Srivastava. Wiley Eastern Ltd.
4. Berkley Physics Course. Vol I, Mechanics: E.M. Purcell, McGraw hill
5. Properties of Matter: D. S. Mathur. Shamlal Chritable Trust. New Delhi
6. Mechanics: D.S. Mathur. S Chand and Company, New Delhi-5.
7. The Feymman Lectures in Physics Vol. I: R. P. Feymman, R.B. Lighten and M. Sands

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**Class: B.Sc. First Year**  
**Max. Marks: 40 + (CCE) 10= 50**

Subject : **Physics**  
Paper : **2**  
Title of Paper : **Thermodynamics and Statistical Physics**

**Unit-I: Thermodynamics-1 [15 Lectures]**

Reversible and irreversible process. Heat engines, Definition of efficiency, Carnot's ideal heat engine, Carnot's cycle, Effective way to increase efficiency, Carnot's engines and refrigerator. Coefficient of performance, Second law of thermodynamics. Various statements of Second law of thermodynamics. Carnot's theorem. Clapeyron's latent heat equation. Carnot's cycle and its applications. Steam engine. Otto engine. Petrol engine. Diesel engine.

**Unit II: Thermodynamics-II [15 Lectures]**

Concept of entropy. Change in entropy in adiabatic process. Change in entropy in reversible cycle. Principle of increase of entropy. Change in entropy in irreversible process. T-S diagram, Physical significance of Entropy, Entropy of a perfect gas, Kelvin's thermodynamic scale of temperature, The size of a degree, Zero of absolute scale, Identity of a perfect gas scale and absolute scale. Third law of thermodynamics, Zero point energy. Negative temperatures (not possible). Heat death of the universe. Relation between thermodynamic variables (Maxwell's relations)

**Unit-III: Statistical Physics-I [15 Lectures]**

Description of a system: Significance of statistical approach, Particle-states, System-states, Microstates and Macro-states of a system, Equilibrium states, Fluctuations, Classical & Statistical Probability, The equi-probability postulate. Statistical ensemble. Number of states accessible<sup>^</sup> to a system. Phase space. Micro Canonical Ensemble. Canonical Ensemble.



Helmholtz free energy, Enthalpy, First law of thermodynamics, Gibbs free energy, Grand Canonical Ensemble.

**Unit-IV: Statistical Physics-II [15 Lectures]**

**Statistical Mechanics:** Phase space. The probability of a distribution. The most probable distribution and its narrowing with increase in number of particles. Maxwell-Boltzmann statistics, Molecular speeds, Distribution and mean, r. m. s. and most probable velocity. Constraints of accessible and inaccessible states.

**Quantum Statistics:** Partition Function. Relation between Partition Function and Entropy, Bose-Einstein statistics, Black-body radiation. The Rayleigh-Jeans formula. The Planck radiation formula, Fermi-Dirac statistics. Comparison of results. Concept of Phase transitions.

**Unit-V: Contributions of Physicists [15 Lectures]**

S.N. Bose, M.N. Saha, Maxwell. Clausius, Boltzmann. Joule, Wien, Einstein, Planck. Bohr, Heisenberg, Fermi. Dirac, Max Born, Bardeen.

**Text and Reference Books:**

**Heat and Thermodynamics:** Mark W. Zemansky. Richard H. Dittman. Seventh Edition. McGraw-Hill International Editions.

**Thermal Physics (Heat and Thermodynamics):** A.B. Gupta, H. P. Roy. Books and Allied (P) Ltd. Calcutta.

**Department of Higher Education, Government of Madhya Pradesh**

3. **Heat and Thermodynamics:** Brijlal and N. Subrahmanyam, S. Chand & Company Ltd. New Delhi.
4. Berkley Physics Course. Vol 3. Thermodynamics: F. Reif. McGraw Hill
5. **Thermodynamics and Statistical Physics,** D. P. Khandelwal and A. K. Pandey, Himalaya Publication.
6. **Laboratory manual of Physics for undergraduate classes.** D. P. Khandelwal, Vani publishing house, New Delhi.

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**Class: B.Sc. First Year**

**Max. Marks: 50**

Subject                      **Physics**

**For Regular Students**

Practical	Sessional	Viva	Total
25	10	15	50

**For Ex-Student**

Practical	Sessional	Viva	Total
35	00	15	50

**List of Practical's**

- To verify laws of parallel and perpendicular axes for moment of inertia.
- To determine acceleration due to gravity using compound pendulum.
- To determine damping coefficient using a bar pendulum.
- To determine Young's Modulus by bending of beam method.
- To determine Young's Modulus using Cantilever method.
- To determine coefficient of rigidity by static method.
- To determine coefficient of rigidity by dynamic method.
- To determine Surface Tension by Jaegers s method.
- To determine Surface Tension of a liquid by capillary rise method.
- To determine Viscosity of fluid using Ponselle's method.
- To study conversion of mechanical energy into heat using Calendar & Barne's method.
- To determine heating efficiency of electrical Kettle with various voltages.
- To determine heating temperature coefficient of resistance using platinum resistance thermometer.
- To determine thermo electromotive force by a thermocouple method.
- To determine heating efficiency of electrical Kettle with various voltages.
- To determine heat conductivity of bad conductors of different geometry by Lee's method.
- To verify Newton's Laws of cooling.
- To determine specific heat of Coefficient of thermal conductivity by Searl's method.
- To determine specific heat of a liquid.
- To compare Maxwell-Boltzmann, Bose Einstein and Fermi-Dirac Distribution function vs. temperature using M.S. Excel / C++.
- To plot equation of state and Vander-wall equation with temperature using M.S. Excel

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**Academic Year (2017-2018)**

**B. Sc. I**

**There will be Three sections of a Question Paper Section (A) Contains 5 Objective Question of 1/2 Mark each Section (B) Contains 5 Short answer type question of 02 Marks each section (c) contains 5 long answer type question of 06 marks each**

**1. For Regular students:**

<b>Section (A)</b>	<b>Objective Questions</b>	<b>5</b>		<b>2.5</b>
<b>Section (B)</b>	<b>Short Questions</b>	<b>5</b>	<b>2</b>	<b>10</b>
<b>Section (C)</b>	<b>Main Question</b>	<b>5</b>	<b>6</b>	<b>30</b>
		<b>Total Marks</b>		<b>42.5</b>

<b>Section (A)</b>	<b>Objective Questions</b>	<b>5</b>	<b>1</b>	<b>5</b>
<b>Section (B)</b>	<b>Short Questions</b>	<b>5</b>	<b>2</b>	<b>10</b>
<b>Section (C)</b>	<b>Main Question</b>	<b>5</b>	<b>7</b>	<b>35</b>
		<b>Total Marks</b>		<b>50</b>

**Department of Higher Education, Government of Madhya Pradesh**  
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**B.Sc. (IT) Second Year**  
**First Paper**  
**Operating System Concepts & Computer Network**

**Maximum Marks: 40**

**Unit -1**

Introduction to Operating Systems, Operating system services, multiprogramming, time sharing system, real time systems, storage structures, system calls, multiprocessor system. Basic concepts of Process, states and process scheduling algorithms. Unix Commands: Files and Directories, File permission, Basic Operation on Files, Changing Permission Modes, Standard files, Processes Inspecting Files, Operating On Files, Printing Files, Rearranging Files, Sorting Files, Splitting Files, Translating Characters, On line communication, Off line communication. VI EDITORS General characteristics, Adding text and Navigation, changing text, searching for text, copying and Moving text.

**Unit-II**

Deadlock problem, deadlock prevention, deadlock avoidance, deadlock detection, Methods for deadlock handling. Concepts of memory management, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation. Concepts of virtual memory, demand paging, page replacement algorithms. Disk scheduling basics.

**Unit-III**

Computer Network: Definition and fundamentals of networks, Goals and Applications, Reference models - OSI and TCP/IP. A Comparative study. LAN, MAN and WAN and topologies, LAN components - File server, Workstations, Network Adapter Cards. Connection Oriented and Connection less services, Switching Techniques - Circuit Switching, Packet Switching. Data Link Layer: Error Detection: Parity Check, Check Sum and Cyclic Redundancy Check (CRC); Correction Technique: Hamming code, Ethernet, token bus & token ring.

**Unit-IV**

Data Link Protocols: Flow Control: An Unrestricted Simplex Protocol, Simplex Stop-and-Wait Protocol, Sliding Window Protocols: One-Bit Sliding Window Protocol Go Back N and Selective Repeat. MAC Sub layer: Multiple access protocols: Aloha, CSMA Protocols; Collision- Free Protocols; IEEE MAC Sub layer protocols: 802.3, 802.4, 802.5 and their management.

