# DEGREE PROGRAM

## B.Sc.VSem.

| SUBJECT CODE | Category | SUBJECT NAME | TEACHING &EVALUATION SCHEME | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THEORY | | | PRACTICAL | | Th | T | P | CREDITS |
| | | | End Sem University Exam | Two Term Exam | Teachers Assessment * | End Sem University Exam | Teachers Assessment* | | | | |
| BSPH502 | DC | **QUANTUM MECHANICS** | 60 | 20 | 20 | 30 | 20 | 3 | 1 | 4 | 6 |

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
Q/A – Quiz/Assignment/Attendance, MST MidSem Test.
*Teacher Assessment shall be based on following components: Quiz/Assignment/ Project/Participation in class (Given that no component shall be exceed 10 Marks)

**Course Objectives:-**

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

**Course Outcomes:-**

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

## QUANTUM MECHANICS

UNIT-I

Particles and waves inadequacies in classical physics, Blackbody radiation: quantum theory of light. Photoelectric effect, Compton Effect, Wave nature of matter: de Broglie hypothesis. Wave-particle duality, Davisson-germer experiment, Wave description of particles by wave packets.Group and phase velocities and relation between them, Two-slit experiment with electrons. Probability, Wave amplitude and wave functions

UNIT-II

Heisenberg's uncertainty principle (uncertainty relations involving canonical pair of variables): derivation from wave packets. Energy, momentum and Hamiltonian operators, Time-independent Schrodinger wave equation for stationary states, Properties of wave Function. Interpretation of wave function, Probability density, Conditions for physical acceptability of wave functions, .Linearity and superposition Principles, Eigen values and Eigen functions

UNIT-III

Expectation values, Wave function of a free Particle. Applications of Schrödinger wave equation: Eigen functions and Eigen values for a particle in a one dimensional box. general features of a bound Particle system, (1) one dimensional Simple harmonic oscillator: energy levels and wave Functions. Zero point energy, (2) Quantum theory of hydrogen atom: particle in a spherically symmetric potential.

UNIT-IV

Schrodinger wave equation, Separation of variable, .Radial solutions and principal quantum Number, orbital and magnetic quantum numbers, Quantization of energy and Angular Momentum, Space quantization, Electron probability Density.

UNIT-V

Finite Potential Step: Reflection and Transmission. Stationary solutions, Probability current, Attractive and repulsive potential Barriers (2) Quantum phenomenon of tunneling: tunnel effect. Tunnel diode (qualitative Description) (3) Finite potential well (Square well)

## Suggested books:

1. L. I. Schiff, quantum mechanics, 3rd Edition, (McGraw hill book co., New York 1968).

2. E. Merzbacher, quantum mechanics, 3rd Edition, (john Wiley & sons, inc1997)

3. J.l. Powell & b. Crasemann, quantum mechanics, (Addison-Wesley pubs.co., 1965)

4. A. Ghatak& s. Lokanathan, quantum mechanics: theory and applications, 5th Edition, (Macmillan India, 2004)

5. E. M. Lifshitz and l. D. Landau, quantum mechanics: non-relativistic theory (course of Theoretical physics, vol 3), 3rd Edition, butterworth-heinemann (1981).

# ShriVaishnavVidyapeethVishwavidyalaya Indore

# ShriVaishnav Institute of Computer Applications

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

| Subject Code | Category | Subject Name | Teaching & Evaluation Scheme | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory | | | Practical | | L | T | P | CREDITS |
| | | | End Sem University Exam | Two Term Exam | Teacher Assessment | End Sem University Exam | Teacher Assessment | | | | |
| BSCS503 | Compulsory | Operating System Concepts | 60 | 20 | 20 | | | 3 | 1 | 0 | 4 |

**Course Education Objectives (CEOs):**

In this course students should understand how the operating system effectivelymanages system resources.

**Course Outcomes (COs):**

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

- Understand the types of Operating systems and analyze the process scheduling Algorithms and Case study on processing Scheduling.
- Understand the resource sharing among the processes in the system.
- Understand how to manage the memory during the process execution (Memory Management) and File Management system.

