# HOLY CROSS COLLEGE (AUTONOMOUS)
### Affiliated to Bharathidasan University
### Nationally Accredited(3rd Cycle) with 'A' Grade by NAAC
### College with Potential for Excellence.
### Tiruchirapalli - 620002.
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## PG AND RESEARCH DEPARTMENT OF MATHEMATICS

| PO No. | Programme outcomes<br>Upon completion of the B.Sc. Degree Programme, the graduate will be able to |
|--------|--------------------------------------------------------------------------------------------------|
| PO - 1 | Obtain knowledge in basic concepts in pure and applied Mathematics |
| PO - 2 | Develop aptitude Skills and skill based knowledge |
| PO - 3 | Learn algorithmic approach and statistical analysis in scientific and social problems |
| PO - 4 | Improve logical and reasoning capacity |
| PO - 5 | Receive training for basics of research and methodology |

| PSO No. | Programme Specific outcomes<br>Upon completion of these Courses the Students would have |
|---------|---------------------------------------------------------------------------------------|
| PSO - 1 | Become an individual academic excellence to face eligibility exams |
| PSO - 2 | Acquired knowledge for higher studies |
| PSO - 3 | Gained the skills to become an entrepreneur in a tuition centre |
| PSO - 4 | Become a management / software professional |
| PSO - 5 | Been capable of executing research and research projects |

| Course Title | MAJOR CORE - 1 - CALCULUS | | |
|---|---|---|---|
| Code | **U15MA1MCT01** | | |
| **CO No.** | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Recognize and relate successive differentiation of various functions and illustrate how to compose equations | **PSO – 2** | **R,U** |
| CO - 2 | Demonstrate and calculate maxima and minima, radius of curvature evolute and Involute. | **PSO -3** | **Ap, E** |
| CO - 3 | Recognize and sketch partial differentiation , application of Euler's theorem and Jacobians | **PSO -1** | **E** |
| CO - 4 | Calculate integration of irrational functions of specific type | **PSO -4** | **An** |
| CO - 5 | Recall the properties of definite integrals and interpret reduction formula | **PSO -5** | **R,U** |
| CO - 6 | To acquaint the students become familiar with techniques of differentiation and integration and apply them to solve problems - Skill Development | **PSO-2** | **Ap** |

| Course Title | ALLIED 1 - MATHEMATICAL STATISTICS I | | |
|---|---|---|---|
| Code | U15MA1ACT01 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recall various methods of collection of data and describe graphs | PSO -2 | R,U |
| CO - 2 | Categorize and evaluate various measures of central tendency. | PSO -3 | E |
| CO - 3 | Calculate correlation and regression | PSO -1 | E,An |
| CO - 4 | Compute index number by Laspeyre's, Fisher's methods, expenditure method and family Budget method. | PSO -5 | Ap |
| CO - 5 | Examine time series with respect to different variation | PSO -4 | E,An |
| CO - 6 | Analyse various measures of central tendency.Understand to correlate data and fit into a linear regression curve- Skill Development | PSO-1,2 | An,Ap |

| Course Title | ALLIED 2- MATHEMATICAL STATISTICSII | | |
|---|---|---|---|
| Code | **U15MA1ACT06** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO -1 | Recognize and discuss probability, conditional probability and its axiom, Theorems . | **PSO -3** | **R,U** |
| CO - 2 | Explain and relate discrete and continuous random variable | **PSO -5** | **U,Ap** |
| CO - 3 | Compute expectation and variance and discuss relevant theorems. | **PSO -1** | **E** |
| CO - 4 | Recognize binomial distribution, Poisson distribution and describe their properties. | **PSO -2** | **U, Ap** |
| CO - 5 | Explain normal distribution and its properties | **PSO -4** | **U, Ap** |
| CO - 6 | Understand discrete and continuous random variable and its properties and properties of two dimensional random variable. Evaluate expectation and variance and itsrelevant theorems- SkillDevelopment | **PSO – 2,3** | **U, An** |