**Unit - V**

Routing Algorithms: Optimality Principle, Flooding, Distance Vector Routing. Link State Routing, The Network Layer in the Internet: Internet Protocol, Internet addressing and Internet Control protocols. Transport Layer: The Internet Transport Protocol UDP: Introduction to UDP. Introduction to TCP. Application layer: Client Server Architecture, DNS, WWW and HTTP, Cookies, Proxy Server. E-mail Protocols (SMTP, POP3, IMAP, MIME), FTP, TELNET.

**Text Books:**

1. Computer Networks, Andrew S. Tanenbaum, Addison-Wesley, 4th Ed.

2. Data Communications and Networking, B.A. Frouzan, McGraw-Hill.
3. Operating System Concepts by Silberschatz, Galvin and Gagne.

**Reference Book:**

1. Operating system Design & Concept by Milan Milenkovic
2. Operating System by Peterson
3. Unix Operating Systems, Sumitabh Das, Tata McGraw Hill publication.
4. Unix System Administration Handbook (Second edition), Evi Nemeth, Garth Synder, Scott Seebass, Trent R Hein, Pearson Education - Asia, 2000.
5. Design of UNIX Operating System, Maurice J. Back, Pearson Education - Asia.

**Instruction to Paper Setter:**

Question Paper should be framed in both English and Hindi version.

**Lab for B.Sc. (IT) Second Year based on paper-I****Exercises on Unix:**

1: Demonstrate the following unix/linux commands:

- i) ls
- ii) cat
- iii) mkdir
- iv) cp
- v) pwd
- vi) chmod with its options, cal, date, who, tty, lp, stty.

2: Explain basic commands for following operations:

- i. Connecting to the system
- ii. Disconnecting from the system
- iii. Text and graphic mode
- iv. Changing your password
- v. Navigating through the file system
- vi. Determining file type
- vii. Looking at text files
- viii. Finding help
- ix. List the different types of file comparisons command.

3: Demonstrate all types of disk related commands.

4: Demonstrate following unix/linux commands:

- (i) md (ii) rm (iii) file (iv) less

5: Demonstrate the following unix/linux commands

- (i) head (ii) tail (iii) wc (iv) paste (v) sort

**B.Sc. (IT) Second Year**  
**Second Paper**  
**Internet Programming using JAVA**

**Maximum Marks: 40**

**Unit-I**

Introduction Static & Dynamic Web Pages & Web sites, HTML Forms, scripting languages, Introduction to HTTP, web Server and application Servers, Installation of Application servers, Configuration files, Web.xml. Internet and WWW, JAVA environment, JAVA program structure, Tokens, Statements, JAVA virtual machine, Constant & Variables, Data Types, Type Casting.

Operators: Arithmetic, Relational, Logical Assignments, Increment and Decrement, Conditional, Bitwise, Special etc. *If* statement, *if..else..statement*, Nesting of *if..else...* statements, *else...if* Ladder, Switch, Loops - *while*, *do*, *for* Loops.

**Unit-II**

Defining a Class, Adding Variables and Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members.

Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract methods and Classes, Visibility Control.

Arrays: One Dimensional & Two Dimensional, strings, Defining Interface, Extending Interface, Implementing Interface, Accessing Interface Variable, Packages (Basic Knowledge).

**Unit-III**

Local and Remote Applets v/s Applications, Writing Applets, Applets Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, Passing Parameters to Applets, Aligning the Display.

**Unit-IV**

Java Servlet, Servlet Development Process, Deployment Descriptors, The Generic Servlet Lifecycle. Servlet Packages, Classes, Interfaces, and Methods. Handling Forms with Servlets. Various methods of Session Handling.

Java Database Connectivity: various steps in process of connection to the database, various type of JDBC Driver.

**Unit-V**

JSP Basics: JSP lifecycle, directives, scripting elements, standard actions, implicit objects.

Writing JSPs. Expression Language (EL), Separating Business Logic and Presentation Logic, Connection of JSP with different database viz. Oracle, MS-SQL Server, MySQL.

java.sql Package. Type of Statements, Connection pooling: multiple users and need of connection pooling, Session handling in JSP.

**TEXT BOOKS:**

1. E. Balaguruswamy, "Programming In Java", 2nd Edition, TMH Publications ISBN.
2. "Core Servlets and Java Server Pages", 2nd edition, Marty Hall, Larry Brown, Pearson Education.
3. Marty Hall, Larry Brown, "Core Servlets and Java Server Pages", 2nd edition, Pearson Education

**REFERENCE BOOKS:**

1. Peter Norton, "Peter Norton Guide To Java Programming", Techmedia Publications.
2. "Professional Java Server Programming", S. Allamaraju Wrox Press
3. "Struts Recipes", G. Franciscus, Manning Press
4. "Hibernate in Action", C. Bauer, G. King, Manning Press

**Instruction to Paper Setter:**

Question Paper should be framed in both English and Hindi version.

**Lab for B.Sc. (IT) Second Year based on paper-II****Suggested List of Practical:**

1. Write a servlet that prints "Hello World"
2. Write a servlet that knows to whom it's saying hello, This servlet must be called from an HTML page taking user name as input. (Use both get and post method)
3. Write a servlet that counts and displays the number of times it has been accessed since the last server reboot.
4. Write a servlet that counts the times it has been accessed, the number of instances created by the server, and the total times all of them have been accessed.
5. Write a servlet that counts and displays the number of times it has been accessed, and reads an init parameter to know what at what number to begin counting.
6. This servlet counts and displays the number of times it has been accessed, and saves the count to a file in its destroy() method to make the count persistent.
7. Write a servlet that searches for prime numbers above one quadrillion. The algorithm it uses couldn't be simpler: it selects odd-numbered candidates and attempts to divide them by every odd integer between 3 and their square root. If none of the integers evenly divides the candidate, it is declared prime. It's disabled to let the server's CPU handle important tasks.
8. Write a servlet that prints the name and value for all of its init parameters.
9. Write a servlet that displays information about its server (The process is called Snooping).
10. Write a servlet that snoops the server's servlet and Java version.

**Notes: Student must write/run 50 programmes on their practical file & Computer lab.**



## Department Of Higher Education, Govt., of M. P.

### Scheme of Examination and Syllabus for Annual Exam System

B. Sc. II Year

Academic Session: 2018-2019

Recommended by Central Board of Studies

Paper Number & Title of the Paper	Paper-wise Maximum Marks	Total Theory Marks	Minimum Passing Marks in Theory	Internal Assessment Maximum Marks.	Minimum Passing Marks in Internal Assessment	Practical Maximum Marks	Practical Passing Marks	Total
I- Abstract Algebra	42.5	127.5	42	1st term- (3 Months) 7.5	8			150
II- Advanced calculus	42.5			(6 Months) 15				
III- Differential Equations	42.5							

**Note:** There will be three sections in each paper. All questions from each section will be compulsory.

Section A (5 Marks): This section will contain 5 objective type questions, one from each unit, with the weightage of 1 mark.

Section B (12.5 Marks): This section will contain 5 short answer type questions (each having internal choice), one from each unit, with the weightage of 2.5 marks.

Section C (25 Marks): This section will contain 5 long answer type questions (each having internal choice), one from each unit, with the weightage of 5 marks.

There should be 12 teaching periods per week for Mathematics like other Science Subjects

(6 Period Theory - 6 Period Practical)

**Department of Higher Education, Govt., of M. P.**  
**B.Sc. /B.A. Annual Examination System wise syllabus**  
**Recommended by Central Board of studies**

**Session: 2018-19**

Max. Marks : 42.5  
 Class : B.Sc. /B.A.  
 Year : Second  
 Subject : Mathematics  
 Paper : First  
 Title : Abstract Algebra

Unit-1	Definition and basic properties of groups, subgroups, subgroups generated by a subset, Cyclic groups and simple properties.
Unit-2	Coset decomposition. Lagrange's theorem and its corollaries including Fermat's theorem. Normal subgroups. Quotient groups.
Unit-3	Homomorphism and Isomorphism of groups, fundamental theorem of homomorphism. Transformation and Permutation group. $S_n$ (various subgroups of $S_n$ $n < 5$ to be studied). Cayley's theorem.
Unit-4	Group Automorphism. Inner Automorphism, group of Automorphisms. Conjugacy relation and Centraliser. Normaliser. Counting principle and class equation of a finite group. Cauchy's theorem for finite abelian groups and non-abelian groups.

Unit-5	Definition and basic properties of rings. Ring homomorphism subrings. Ideals and Quotient rings. Polynomial rings & its properties. Integral domain and Field.
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**Text Books:**

1. I. N. Herstein-Topics in Algebra. Wiley Pastern Ltd. New Delhi. 1977.
2. PB Bhattacharya. S. K. Jain and S R Nagpaul-Basic Abstract Algebra. Wiley Pastern, New Delhi. 1997

**Reference Books:**

1. Shantinarayan-A text Book of Modern Abstract Algebra, S. Chand and Company. New Delhi.
2. Surjeet Singh- A Text Book of Modern Algebra.
3. N. Jacobson- Basic Algebra. Vol. I and II, W. II Freeman.
4. I. S. Luther and I. B. S. Passi- Algebra. Vol. I and II, Narosa Publishing House.