**UNIT – I**

**Introduction**: What is an Operating System, Simple Batch Systems, Multiprogrammed Batch Systems, Time-Sharing Systems, Personal-computer systems, Parallel systems, Distributed Systems, Real-Time Systems.

**UNIT - II**

**Processes:** Process Concept, Process Scheduling, Operation on Processes

**CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling.

**Process Synchronization:** Background, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization

**UNIT – III**

**Memory Management:** Background, Logical versus Physical Address space, swapping,Contiguous allocation, Paging, Segmentation.

**Virtual Memory:** Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations.

**UNIT – IV**

**Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

**Device Management:** Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Input or Output Devices, Storage Devices, Buffering, Secondary-Storage

Structure: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Reliability.

**UNIT – V**

**Overview of Linux :** What is Linux, Linux's, Common Linux Features, advantage of Linux, Overview of Unix and Linux architectures, Linux files system, hardware requirements for Linux, Linux Internals: Introduction, Process management, System Calls.

**Linux File system :** Logging in, getting familiar with Linux desktop, shell interface, understanding Linux Shell, Types of Text Editors, using vi editor, prompt character, correcting typing errors, simple shell commands-date, cal, who, tty, uname, passwd, bc, script, echo, logging out, Environment variables, wild card characters, *, ?, absolute and relative path, listing files and directories commands, navigating file system- pwd, cd, mkdir, rmdir, ls, pr, Handling ordinary files- cat, cp, mv, wc, rm, comm.., amp, diff, Basic files attributes – file permissions, changing permissions.

**TEXT BOOKS:**

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Principles", 7th edition, John Wiley & Sons Inc, 2006.

**REFERENCES:**

1. William Stallings, "Operating Systems – Operating System: Internals and Design Principles", 6th edition, Prentice Hall, 2005.
2. Andrew S Tanenbaum,"Modern Operating Systems", 3rd edition, Prentice Hall, 2007.

# ShriVaishnavVidyapeethVishwavidyalaya Indore

# ShriVaishnav Institute of Computer Applications

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

| Subject Code | Category | Subject Name | Teaching & Evaluation Scheme | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theory | | | Practical | | L | T | P | CREDITS |
| | | | End Sem University Exam | Two Term Exam | Teacher Assessment | End Sem University Exam | Teacher Assessment | | | | |
| BSCL507 | Compulsory | Operating System Lab using Linux | 0 | 0 | 0 | 30 | 20 | 0 | 0 | 4 | 2 |

## Course Education Objectives (CEOs):

In this course students should understand how the operating system effectively manages system resources.

## Course Outcomes (COs):

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

- Understand the types of Operating systems and analyze the process scheduling Algorithms and Case study on processing Scheduling.
- Understand the resource sharing among the processes in the system.
- Understand how to manage the memory during the process execution (Memory Management) and File Management system.

**List of Experiments:**

1. Study how to log in and get familiar with linux desktop.
2. Understand linux shell.
3. Study different types of text editors.
4. Study how to use vi editor.
5. Study how to correct typing errors.
6. Study simple shell commands like date, cal, who, tty, uname, passwd. bc.
7. Study the use of commands pwd, cd, mkdir, rmdir, ls, pr.
8. Study how to use commands cat, cp, mv, wc, rm.

**TEXT BOOKS:**

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Principles”, 7th edition, John Wiley & Sons Inc, 2006.

**REFERENCES:**

1. William Stallings, “Operating Systems – Operating System: Internals and Design Principles”, 6th edition, Prentice Hall, 2005.
2. Andrew S Tanenbaum,”Modern Operating Systems”, 3rd edition, Prentice Hall, 2007.

# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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

| SUBJECT CODE | Category | SUBJECT NAME | TEACHING & EVALUATION SCHEME | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THEORY | | | PRACTICAL | | Th | T | P | CREDITS |
| | | | END SEM | MST | Q/A | END SEM | Q/A | | | | |
| BSMA 504 | DC | **Numerical Methods & Linear Programming** | 60 | 20 | 20 | - | - | 3 | 1 | - | 4 |

## Course Objective

*To introduce the students with the Fundamentals of the Numerical Methods & Linear Programming.*

## Course Outcomes

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

1. *understand and solve problems of the straight lines in 3D.*
2. *solve the problems of the planes.*
3. *know the solution of the problems of the spheres.*
4. *understand and apply the concepts of the algebra of the Right circular cone.*

## Course Content:

**UNIT – I**

Approximate numbers, Significant figures, Rounding off numbers. Error – Absolute, Relative and Percentage. **Operators** - Δ , ∇ and E (Definitions and some relations among them).**Interpolation :** The problem of Interpolation, Equispaced arguments – Difference Tables, Deduction of Newton's Forward Interpolation Formula. Remainder term (expression only). Newton's Backward Interpolation formula (statement only) with remainder term. Unequally – spaced arguments –Lagrange's Interpolation Formula (statement only). Numerical problems on Interpolation with both equi- and unequally-spaced arguments.

# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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

**UNIT – II**

**Number Integration:** Trapezoidal and Simpson's ⅓rd formula (statement only). Problems on Numerical Integration. **Numerical Solution of Equation:** To find a real root of an algebraic or transcendental equation. Location of root (Tabular method), Bisection method. Newton-Raphson method with geometrical significance. Numerical problems.

**UNIT – III**

**Linear Programming:** Motivation of Linear Programming problem. Statement of L.P.P. formulation of L.P.P. Slack and Surplus variables. L.P.P. is matrix form. Convex set, Hyperplane, Extreme points, Convex Polyhedron, Basic solutions and Basic Feasible Solutions (B.F.S.) Degenerate and Non-degenerate B.F.S. The set of all feasible solutions of an L.P.P. is a convex set. The objective function of an L.P.P. assumes its optimal value at an extreme point of the convex set of feasible solutions. A B.F.S. to an L.P.P. corresponds to an extreme point of the convex set of feasible solutions.

**UNIT – IV**

Fundamental Theorem of L.P.P. (Statement only). Reduction of a feasible solution to a B.F.S. Standard form of an L.P.P. Solution by graphical method (for two variables), by simplex method and method of penalty. Concept of duality. Duality theory. The dual of the dual is the primal. Relation between the objective values of dual and the primal problems. Dual problems with at most one unrestricted variable, one constraint of equality.

**UNIT – V**

Transportation and Assignment problems and their optimal solutions.

**Texts:**


1. Numerical methods – E. Balagurusamy (Tata McGraw Hill).
2. Introduction to numerical analysis – F. B. Hilderbrand (TMH Edition).
3. Numerical Analysis – J. Scarborough.
4. Introduction to numerical analysis – Carl Erik Froberg (Addison Wesley Publishing).
5. Numerical methods for science and engineering – R. G. Stanton (Prentice Hall).
6. Linear Programming : Method and Application – S. I. Gass.
7. Linear Programming – G. Hadley.

8. An Introduction to Linear Programming & Theory of Games – S. Vajda.

# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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

| SUBJECT CODE | Category | SUBJECT NAME | TEACHING & EVALUATION SCHEME | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THEORY | | | PRACTICAL | | Th | T | P | CREDITS |
| | | | END SEM | MST | Q/A | END SEM | Q/A | | | | |
| BSMA 505 | DC | **Any one of the following groups : Group A : Analytical Dynamics Group B : Probability & Statistics** | 60 | 20 | 20 | - | - | 3 | 1 | - | 4 |

### Group A: Analytical Dynamics

## Course Objective

*To introduce the students with the Fundamentals of the Analytical Dynamics.*

## Course Outcomes

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

1. *understand and solve problems of the motion of a particle.*
2. *solve the problems of the motion under forces.*
3. *understand and apply the concepts of the motion in 2D.*

## Course Content:

**UNIT – I**

Velocity and Acceleration of a particle. Expressions for velocity and acceleration in rectangular Cartesian and polar co-ordinates for a particle moving in a plane. Tangential and normal components of velocity and acceleration of a particle moving along a plane curve.

# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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

**UNIT – II**

**Concept of Force:** Statement and explanation of Newton's laws of motion. Work, power and energy. Principles of conservation of energy and momentum. Motion under impulsive forces. Equations of motion of a particle (i) moving in a straight line, (ii) moving in a plane.

**UNIT – III**

Study of motion of a particle in a straight line under (i) constant forces, (ii) variable forces (S.H.M., Inverse square law, Damped oscillation, Forced and Damped oscillation, Motion in an elastic string). Equation of Energy. Conservative forces.

**UNIT – IV**

**Motion in two dimensions :** Projectiles in vacuo and in a medium with resistance varying linearly as velocity. Motion under forces varying as distance from a fixed point.

**UNIT – V**

Central orbit. Kepler's laws of motion. Motion under inverse square law.

**Texts:**


1. An Elementary Treatise on the Dynamics of a Particle & of Rigid bodies – S. L. Loney (Macmillan).
2. Dynamics of Particle and of Rigid Bodies – S. L. Loney.

# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

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

### Group B: Probability & Statistics

## Course Objective

*To introduce the students with the Fundamentals of the Probability & Statistics.*

## Course Outcomes

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

1. *understand and solve problems of the motion of a particle.*
2. *solve the problems of the motion under forces.*
3. *understand and apply the concepts of the motion in 2D.*

## Course Content:

**UNIT – I**

**Elements of Probability Theory:** Random experiment, Outcome, Event, Mutually Exclusive Events, Equality like and Exhaustive, Classical definition of Probability, theorems of Total Probability, Conditional Probability and Statistical Independence. Bayes' theorem. Problems. Shortcomings of the classical definition. Axiomatic approach –Problems. Random Variable and its Expectation. Theorems on mathematical expectation. Joint distribution of two random variables. Theoretical Probability Distribution – Discrete and Continuous (p.m.f. pd.d.f.) Binomial, Poisson and Normal distributions and their properties.

**UNIT – II**

Elements of Statistical Methods. Variables, Attributes, Primary data and secondary data. Population and sample. Census and Sample Survey. Tabulation – Chart and Diagram, graph, Bar diagram, Pie diagram etc. Frequency Distribution – Un-grouped and grouped cumulative frequency distribution. Histogram, Frequency curve, Measure of Central Tendencies – Average : AM, GM, HM, Mean, Median and Mode (their advantages and disadvantages). Measures of Dispersions – Range, Quartile Deviation, Mean Deviation, Variance/S.D., Moments, Skewness and Kurtosis.

**UNIT – III**

**Sampling Theory:** Meaning and objects of sampling. Some ideas about the methods of selecting samples. Statistic and Parameter, Sampling Distribution – standard error of a statistic (e.g. sample mean, sample proportion). Four fundamental distributions derived from the normal **:** (i) Standard Normal Distribution, (ii) Chi-square distribution, (iii) Student's distribution, (iv) Snedecor's F-distribution.

**UNIT – IV**

Estimation and Test of Significance. Statistical Inference. Theory of estimation – Point estimation and Interval estimation. Confidence Inter/Confidence Limit. Statistical Hypothesis – Bull Hypothesis and Alternative Hypothesis. Level of significance. Critical Region. Type I and Type II error. Problems. Bivariate Frequency Distribution. Scatter Diagram, Correlation co-efficient –Definition and properties. Regression lines.

**UNIT – V**

**Time Series :** Definition. Why to analyze Time series data? Components. Measurement of Trend – (i) Moving Average Method, (ii) Curve Fittings (linear and quadratic curve). (Ideas of other curves, e.g. exponential curve etc.). Ideas about the measurement of other components. **Index Number :** Meaning of Index Number. Construction of Price Index Number. Consumer Price Index Number. Calculation of Purchasing Power of Rupee.

**Texts:**

1. The elements of probability theory and some of its applications - H. Cramer.

2. An introduction to probability theory and its applications (Vol. 1) – W. Feller.

3. Mathematical methods of statistics – H. Cramer.

4 Theory of probability – B. V. Gnedenko.

5. Mathematical probability – J. V. Uspensky.