| Course Title | Allied 1 – ALGEBRA, CALCULUS AND TRIGONOMETRY ( For Physics Students) | | |
|---|---|---|---|
| Code | **U15MA1ACT02** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO – 1 | Compute eigen values and eigen vectors using Cayley Hamilton theorem. | **PSO -2** | **E** |
| CO – 2 | Recall successive differentiation and evaluation of successive differentiation using Libenitz methods and jacobians. | **PSO -5** | **U,Ap** |
| CO - 3 | Evalute double and triple integral. | **PSO -1** | **E** |
| CO - 4 | Demonstrate reduction formula to different standard integrals. | **PSO -3** | **U, Ap** |
| CO - 5 | Computethe expansion of trigonometric function as multiple of $\theta$ and a series of powers of $\theta$ Recall and evaluate hyperbolic function, inverse hyperbolic function and separation into real and imaginary parts. | **PSO -4** | **U ,E** |
| CO - 6 | Give an in depth knowledge of matrices, trigonometry and calculus and inculcate the habit of problem solving - Skill Development | **PSO- 2,3** | **Ap** |

| Course Title | Allied 2 – ANALYTICAL GEOMETRY OF THREE DIMENSIONS AND VECTOR CALCULUS( For Physics Students) | | |
|---|---|---|---|
| Code | **U15MA1ACT07** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Recognize and compute direction cosines and direction ratios, the plane and its standard forms. | **PSO -1** | **R,U** |
| CO - 2 | Recall and relate equation of line, co planarity of lines, skew lines and shortest distance between them. | **PSO -5** | **U,Ap** |
| CO - 3 | Explain and describe sphere and section of sphere by a plane. | **PSO -2** | **E** |
| CO - 4 | Evaluate the application of differentiation of vectors to physics phenomena | **PSO -3** | **U, Ap,E** |
| CO - 5 | Comp Evaluate line integral, surface integral and volume integrals and Interpretation of Gauss and Stoke's theorem. | **PSO -4** | **E** |
| CO - 6 | Make the students familiar with the basic concepts of three dimensional geometry, line surface and volume integrals- Skill Development | **PSO – 1,2** | **R, Ap** |

| Course Title | ALLIED 1: BUSINESS MATHEMATICS (For commerce students) |
|---|---|
| Code | **U15MA1ACT03** |

| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
|--------|-----------------|----------------|-----------------|
| CO – 1 | Record and assess mathematical finance, simple and compound interests, depreciation and discounting. | PSO -1 | R,U, |
| CO – 2 | Recall matrices and test for consistency of system of equations | PSO -3 | U,Ap |
| CO – 3 | Apply differentiation to estimate marginal functions, elasticity, maxima and minima | PSO -2 | U,E |
| CO – 4 | Evaluate of initial basic feasible solution of the transportation problem | PSO -5 | Ap,E |
| CO – 5 | Evaluate assignment problem using Hungarian algorithm. | PSO -4 | E |
| CO -6 | Be Introduced to the basic concepts of mathematics relevant to business and managerial skills - Skill Development | PSO-1,4 | R, Ap |

| Course Title | ALLIED 1 : BUSINESS MATHEMATICS AND STATISTICS<br>(For commerce students-vocational) | | |
|---|---|---|---|
| Code | U15MA1ACT04 | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Compute marginal function, elasticity, maxima and minima. | **PSO -1** | **R,U** |
| CO - 2 | Evaluate of initial basic feasible solution to transportation and assignment problem | **PSO -3** | **U,Ap** |
| CO - 3 | Recognize various method of collection of data and demonstrate through graphs. | **PSO -2** | **U,E** |
| CO - 4 | Assess and compare measures of dispersion and correlation. | **PSO -5** | **Ap,E** |
| CO - 5 | Recall index numbers and categorize its types and uses. | **PSO -4** | **E** |
| CO - 6 | Provide sufficient knowledge of statistics which enables them to compute various statistical measures. To solve socially relevant allocation problems- - Skill Development | **PSO -2,4** | **U, Ap** |