**Department of Higher Education, Govt., of M.P.**  
**B.Sc./B.A. Annual Examination System wise syllabus**  
**Recommended by Central Board of studies**

**Session: 2018-19**

Max. Marks	:	42.5
Class	:	B.Sc.
Year	:	Second
Subject	:	Mathematics
Paper	:	Second
Title	:	Advanced calculus

Unit-1	Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion, series of non-negative terms. Comparison test. Cauchy's integral test. Cauchy's root test, ratio tests. Raabe's tests, logarithmic tests. Alternating series. Leibnitz's test. Absolute and conditional convergence.
Unit-2	Continuity of functions of single variable, sequential continuity. Properties of continuous functions. Uniform continuity, chain rule of differentiability. Mean value theorems and their geometrical interpretations. Darboux's intermediate value theorem for derivatives.
Unit-3	Limit and continuity of functions of two variables. Partial differentiation, Change of variables. Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables. Jacobians.

Unit-4	Envelopes, Evolutes. Maxima and Minima of functions of two variables. Lagrange's multiplier method. Beta and Gamma Functions.
Unit-5	Double and triple integrals, volumes and surfaces of solids of revolution Dirichlet's integrals, change of order of integration in double integrals.

**Text Books:**

1. R. R. Goldbeg -Real Analysis. Oxford & I.B.H. Publishing co. New Delhi
2. Gorakh Prasad- Differential Calculus. Pothishala Pvt. Ltd. Allahabad.
3. Gorakh Prasad- Integral Calculus, Pothishala Pvt. Ltd. Allahabad

**Reference Books:**

1. Gabriel Klaumber- Mathematical Analysis. Marcel Dekkar. Inc. New York. 1975
2. T. M. Apostol- Mathematical Analysis. Narosa Publishing House. New Delhi. 1985
3. D. Soma Sundaram and B. Choudhary- A first Course in mathematical Analysis. Narosa Publishing. House, New Delhi, 1997.
4. Murray R. Spiegel- Theory and problems of advance Calculus. Schauma Publishing Co. New York
5. O. E. Stanaitis- An Introduction to Sequences, Series and improper Integrals.

**Department of Higher Education, Govt., of M. P.**  
**B.Sc. Annual Examination System wise syllabus**  
**Recommended by Central Board of studies**

**Session: 2018-19**

Max. Marks	:	42.5
Class	:	B.Sc.
Year	:	Second
Subject	:	Mathematics
Paper	:	Third
Title	:	Differential Equations

Unit-1	Series solutions of differential equations. Power series method, Bessel and Legendre equations, Bessel's and Legendre's functions and their properties- recurrence and generating function. Orthogonality of functions.
Unit-2	Laplace Transformation. Linearity of the Laplace transformation. Existence theorem for Laplace transforms. Laplace transforms of derivatives and integrals. Shifting theorems. Differentiation and integration of transforms.
Unit-3	Inverse Laplace transforms. Convolution theorem. Application of Laplace transformation in Solving linear differential equations with constant coefficients.
Unit-4	Partial differential equations of the first order. Lagrange's solution. Some special types of equations which can be solved easily by methods other than the general method. Charpit's general method.

Unit-5	Partial differential equations of second and higher orders. Classification of partial differential equations of second order. Homogeneous and non-homogeneous equations with constant coefficients. Partial differential equations reducible to equations with constant coefficients.
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**Text Book:**

1. Sharma and Gupta- Integral Transform. Pragati. Prakashan Meerut.
2. Sharma and Gupta- Differential Equation. Pragati. Prakashan Meerut.
3. Raysinghania- Differential Equation. S. Chand & Company. New Delhi.

Reference Book:

1. D. A. Murray - Introductory course in differential equation. Orient Longman. India. 1967
2. G. F. Simmons- Differential Equations. Tata McGraw Hill. 1972.
3. E.A. Coddington - An introduction to Ordinary differential equations. Prentice Hall of India. 1961
4. H. T. H. Piaggio - Elementary Treatise on Differential equations and their applications. C. B. S. Publisher and Distributors, Delhi. 1985.
5. E. D. Rainville - Special Functions. The Macmillan Company. New York.

**Under Graduate (UG) Annual Syllabus as Recommended by Central Board of Studies  
and Approved by Governor of M.P.  
(w. e. f. session 2018-2019)**

**Class: B.Sc. Second Year**

**Max. Marks: 40 + (CCE) 10 = 50**

**Subject : Physics**

**Paper : 1**

**Title of Paper : Optics**

**Unit-I Geometrical Optics**

**[15 Lectures]**

Reflection and refraction. Fermat's Principle. Refraction at a spherical surface, Aplanatic points and its applications. Lens formula. Combination of thin lenses and equivalent focal length. Dispersion and dispersive power, chromatic aberration and achromatic combination, different types of aberration (qualitative) and their remedy. Need for multiple lenses in eyepieces, Ramsden and Huygens eye-piece.

**Unit-II Interference of light**

**[15 Lectures]**

The principle of superposition, two slit interference, coherence requirement for the sources, optical path retardations. Lateral shift of fringes, Rayleigh refractometer and other applications. Localised fringes, thin films, interference by a film with two nonparallel reflecting surfaces. Newton's rings. Haidinger fringes (Fringes of equal inclination), Michelson interferometer, its application for precision determination of wavelength, wavelength difference and the width of spectral lines. Intensity distribution in multiple beam interference, Fabry-Perot interferometer and Etalon.

**Unit-III Diffraction**

**[15 Lectures]**

Fresnel's theory of half period zone, diffraction at straight edge, rectilinear propagation. Diffraction at a slit, phasor diagram and integral calculus methods.



**Under Graduate (UG) Annual Syllabus as Recommended by Central Board of Studies  
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(w. e. f. session 2018-2019)**

Diffraction at a circular aperture and a circular disc. Rayleigh criterion of resolution of images. Resolving power of telescope and microscope. Outline of phase contrast microscopy. Diffraction at N-parallel slits, Intensity distribution, Plane diffraction grating, Resolving power of a grating and comparison with resolving power of prism and of a Fabry-Perot etalon.

**Unit-IV Polarisation**

**[15 Lectures]**

Transverse nature of light waves. Polarization of electromagnetic waves. Plane polarised light - production and analysis. Description of Linear, circular and elliptical polarisation. Propagation of electro magnetic waves in anisotropic media, uniaxial and biaxial crystals, symmetric nature of dielectric tensor. Double refraction. Huygen's principle. Ordinary and extraordinary refractive indices, Fresnel's formula, light propagation in uniaxial crystal, Nicol prism. Production of circularly and elliptically polarized light, Babinet compensator and applications, Optical rotation, Optical rotation in liquids and its measurement through Polarimeter.

**Unit-V Laser and Photo Sensors**

**[15 Lectures]**

A brief history of lasers, characteristics of laser light, Einstein prediction. Relationship between Einstein's coefficients (qualitative discussion), Pumping schemes, Resonators, Ruby laser. He-Ne laser, Applications of lasers, Principle of Holography. Photodiodes, Phototransistors, and Photomultipliers.

1. **Fundamentals of Optics:** F.A. Jenkins and H. E. White, 1976, McGraw-Hill.
2. **Principles of Optics:** B. K. Mathur, 1995, Gopal Printing.
3. **University Physics:** F.W. Sears, M.W. Zemansky and H.D. Young, 13/e, 1986. Addison-Wesley.
4. **Optics:** A. K. Ghatak, McGraw Hill Publications.

**Under Graduate (UG) Annual Syllabus as Recommended by Central Board of Studies  
and Approved by Governor of M.P.  
(w. e. f. session 2018-2019)**

**Class: B.Sc. Second Year**

**Max. Marks: 40 + (CCE) 10 = 50**

Subject : **Physics :**

Paper **2**

Title of Paper **Electrostatics, Magneto statics and Electrodynamics**

**Unit-1 Electrostatics**

**[15 Lectures]**

Coulombs law in vacuum expressed in vector forms, calculations of electric field E for simple distributions of charge at rest, dipole and quadruple fields. Work done on a charge in an electrostatic field expressed as a line integral, conservative nature of the electrostatic field. Relation between electric field and electric potential ( $E = - \nabla V$ ), torque on a dipole in a uniform electric field and its energy, flux of the electric field. Gauss's law and its application for finding E for symmetric charge distributions. Capacitors, conducting sphere in a uniform electric field, point charge in front of a grounded infinite conductor. Dielectrics, parallel plate capacitor with a dielectric, dielectric constant, polarization and polarization vector P, relation between displacement vector D, E and P. Molecular interpretation of Clausius-Mossotti equation.

**Unit-2 Magnetostatics**

**[15 Lectures]**

Force on a moving charge. Lorentz force equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field, torque on a current loop, magnetic dipole moment, angular momentum and gyromagnetic ratio. Biot and Savart's law. calculation of H for simple geometrical situations such as Solenoid, Anchor ring. Ampere's Law,  $\nabla \times B = \mu_0 J$ ,  $\nabla \cdot B = 0$ . Field due to a magnetic dipole, free and bound currents, magnetization vector (M), relationship between B, H and M. Derivation of the relation  $\nabla \times M = J$  for non-uniform magnetization.

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and Approved by Governor of M.P.  
(w. e. f. session 201 8-2019)**

**Unit-3 Current Electricity and Bio electricity**

**[15 Lectures]**

Steady current, current density  $J$ , non-steady currents and continuity equation. Kirchhoff's laws and analysis of multiloop circuits, growth and decay of current in LR and CR circuits, decay constants. LCR circuits. AC circuits, complex numbers and their applications in solving AC circuits problems, complex impedance and reactance, series and parallel resonance. Q-factor, power consumed by an A.C. circuit, power factor, Y and A networks and transmission of electric power. Electricity observed in living systems, Origin of bioelectricity.

**Unit-4 Motion of Charged Particles in Electric and Magnetic Fields**

**[15 Lectures]**

*(Note: The emphasis here should be on the mechanical aspects and not on the details of the apparatus mentioned which are indicated as applications of principles involved.)*

AE as an accelerating field, electron gun, discharge tube, linear accelerator, E as deflecting field - CRO, Sensitivity of CRO. Transverse B field;  $180^\circ$  deflection, Mass spectrograph and velocity selector. Curvatures of tracks for energy determination for nuclear particles: Principle and working of Cyclotron, Mutually perpendicular and parallel E & B fields: Positive ray parabolas, Discovery of isotopes. Elements of Mass Spectrographs. Principle of magnetic focusing (lenses).

**Department of Higher Education, Government of Madhya Pradesh**  
**Under Graduate (UG) Annual Syllabus as Recommended by Central Board of Studies**  
**Under Graduate (UG) Annual Syllabus as Recommended by Central Board of Studies**  
**and Approved by Governor of M.P.**  
**(w. e. f. session 2018-2019)**

**Unit-5 Electrodynamics**

**[15 Lectures]**

Electromagnetic induction, Faraday's Laws, Electromotive Force, Integral and differential forms of Faraday's Laws. Self and mutual inductance. Transformers, Energy in a static magnetic field, Maxwell's displacement current, Derivations of Maxwell's equations, Electromagnetic field energy density, Poynting vector, Electromagnetic wave equation, Plane electromagnetic waves in vacuum and dielectric media, reflection at a plane boundary of dielectrics, Fresnel's Laws, Polarization by reflection and total internal reflection, Waves in a conducting media, Reflection and refraction by the ionosphere.

**References:**

1. **Berkley Physics Course:** Electricity and Magnetism Ed. E. M. Purcell McGraw Hill
2. **Physics Volume 2:** D. Halliday and R. Resnick
3. **Introduction to Electrodynamics:** D. J. Griffiths, 4th Edition, Printice Hall
4. **Electricity and Magnetism:** S. S. Atwood Dover
5. **Electrodynamics:** Emi Cossor and Bassin Lorraine, Asahi Shimbunsha Publishing Ltd.
6. **From Neuron to Brain:** Kuffler and Nicholas, Sinauer Associates, Inc. Pub. Sunderland, Masschuetts.
7. **Schaums Outline of Beginning Physics II:** Electricity and Magnetism

**Department of Higher Education, Government of Madhya Pradesh**  
**Under Graduate (UG) Annual Syllabus as Recommended by Central Board of Studies**  
**and Approved by Governor of M.P.**  
(w. e. f. session 2017-2018)

**Class: B.Sc. Second Year**

**Max. Marks: 50**

Subject : **Physics**

**For Regular Students**

Practical	Sessional	Viva	Total
25	10	15	50

**For Ex-Student**

Practical	Sessional	Viva	Total
35	00	15	50

List of Practical:

1. Study of interference using biprism.
2. Study of diffraction at straight edge.
3. Use of plane diffraction grating to determine D1, D2 lines of sodium lamp.
4. Resolving power to telescope.
5. Polarization by reflection and verification of Brewster's Law.
6. Study of optical rotation in Sugar solution.
7. Refractive index and dispersive power of prism using spectrometer.
8. Absorption spectrum of material using constant deviation spectrograph.
9. Beam divergence of He-Ne Laser.
10. Determination of wavelength of laser by Diffraction.
11. Determination of radius of curvature of plano-convex lens by Newton's rings.
12. Characteristics of a Ballistic galvanometer.
13. Setting up and using an electroscopes or electrometer.
14. Measurement of low resistance by Carey-Foster bridge or otherwise.
15. Measurement of inductance using impedance at different frequencies.
16. Measurement of capacitance using impedance at different frequencies.
17. Response curve for LCR circuits and response frequencies.
18. Sensitivity of a cathode-ray oscilloscope.
19. Use of vibration magnetometer to study a field.
20. Study of magnetic field due to current using Tangent Galvanometer.
21. Study of decay of currents in LR and RC circuits.
22. Study of Lissajous figures using CRO.
23. Verification of networks theorem.

**Department of Higher Education, Government of Madhya Pradesh**  
**Under Graduate (UG) Annual Syllabus as Recommended by Central Board of Studies and**  
**Approved by Governor of M. P.**  
**(w. e. I. session 2017-2018)**

**Academic Year (2017-2018)**

**B. Sc II**

**There will be Three sections of a Question Paper Section (A) Contains 5 Objective Question of ½ Mark each Section (B) Contains 5 Short answer type question of 02 Marks each section (c) contains 5 long answer type question of 06 marks each**

<b>Section (A)</b>	<b>Objective Questions</b>	<b>5</b>	<b>½</b>	<b>2.5</b>
<b>Section (B)</b>	<b>Short Questions</b>	<b>5</b>	<b>2</b>	<b>10</b>
<b>Section (C)</b>	<b>Main Question</b>	<b>5</b>	<b>6</b>	<b>30</b>
		<b>Total Marks</b>		<b>42.5</b>

<b>Section (A)</b>	<b>Objective Questions</b>	<b>5</b>	<b>1</b>	<b>5</b>
<b>Section (B)</b>	<b>Short Questions</b>	<b>5</b>	<b>2</b>	<b>10</b>
<b>Section (C)</b>	<b>Main Question</b>	<b>5</b>	<b>7</b>	<b>35</b>
		<b>Total Marks</b>		<b>50</b>

**Yearly Syllabus for Undergraduates**  
**As recommended by Central Board of Studies of Information Technology &**  
**Approved by H E the Governor of Madhya Pradesh**  
**Session 2017-18**  
**JULY 2017 Onwards**  
**Class: B.Sc. (Information Technology)**

**B.Sc. (IT) Third Year**  
**First Paper**  
**DBMS and RDBMS using Oracle**

**Maximum Marks: 40**

**Unit-I**

Traditional File Systems versus Modern Database Systems, Introduction and applications of DBMS, Purpose of data base, Data Independence, Schemas and Instances, Database System architecture, level of abstraction, Database users and DBA, Classification of Database Management Systems, Components of database system.  
ER Model Concept, Components of an ER Model, Attributes, Relationships, Roles, Participation, Constraints on Relationship Types, Strong & Weak entity set, Advance ER Model Features.

**Unit-II**

Database Languages and Interfaces, Evaluation of SQL, Between clause, Distinct Clause, Order by Clause, Group by Clause, SQL Functions, Sub queries, Handling null value, Aggregate function, User Defined Function, View, Join Operations.  
Introduction to Relational Algebra, Relational Model Constraints, Various operations on Relations. Relational Calculus, Introduction, Tuple Relational Calculus, Domain Relational Calculus.

**Unit-III**

Relational Database design, Features of good relational database design, Codd's Rule, Integrity constraints, Keys, Armstrong Axioms, Functional Dependency, Closure Set of Functional Dependency, Closure Set of Attributes, Canonical Cover, 1NF, 2NF, Transitive Dependency & 3NF, BCNF, Multivalued Dependency & 4NF, Join Dependency & 5NF.

**Unit-IV**

Transaction Management, ACID properties, Serializability, Concurrency Control, Lock and types of Locks, Two Phase Locking Protocol, Check Points, Recovery Techniques, Deferred and Immediate data modification.  
Emerging Database Technology, Data Warehouse, Data Mining, Distributed database, Mobile Database, Object Oriented Database, Geographical Database, Query Processing and Query Optimization.