| Course Title | ALLIED 2 : APPLIED MATHEMATICS I<br><br>(for BCA and B.Sc. Computer science students) | | |
|---|---|---|---|
| Code | **U15MA1ACT05** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO –1 | Recall logic and truth table | **PSO -3** | **R,U** |
| CO –2 | Recognize WFF, Tautology and Summarize equivalence of formula. | **PSO -5** | **U,Ap** |
| CO –3 | Compute measures of central tendency | **PSO -2** | **U,E** |
| CO –4 | Calculate and compare dispersion , Skewness, kurtosis | **PSO -4** | **E** |
| CO –5 | Evaluate Correlation and regression | **PSO -1** | **E** |
| CO – 6 | Enable the students to understand the concept of mathematical logic. To provide sufficient knowledge of statistics which enables them to compute various statistical measures- SkillDevelopment | **PSO - 4** | **R,U, Ap** |

| Course Title | MAJOR CORE 2 – MULTI VARIATE CALCULUS | | |
|---|---|---|---|
| Code | U15MA2MCT02 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Compute Double and triple integral in Cartesian coordinates | PSO -1 | E |
| CO - 2 | Recall and relate beta and gamma function and their properties | PSO -5 | U,K |
| CO - 3 | Apply vector differentiation to physics concepts | PSO -2 | Ap, E |
| CO - 4 | Compute line integral surface integral and volume integral | PSO -4 | E |
| CO - 5 | Apply and assess Gauss divergence theorem and Stokes theorem | PSO - 3 | Ap, E |
| CO - 6 | Introduce the concepts of multiple integrals and some applications of integration to the students and to expose them the vector differential operator, vector differentiation , vector integration and the idea of line , surface and volume integrals-Skill Development | PSO-2,3 | R, Ap |

| Course Title | MAJOR CORE -3 - ANALYTICAL GEOMETRY OF TWO AND THREE DIMENSIONS | | |
|---|---|---|---|
| Code | U15MA2MCT03 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO –1 | Recognize and discuss straight line | PSO -4 | R,U |
| CO –2 | Recognize and discuss circle | PSO -1 | U,E |
| CO –3 | Describe and analyze plane, angle between the plane, length of the perpendicular, line intersection of two given planes. | PSO -2 | K, E |
| CO –4 | Explain straight line, coplanar lines, shortest distance between skew lines and its equation | PSO -5 | U,E |
| CO –5 | Recall and summarize sphere, intersection of two sphere, plane section of a sphere and the equation of the tangent plane to the sphere. | PSO - 3 | U, E |
| CO – 6 | Enable the students to be familiar with the fundamental concepts of two dimension and enhance the knowledge of three dimensional geometry- Skill Development | PSO-2,3 | U,E |

| Course Title | ALLIED 3- MATHEMATICAL STATISTICS III | | |
|---|---|---|---|
| Code | U15MA2ACT08 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recognize and explain sampling theory, Chi-square test, Student t test and F test | PSO -2 | R,E |
| CO - 2 | Recall and compute estimators and method of maximum likelihood. | PSO -3 | Ap, E |
| CO - 3 | Explain      Large sample and evaluate testing the hypothesis. | PSO -1 | K, E |
| CO - 4 | Discuss Small sample and evaluate test of hypothesis using t and chi-square distribution | PSO -5 | An,E |
| CO - 5 | Evaluate and apply test of hypothesis using F distribution | PSO - 4 | Ap, E |
| CO - 6 | Understand Large sample and evaluate testing the hypothesis. Understand Small sample and evaluate test of hypothesis using t and chi-square distribution- Skill Development | PSO-4 | U,E |