**Unit-V**

PL/SQL Programming using Oracle, Oracle Data types, Looping and Decision Making, Working with Stored Procedure, Trigger, Cursor, Package, Index, Synonym and Sequence. Various Programming Examples.

**TEXTBOOK:**

1. RamezElmasri and Shamkant B. Navathe, "Fundamentals of Database Systems",
2. Database Management System by Seema Kedar, Technical Publication

**REFERENCE BOOK:**

1. C J. Date, A.Kannan and S. Swamynathan, "An Introduction to Database Systems
2. AtulKahate, "Introduction to Database Management Systems",
3. Raghuram Ramakrishnan, "Database Management Systems",
4. G. K.

Gupta, "Database Question Paper should be framed in both English and Hindi version. Management Systems", Tata McGraw Hill, 2011.

**Instruction to Paper Setter:**



**B.Sc. (IT) Third Year  
Second Paper  
Information Technology Trends**

**Maximum Marks: 40**

**UNIT-I**

**Distributed Systems:** Introduction, Distributing the processing and storage function, Concept of Parallel systems, Difference between parallel & Distributed systems, Advantages & Disadvantages of Parallel and Distributed system, wireless networks, Architecture of Distributed systems, Security of Distributed system, Services of distributed system.

**E-Supply Chain Management:** Introduction, E-Supply-Chain components, E-Supply- Chain architecture, Major Trends in E-SCM, Examples of using E-SCM.

**E-Customer Relationship Management (E-CRM):** Customer Relationship management concepts. How technology can help in this? E-CRM solutions, advantages, E- CRM capabilities, Data Mining & E-CRM, Examples of using E-CRM.

**Enterprise Resource Planning concepts.**

**UNIT-II**

**DATAWAREHOUSE AND DATA MARTS:** Introduction, Advantages of data warehouse, Data warehouse components, Summarised data, Current details, System of records, Integration and transformation programs, Archives, Metadata, Structure of a data warehouse, Uses of a data warehouse, Standards reports and queries, Queries against summarised data, Data mining, Interface with other warehouse.

**DATA MINING:** Introduction, Evolution of data mining, Data mining -verification versus discovery, Advantages of data mining, Technologies used in data mining.

**Big Data concepts, Introduction to HADOOP**

**UNIT-III**

**Mobile Commerce:** Introduction, Growth, Success stories of Mobile commerce, Technologies for mobile commerce, WAP & its basics, WAP programming model, other wireless technology, different generations in wireless communications, GSM versus CDMA security issues, M-Commerce in India.

**GEOGRAPHIC INFORMATION SYSTEM (GIS):** Components of a GIS -Hardware, software, data, People, Methods, Working of GIS, Geographic references, Vector and Raster Models, Data for GIS, GIS and Related Technologies, Desktop Mapping, CAD, Remote sensing and GPS,

**Virtual private Network:** Concept of VPN, Elements and basic requirements of VPN, its uses.

**UNIT - IV**

Introduction and basic concepts of modem communication and telephony technology: CDMA, WLL, GSM, VOIP, Bluetooth, WI-Fi. Communication Technology: 2G, 3G, 4G, 5G.

Communication over Radio, Microwave systems, Communication satellites, Radar, Fiber optics, ISDN - their properties, pros & cons of each device.

Network Security: Aspects of Security, Privacy: Encryption and Decryption.

**UNIT V**

**Multimedia:** Concept, types of graphics-bitmap & vector graphics, graphic effects and techniques, sound, Music and Video, Uses of multimedia, advantage and Application of Multimedia.

**Artificial Intelligence and Expert system-** Concepts of AI & Expert Systems, Building of Expert system, Merits and Demerits

of Expert system, Application of Expert system and AL Introduction to virtual reality: Definition, Applications of VR in Defense, Media, Education & Business.  
Elementary Concepts of IoT, Smart Systems, Embedded systems, Cloud Computing.

### **TEXTBOOKS AND REFERENCE BOOKS:**

1. Fundamentals of Information Technology by Alex Leon & M. Leon, Vikas Publications, New Delhi.
2. Frontiers of Electronic Commerce, by Kalakota, Ravi, Stone, Tom, Whinston, Andrew B, Addison Wesley Publishing Co, ISBN8178080575
3. E-Commerce An Indian Perspective (Second Edition) - by P.T. Joseph, S. J. Prentice- Hall of India
4. Security in Computing, third edition, by C. P. Pfleeger, S. Pfleeger and S. Ware, Prentice Hall 2002
5. Mobile communications, Joschen Schiller, pearson education
6. Recent Magazines of Computers and Communication

### **Instruction to Paper Setter:**

Question Paper should be framed in both English and Hindi version.

### **Lab for B.Sc. (IT) Third Year**

**Note: Solve the following queries using ORACLE.**

1. List the name & salary of the employee who is working in deptno 30.
2. List the name & salary of the employee who is working as an Analyst in deptno 10.
3. List the name & job of the employee whose salary more than 1000 but less than 2000.
4. List all the deptno from EMP table.
5. List the name & salary of the employee who is working in deptno 10, 20, and 30.
6. List the name & salary of the employee who is not working in deptno 10, 20.
7. List the entire analyst who is working in deptno 20.
8. Display following output. "SCOTT IS A MANAGER IN DEPARTMENT NUMBER 10"
9. List the entire clerk whose salary is more than 800 & not working for deptno 10.
10. Give bonus of Rs 500 to all employees working for deptno 30.
11. Find the total salary of the each employee working for deptno 20.
12. Find the oldest employee.

13. List the name of the employee whose salary is more than 1000 & working either in dept 10 or 20.
14. List the name & salary of the employee who are getting no commission for dept 10.
15. List the name & employee code of the employee whose salary is not in the range of 1000 & 1800.
16. List the id & job of the employee whose salary > 2000 & name starts with S.
17. List all employees who joined in 1981.
18. List all employee names and their salaries, whose salary lies between 1500/- and 3500/- both inclusive.
19. List all employees which start with either J or T.
20. List all employee names and jobs, whose job title includes M or P.
21. List all jobs available in employee table.
22. List all employees who belong to the department 10 or 20.
23. List all employee names, salary and 15% rise in salary.
24. List minimum, maximum, average salaries of employee.
25. Find how many job titles are available in employee table.
26. Find second highest salary
27. Display all employee names and salary whose salary is greater than minimum salary of the company and job title starts with 'M'.
28. Find how much amount the company is spending towards salaries
29. Display name of the department with deptno 20.
30. List ename whose commission is NULL.
31. List ename whose manager is not NULL.
32. Display the employee no and total salary for all the employees
33. Display the employee name and annual salary for all employees.
34. Display the names of employees who are working as clerks, salesman or analyst and drawing a salary more than 3000.
35. Display the names of the employees who are working in the company for the past 5 years;
36. Display the names of all tables from current user;
37. Display the name of the current user.
38. Display the names of employees working in depart number 10 or 20 or 40 or employees working as CLERKS, SALESMAN or ANALYST.
39. Display the names of employees whose names have second alphabet A in their names.
40. Display the names of the employee whose names is exactly five characters in length.

.....The End.....

**Department Of Higher Education, Govt., of M. P.**  
**Scheme of Examination and Syllabus for Annual Exam System**  
**B. Sc. III Year**

**Academic Session: 2019-2020**

Recommended by Central Board of Studies

Paper Number & Title of the Paper	Paper-wise Maximum Marks	Total Theory Marks	Minimum Passing Marks in Theory	Internal Assessment Maximum Marks.	Minimum Passing Marks in Internal Assessment	Practical Maximum Marks	Practical Passing Marks	Total
1- Linear Algebra And Numerical Analysis	42.5	127.5	42	1st term- (3 Months)	8	—	—	150
II- Real and Complex Analysis	42.5			7.5				
III- Optional Paper*	42.5			15 Total=22.5				

**\*III A Statistical methods, III B- Discrete Mathematics, III C- Mechanics. III D Mathematical Modeling, III E- Financial Mathematics**

**(Optional Paper should be different from main subject.)**

Note: There will be three sections in each paper. All questions from each section will be compulsory

Section A (5 Marks): This section will contain 5 objective type questions, one from each unit, with the weightage of 1 mark.

Section B (12.5 Marks): This section will contain 5 short answer type questions (each having internal choice), one from each unit, with the weightage of 2.5 marks.

Section C (25 Marks): This section will contain 5 long answer type questions (each having internal choice), one from each unit, with the weightage of 5 marks.

There should be 12 teaching periods per week for Mathematics like other Science Subjects

(6 Period Theory + 6 Period Practical)

**Department of Higher Education, Govt., of M.F.**  
**B.Sc. /B.A. Annual Examination System wise syllabus**  
**Recommended by Central Board of studies**

**Session : 2019-20**

Max. Marks	:	42.5
Class	:	B.Sc.
Year	:	Third
Subject	:	Mathematics
Paper	:	First
Title	:	Linear Algebra and Numerical Analysis

**Note:** - Scientific Calculator will be allowed in the examination of this paper.

Unit-1	Definition and examples of Vector spaces, subspaces, sum and direct sum of subspaces. Linear span, Linear dependence, independence and their basic properties. Basis, Existence Theorem for basis. Extension Theorem. Invariance of the number of elements of a basis. Dimension. Finite dimensional vector spaces. Existence of complementary subspaces of a subspace of a finite dimensional: vector space. Dimension of sum of subspaces. Quotient space and its dimension
Unit-2	Linear transformations and their representation as matrices. Algebra of linear transformations. Rank-Nullity theorem, change of basis, dual space, bi-dual space and natural isomorphism, Adjoint of a linear transformation, Eigen values and Eigen vectors of a linear transformation. Diagonalisation. Bilinear. Quadratic and Hermitian forms.
Unit-3	Inner Product Space- Cauchy-Schwartz inequality, orthogonal vectors, orthogonal complements, orthonormal sets and bases, Bessel's inequality for finite dimensional spaces. Gram- Schmidt orthogonalization process

Unit-4	Solution of Equations: Bisection. Secant. Regular Falsi. Newton's Methods. Roots of second degree Polynomials. Interpolation: Lagrange interpolation. Divided differences. Interpolation formula using Differences. Numerical Quadrature. Newton- Cote's formulae. Gauss Quadrature formulae
Unit-5	Linear equations direct methods for solving systems of linear equations (Gauss elimination. LU decomposition. Cholesky decomposition). Iterative methods (Jacobi, Gauss- Seidel reduction methods). Ordinary differential equations: Euler method. Single step method, Runge- Kutta's method, Multistep methods. Milne Simpson method. Methods based on Numerical integration, methods based on numerical differentiation

**Text Books:-**

1. K. B. Dalia- Matrix and Linear Algebra. Prentice hall of India Pvt. Ltd. New Delhi. 2000.
2. S. S. Sastry- Introductory Methods of Numerical Analysis. Pill Learning Pvt. Ltd.

**Reference Books:**

1. K. Hoffiman and R. Kunze- Linear Algebra. 2<sup>nd</sup> Edition. Prentice Hall Englewood Cliffs. New Jersey, 1971.
2. S. K. Jain. A Gunawardena& P. B. Bhattacharya- Basic Linear Algebra with MATLAB Key College Publishing(Springer- Verlag) 2001
3. S. Kumarsaran- Linear Algebra, A BermetricApproac Prentice- Hall of India, 2000
4. Balaguruswamy- Numerical Methods, Tata McGraw Hill Publication. New York.

**Department of Higher Education, Govt., of M. P.**

**B.Sc. Annual Examination System wise syllabus**

**Recommended by Central Board of studies**

**Session: 2019-20**

Max. Marks	:	42.5
Class	:	B.Sc.
Year	:	Third
Subject	:	Mathematics
Paper	:	Second
Title	:	Real and Complex Analysis

Unit-1	Riemann integral, Integrability of continuous and monotonic functions. The fundamental theorem of integral calculus. Mean value theorems of integral calculus. Partial derivatives and differentiability of real-valued functions of two variables. Schwarz's and Young's theorem. Implicit function theorem,
Unit-2	Improper integrals and their convergence. Comparison tests. Abel's and Dirichlet's tests. Frullani's integral as a function of a parameter. Continuity, derivability and integrability of an integral of a function of a parameter. Fourier series of half and full intervals.
Unit-3	Definition and examples of metric spaces. Neighborhoods. Limit points. Interior points. Open and closed sets. Closure and interior. Boundary points. Subspace of metric space, Cauchy sequences, Completeness. Cantor's intersection theorem. Contraction principle, Real number as a complete ordered field. Dense subsets. Baire Category theorem. Separable, second countable and first countable spaces.
Unit-4	Continuous functions. Extension theorem. Uniform continuity. Compactness. Sequential compactness. Totally bounded spaces, finite intersection property. Continuous functions and compact sets. Connectedness.

Unit-5	Complex numbers as ordered pairs. Geometric representation of complex numbers. Continuity and differentiability of complex functions. Analytic functions. Cauchy-Reimann equations. Harmonic functions. Mobius transformations. Fixed points. Cross ratio. Inverse points, Conformal Mappings.
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**Text Books:**

1. Mathematical analysis by S. C. Malik and Savita Arora. New Age Publication. Delhi.
2. G.F. Simmons - Introduction to Topology and Modern Analysis. McGraw Hill. New York 1963
3. L. V. Ahlfors, complex Analysis McGraw Hill. New York

**Recommend Books**

1. Walter Rudin- Real and Complex Analysis. McGraw Hill. New York
2. Ponnuswamy- Complex Analysis. Narosa Publication. New Delhi.
3. R. V. Churchill & J.W. Brown. Complex Variables and Application. 5<sup>th</sup> Edition. McGraw Hill, New York. 1990



**Department of Higher Education, Govt., of M. P.**

**B.Sc. Annual Examination System wise syllabus**

**Recommended by Central Board of studies**

**Session: 2019-20**

Max. Marks	:	42.5
Class	:	B.Sc.
Year	:	Third
Subject	:	Mathematics
Paper	:	Third Optional
Title	:	Statistical methods

**Note: - Simple Calculator will be allowed in the examination of this paper.**

Unit-1	Frequency distribution- Measures of central tendency. Mean. Median, Mode, G.M, H.M. Partition values. Measures of dispersion- Range. Interquartile range. Mean deviation. Standard deviation. Moments. Skewness and kurtosis.
Unit-2	Probability- Event, Sample space. Probability of an event. Addition and multiplication theorems, Baye's theorem. Continuous probability- probability density function and its applications for finding the mean, mode, median and standard deviation of various continuous probability distributions. Mathematical expectation. Expectation of sum and product of random variables. Moment generating function.
Unit-3	Theoretical distribution-Binomial. Poisson, rectangular and exponential distributions, their properties and uses.

Unit-4	Methods of least squares. Curve fitting, co-relation and regression, partial and multiple correlations (up to three variables only).
Unit-5	Sampling- Sampling of large samples. Null and alternative hypothesis. Errors of first and second kinds. Level of significance. Critical region. Tests of significance based on chi-square. T. F. and Z-statistics.

**Text Books:**

1. H. C. Saxena and J, N. Kapoor. Mathematical Statistics, S. Chand and Company.
2. M. Ray Statistical Methods.

**Department of Higher Education, Govt., of M. P.**

**B.Sc. Annual Examination System wise syllabus**

**Recommended by Central Board of studies**

**Session: 2019-20**

Max. Marks	:	42.5
Class	:	B.Sc.
Year	:	Third
Subject	:	Mathematics
Paper	:	Third Optional-B
Title	:	Discrete Mathematics

Unit-1	Boolean functions-disjunctive & conjunctive normal forms (canonical & dual canonical), Bool's expansion theorem. Relations- Binary relation. Inverse relation, Composite relation. Equivalence relation, Equivalence classes & its properties Partition of a set.
Unit-2	Partial order relation, Partially ordered sets, totally ordered sets. Hasse diagram, maximal and minimal element, first and last element Lattice- definition and examples, dual lattice, bounded lattice, distributive lattice, complemented lattice.
Unit-3	Graph- Definition, types of graphs. Subgraphs, walk, path, circuit, connected and disconnected graphs. Euler graph. Hamiltonian path and circuit, shortest path in weighted graph. Dijkstra's Algorithm for shortest paths.

Unit-4	Trees and its properties, Rooted tree. Binary tree. Spanning tree, Rank and nullity of a graph. Kruskal's Algorithm and Prim's Algorithm.
Unit-5	Matrix representation of graphs--Incidence and Adjacency matrix. Cutset and its properties. Planar graphs (definition) Kuratowski's two graphs.

**Text Books:**

1. C. L. Liu.- Elements of Discrete Mathematics , McGraw Hill New-York
2. NarsinghDeo- Graph Theory, Prentice Hall.

**Department of Higher Education, Govt., of M. P.**

**B.Sc. Annual Examination System wise syllabus**

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**Session: 2019-20**

Max. Marks	:	42.5
Class	:	B.Sc. /B.A.
Year	:	Third
Subject	:	Mathematics
Paper	:	Third Optional
Title	:	Mechanics

Unit-1	Analytical conditions of Equilibrium of Coplanar forces. Virtual work. Catenary.
Unit-2	Forces in three dimensions, Poinsot's central axis, Null lines and Planes. Stable and unstable Equilibrium.
Unit-3	Velocites and accelerations along radial and transverse directions and along tangential and normal directions. Simple Harmonic motion. Elastic Strings, Projectile.
Unit-4	Motion on smooth and rough plane curves. Motion in a resisting medium. Motion of particles of varying mass. Central orbits. Kepler's Law of motion.
Unit-5	Motion of a particle in three dimensions. Moments and Product of inertia

Text Books:

1. R.S. Verma - Statics
2. S. L. Loney- An elementary Treatise on the dynamics of particle of rigid bodies.

Reference Books:

1. M. Ray- Dynamics
2. M. Ray and H. S. Sharma- Dynamics of rigid bodies

**Department of Higher Education, Govt., of M. P.**

**B.Sc. Annual Examination System wise syllabus**

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**Session: 2019-20**

Max. Marks	:	42.5
Class	:	B.Sc.
Year	:	Third
Subject	:	Mathematics
Paper		Third Optional-D
Title	:	Mathematical Modelling

Unit-1	Mathematical modelling through ordinary differential equations of first order: Linear Growth and Decay models. Non-linear Growth and Decay Models. Dynamic problems, Geometrical problems.
Unit-2	Mathematical modelling through system of ordinary differential equations of first order: Population Dynamics, Epidemics. Compartment models. Economic medicine. Arms Race. Battles and International Trade. Dynamics models.
Unit-3	Mathematical modelling through ordinary differential equations of second order: Planetary Motions. Circular Motions and Motion of Satellites. Mathematical modelling through Linear differential equations of second order and miscellaneous mathematical models.
Unit-4	Mathematical modelling through difference equations: Simple Models. Basic theory of linear difference equations with constant coefficients, economic and finance-population dynamics and genetics, probability theory.
Unit-5	Mathematical modelling through Graphs: Solutions that can be modelled through graph, mathematical modelling in terms of directed graphs, signed graphs, weighted digraphs and un-oriented graphs.

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**Session 2017-18 Onwards**

**Text Books:**

1. J. N. Kapur- Mathematical Modelling. New Age International Publishers

**Reference Books:**

1. Stefan Heinz- Mathematical Modelling. Springer.
2. Heilio. M. Lahivaara, T. Lannen- Mathematical Modelling. Springers Nature.
3. Dr. V. P. Saxena- Bio-Mathematics.
4. Belinda Barnes and Glenn Robert Fulford- Mathematical Modelling with Case Studies. CRC Press



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**Department of Higher Education, Govt., of M. P.**  
**B.Sc. Annual Examination System wise syllabus**  
**Recommended by Central Board of studies**  
**Session: 2019-20**

Max. Marks	:	42.5
Class	:	B.Sc.
Year	:	Third
Subject	:	Mathematics
Paper	:	Third Optional- <b>E</b>
Title	:	Financial Mathematics

Unit-1	Financial Management- Nature and Scope of Financial Management. Goals of financial Management and main decisions of financial management. Difference between Risk, Speculation and Gambling.
Unit-2	Time value of Money-Interest rate and Discount Rate. Present value and future value, discrete case as well as continuous compounding case. Annuities and its kinds.
Unit-3	Meaning of return. Return as Internal Rate of Return (IRR). Numerical methods like Newton Raphson Method to calculate IRR. Measurement of returns under uncertainty situations.
Unit-4	Meaning of Risk, Difference between risk and uncertainty. Types of Risks. Measurements of Risk. Calculation of security and portfolio risk and Return- Markowitz Model. Sharpe's Single Index Model- Systematic Risk and Unsystematic Risk.
Unit-5	Taylor series and Bond Valuation. Calculation of Duration and Convexity of Bonds, financial Derivatives- futures, forward. Swaps and options. Call and Put Option, Call and Put Parity theorem.

**Text Books:**

1. Sheldon M. Ross- An Introduction to Mathematical Finance. Cambridge University Press.
2. Mark S. Dorfman- Introduction to Risk Management and Insurance. Prentice Hall Englewood Cliffs, New Jersey

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**Reference Books:**

1. AswathDamodaran, Corporate finance- Theory and Practice. John Wiley & Inc.
2. John C. Hull- Options. Futures and Other Derivatives. Prentice Hall of India Private Ltd.
3. C. D. Daykin, T. Pentikainen and M. Pesonen- Practical Risk Theory for Actuaries.

Chapman  
& Hall.

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**Under Graduate (UG) Annual Syllabus as Recommended by Central Board of Studies**  
**and Approved by Governor of M.P.**  
**(w.e.f. session 2019-2020)**

**Class : B.Sc. Third Year**  
**Subject: Physics**

**Max. Marks: 5**

**For Regular Students**

Practical	Sessional	Viva	Total
25	10	15	50

**For Ex-Student**

Practical	Sessional	Viva	Total
35	00	15	50

1. Specific resistance and energy gap of a semiconductor.
2. Study of half wave and full wave rectification.
3. Characteristics of Zener diode.
4. Characteristic of a tunnel diode.
5. Characteristics of JFET.
6. Characteristic of a transistor.
7. Study of regulated power supply.
8. Study of RC coupled amplifiers
9. Determination of Planck's constant.
10. Determination of e/m using Thomson's method,
11. Determination of e by Millikan's method.
12. Study of spectra of hydrogen and deuterium (Rydberg constant and ratio of masses of electron to proton).
13. Absorption spectrum of iodine vapour.
14. Study of Zeeman effect for determination of Lande g-factor.
15. Study of Raman spectrum using laser as an excitation source
16. To draw B-H curve of ferro-magnetic material with the help of CRO
17. Hysteresis curve a transformer core.
18. Hall Probe method for measurement of resistivity

**Department of Higher Education, Government of Madhya Pradesh**  
**Yearly Syllabus for Undergraduates**  
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**Session 2017-18 Onwards**

**Under Graduate (UG) Annual Syllabus as Recommended by Central Board of Studies and**  
**Approved by Governor of M. P.**  
**(w.e.f. session 2017-2018)**

**Academic Year (2017-2018)**

**B. Sc III**

There will be Three sections of a Question Paper Section (A) Contains 5 Objective Question of 1/2 Mark each Section (B) Contains 5 Short answer type question of 02 Marks each section (c) contains 5 long answer type question of 06 marks each

**1. For Regular students:**

<b>Section (A)</b>	<b>Objective Questions</b>	<b>5</b>	<b>1/2</b>	<b>2.5</b>
<b>Section (B)</b>	<b>Short Questions</b>	<b>5</b>	<b>2</b>	<b>10</b>
<b>Section (C)</b>	<b>1 Main Question</b>	<b>5</b>	<b>6</b>	<b>30</b>
	<b>Total Marks</b>			<b>42.5</b>

**2. For Private students:**

<b>Section (A)</b>	<b>Objective Questions</b>	<b>5</b>	<b>1</b>	<b>5</b>
<b>Section (B)</b>	<b>Short Questions</b>	<b>5</b>	<b>2</b>	<b>10</b>
<b>Section (C)</b>	<b>Main Question</b>	<b>5</b>	<b>7</b>	<b>35</b>
	<b>Total Marks</b>			<b>50</b>

**Department of Higher Education, Government of Madhya Pradesh**  
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**Under Graduate (UG) Annual Syllabus as Recommended by Central Board of Studies  
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(w. e. f. session 2019-2020)

**Class: B.Sc. Third Year**  
**Max. Marks: 40 + (CCE) 10 = 50**

Subject : **Physics**  
Paper : **1**  
Title of Paper : **Quantum Mechanics and Spectroscopy**

**Unit-I: Quantum Mechanics-1** [15 Lectures]

**Particles and Waves:** Photoelectric effect. Black body radiation. Compton effect. De Broglie hypothesis. Wave particle duality. Davisson-Germer experiment. Wave packets. Concept of phase and group velocity. Two slit experiment with electrons. Probability. Wave amplitude and wave functions. Heisenberg's uncertainty principle with illustrations. Basic postulates and formalism of Schrodinger's equation. Eigenvalues. Probabilistic interpretation of wave function. Equation of continuity. Probability current density. Boundary conditions on the wave function. Normalization of wave function.

**Unit-II: Quantum Mechanics-2** [15 Lectures]

**Time independent Schrodinger equation:** One dimensional potential well and barrier. Boundary conditions. Bound and unbound states. Reflection and transmission coefficients for a rectangular barrier in one dimension. Explanation of alpha decay. Quantum phenomenon of tunneling. Free particle in one-dimensional box, eigen functions and eigen values of a free particle. One-dimensional simple harmonic oscillator, energy eigenvalues from Hermite differential equation, wave function for ground state. Particle in a spherically symmetric potential. Rigid rotator.

**Unit-III: Atomic Spectroscopy** [15 Lectures]

**Atoms in electric and magnetic fields:** Quantum numbers, Bohr model and selection rules. Stern-Gerlach experiment. Spin as an intrinsic quantum number. Incompatibility of spin with classical ideas. Orbital angular momentum. Fine structure. Total angular momentum. Pauli exclusion principle. Many particles in one dimensional box. Symmetric and anti-symmetric wave functions. Atomic shell model. Spectral notations for atomic states. Spin-orbit coupling, **L-S** and **J-J** coupling. Zeeman effect. Continuous and characteristic X-rays. Mossley's law.

**Unit-IV: Molecular Spectroscopy** [15 Lectures]

Various types of spectra. Rotational spectra. Intensity of spectral lines and determination of bond distance of diatomic molecules. Isotope effect. Vibrational energies of diatomic molecules. Zero point energy. Anharmonicity. Morse potential. Raman effect, Stokes and anti-Stokes lines and their intensity difference. Electronic spectra. Born-Oppenheimer approximation. Frank-Condon principle, singlet and triplet states. Fluorescence and phosphorescence.

**Unit-V: Nuclear Physics** [15 Lectures]

Basic properties of nucleus: Shape, Size, Mass and Charge of the nucleus. Stability of the nucleus and Binding energy. Alpha particle spectra - velocity and energy of alpha particles. Geiger-Nuttal laws Nature of beta ray spectra. The neutrino. Energy levels and decay schemes. Positron emission and electron capture. Selection rules. Beta absorption and range of beta particles. Kurie plot. Nuclear reactions, pair production. Q-values and threshold of nuclear reactions. Nuclear reaction cross-sections. Examples of different types of reactions and their characteristics. Compound nucleus. Bohr's postulate of compound nuclear reaction Semi empirical mass formula, Shell model. Liquid drop model, Nuclear fission and fusion (concepts).

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**Session 2017-18 Onwards**

**References:**

1. **Quantum Mechanics:** V. Devanathan, Narosa Publishing House, New Delhi, 2005
2. **Quantum Mechanics:** B. H. Bransden, Pearson Education, Singapore, 2005
3. **Quantum Mechanics:** Concepts and Applications. Nouredine Zettili, Jacksonville State University, Jacksonville, USA, John Wiley and Sons, Ltd, 2009
4. **Physics of Atoms and molecules:** B.H. Bransden and C.I. Joachaim. Pearson Education. Singapore, 2003
5. **Fundamentals of Molecular Spectroscopy:** C.M. Ban we 11 and M. McCash, McGraw Hill (U.K. edition).
6. **Introduction to Atomic Physics, H. E. White**
7. **Quantum Mechanics: Schaums Outlines, Y. Peleg, R. Pnini, E. Zaarur, E.Hecht.**

**Department of Higher Education, Government of Madhya Pradesh**  
**Yearly Syllabus for Undergraduates**  
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**Department of Higher Education, Government of Madhya Pradesh**  
**Under Graduate (UG) Annual Syllabus as Recommended by Central Board of Studies**  
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Subject : **Physics**  
Paper : **2**  
Title of Paper : **Solid State Physics**  
**Unit-I: Solid state Physics-1**

**[15 Lectures]**

**Crystal Structure and bonding:** Crystalline and amorphous solids. Translational symmetry. Lattice and basis. Unit cell. Reciprocal lattice. Fundamental types of lattices (Bravais 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, van der Waals and hydrogen bonding. Band theory of solids. Periodic potential and Bloch theorem. Kronig-Penny model (Qualitative)

**Unit-II: Solid state Physics-2**

**[15 Lectures]**

**Lattice structure and properties:** Du long Petit, Einstein and Debye theories of specific heats of solids. Elastic and atomic force constants. Dynamics of a chain of similar atoms and chain of two types of atoms. Optical and acoustic modes. Electrical resistivity. Specific heat of electron. Wiedemann-Franz law. Hall effect. Response of substances in magnetic field, dia-, para- and ferromagnetic materials. Classical Langevin theory of dia and paramagnetic domains. Curie's law. Weiss' theory of ferromagnetism and ferromagnetic domains. Discussion of BH hysteresis.

**Unit-III: Semiconductor devices-1**

**[15 Lectures]**

**Electronic devices:** Types of Semiconductors (**p** and **n**). formation of Energy Bands. Energy level diagram. Conductivity and mobility. Junction formation. Barrier formation in **p-n** junction diode. Current flow mechanism in forward and reverse biased diode (recombination), drift and saturation of drift velocity. Derivation of mathematical equations for barrier potential, barrier width. Single **p-n** junction device (physical explanation, current voltage characteristics and one or two applications). Two terminal devices. Rectification. Zener diode. Photo diode. Light emitting diode. Solar cell. Three terminal devices. Junction field effect transistor (JFET). Two junction devices. Transistors as **p-n-p** and **n-p-n**. Physical mechanism of current flow. Characteristics of transistor.

**Unit-IV: Semiconductor devices-2**

**[15 Lectures]**

Amplifiers (only bipolar junction transistor). CB, CE and CC configurations. Single stage CE amplifier (biasing and stabilization circuits). Q-point, equivalent circuit, input impedance, output impedance, voltage and current gain. Class **A**, **B**, **C** amplifiers (definitions). RC coupled amplifiers (frequency response). Class B push-pull amplifier. Feedback amplifiers. Voltage feedback and current feedback. Effect of negative voltage series feedback on input impedance. Output impedance and gain. Stability, distortion and noise. Principle of an Oscillator, Barkhausen criterion, Colpitts. RC phase shift oscillators. Basic concepts of amplitude, frequency and phase modulations and demodulation

**Unit-V: Nano materials**

**[15 Lectures]**

**Nanostructures:** Introduction to nanotechnology, structure and size dependent properties. 3D, 2D, 1D, 0D nanostructure materials and their density of states, Surface and Interface effects. Modelling of quantum size effect. Synthesis of nanoparticles - Bottom Up and Top Down approach, Wet Chemical Method. Nanolithography. Metal and Semiconducting nanomaterials. Essential differences in structural

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and properties of bulk and nano materials (qualitative description). Naturally occurring nano crystals. Applications of nanomaterial.

**References:**

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



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**Under Graduate (UG) Syllabus as Recommended by Central Board of Studies and**  
**Approved by Governor of M. P.**  
(w. e. f. session 2019-2020)

**Class: B.Sc. Third Year**

**Max. Marks: 50**

**Subject: Physics**

**For Regular Students**

<b>Practical</b>	<b>Sessional</b>	<b>Viva</b>	<b>Total</b>
<b>25</b>	<b>10</b>	<b>15</b>	<b>50</b>

**For Ex-Student**

<b>Practical</b>	<b>Sessional</b>	<b>Viva</b>	<b>Tota</b>
<b>35</b>	<b>00</b>	<b>15</b>	<b>50</b>

**List of Practical's**

1. Specific resistance and energy gap of a semiconductor.
2. Study of half wave and full wave rectification.
3. Characteristics of Zener diode.
4. Characteristic of a tunnel diode.
5. Characteristics of JFET.
6. Characteristic of a transistor.
7. Study of regulated power supply.
8. Study of RC coupled amplifiers
9. Determination of Planck's constant.
10. Determination of e/m using Thomson's method.
11. Determination of e by Millikan's method.
12. Study of spectra of hydrogen and deuterium (Rydberg constant and ratio of masses of electron to proton).
13. Absorption spectrum of iodine vapour.
14. Study of Zeeman effect for determination of Lande g-factor.
15. Study of Raman spectrum using laser as an excitation source
16. To draw B-H curve of ferro-magnetic material with the help of CRO
17. Hysteresis curve a transformer core.
18. Hall probe method for measurement of resistivity.

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**Under Graduate (UG) Annual Syllabus as Recommended by Central Board of Studies and**  
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**(w.e.f. session 2017-2018)**

Academic Year (2017-2018)

**B. Sc III**

**There will be Three sections of a Question Paper Section (A) Contains 5 Objective Question of 1/2 Mark each Section (B) Contains 5 Short answer type question of 02 Marks each section (c) contains 5 long answer type question of 06 marks each**

**1. For Regular students:**

<b>Section (A)</b>	<b>Objective Questions</b>	<b>5</b>	<b>1/2</b>	<b>2.5</b>
<b>Section (B)</b>	<b>Short Questions</b>	<b>5</b>	<b>2</b>	<b>10</b>
<b>Section (C)</b>	<b>Main Question</b>	<b>5</b>	<b>6</b>	<b>30</b>
		<b>Total Marks</b>		<b>42.5</b>

**2. For Private students:**

<b>Section (A)</b>	<b>Objective Questions</b>	<b>5</b>	<b>1</b>	<b>5</b>
<b>Section (B)</b>	<b>Short Questions</b>	<b>5</b>	<b>2</b>	<b>10</b>
<b>Section (C)</b>	<b>Main Question</b>	<b>5</b>	<b>7</b>	<b>35</b>
		<b>Total Marks</b>		<b>50</b>

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