| Course Title | Allied 3 :LAPLACE TRANSFORMS, PARTIAL DIFFERENTIAL EQUATIONS AND FOURIER SERIES ( For Physics Students) | | |
|---|---|---|---|
| Code | U15MA2ACT09 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recognize and express Laplace transform | PSO -5 | R,E |
| CO - 2 | Apply inverse Laplace transform for solving ordinary differential equation with constant coefficient. | PSO -3 | Ap, E |
| CO - 3 | Recall partial differential equation and finding its solution | PSO -4 | R, E |
| CO - 4 | Explain second order partial differential equation and apply to Heat and wave equation. | PSO -2 | Ap,E |
| CO - 5 | Compute Full range Fourier series, half range Fourier series | PSO - 1 | E |
| CO - 6 | Expose the students to Laplace and inverse Laplace transforms, standard forms of partial differential equations, second order linear partial differential equations with constant coefficients and Fourier series and enable them to inculcate the habit of problem solving- Skill Development | PSO -1,2 | R,E |

| Course Title | ALLIED 3 - BUSINESS STATISTICS (For commerce students) | | |
|---|---|---|---|
| Code | **U15MA2ACT10** | | |
| **CO No.** | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO –1 | Recall and relate various method of collection of data and its diagrammatic representation | **PSO -2** | **R,U** |
| CO - 2 | Explain and Compute measures of averages and dispersion. | **PSO -1** | **U,E** |
| CO - 3 | Recognize and calculate Correlation and Regression | **PSO -3** | **R, E** |
| CO - 4 | Discuss and evaluate Time series using measures of trend, measure of seasonal variation | **PSO -5** | **U,E** |
| CO - 5 | Evaluate index number by applying the Laspeyre's, Fishers, Paasche's methods | **PSO - 4** | **E** |
| CO - 6 | Understand the various methods of collection of data and representing them through diagrams and graphs. To calculate various statistical parameters- Skill Development | **PSO – 3,5** | **U,E** |

| Course Title | ALLIED-3 APPLIED MATHEMATICS- II (For BCA & Computer Science students) | | |
|---|---|---|---|
| Code | U15MA2ACT11 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO – 1 | Recognize and relate LPP and solving LPP using graphical and simplex method. | PSO - 3 | R,U,E |
| CO – 2 | Explain Transportation problem and Evaluate its initial basic feasiblesolution | PSO -2 | Ap, E |
| CO – 3 | Discuss and solve assignment problem using Hungarian algorithm. | PSO -1 | E |
| CO – 4 | Recall and evaluate the problem of sequencing with respect to processing n jobs through 2machinesand | PSO -5 | E |
| CO – 5 | Describe and Construct Network and compute PERT and CPM | PSO -4 | R,U,E |
| CO – 6 | Provide an understanding of basic concepts in Operations Research Techniques for Analysis and Modeling in computer applications Skill Development | PSO – 2,5 | U, Ap |

| Course Title | MAJOR CORE –4: ALGEBRA AND TRIGONOMETRY | | |
|---|---|---|---|
| Code | U15MA3MCT04 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recognize and relate number theory and its theorems. | PSO - 1 | R,U |
| CO - 2 | Recall and find summation of Binomial, exponential, logarithmicseries | PSO -3 | Ap, E |
| CO - 3 | Explain the techniques for solving algebraic equations | PSO -5 | R,U |
| CO - 4 | Formulate the expansion of Trigonometric function | PSO -2 | R,U |
| CO - 5 | Summarize hyperbolic function and their properties. | PSO -4 | R,U |
| CO - 6 | Make the students familiar with expansion of trigonometric functions and Hyperbolic functions facilitate ways of separating complex functions- Skill Development | PSO – 2,3 | R,U |

| Course Title | MAJOR CORE 5 – REAL ANALYSIS-I | | |
|---|---|---|---|
| Code | **U15MA3MCT05** | | |
| **CO No.** | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO – 1 | Recognize real valued function, sequence and limit of a sequence. | **PSO - 3** | **R,U** |
| CO - 2 | Recall Convergent sequence and Divergence sequence, Bounded sequence, Monotone sequence and Cauchy sequence. | **PSO -2** | **R,U** |
| CO - 3 | Analyze the series of Real numbers. | **PSO -1** | **An** |
| CO - 4 | Examine convergence property using Comparison test, Cauchy's condensation test, D'Alembert's ratio test and Raabe's test. | **PSO -5** | **U,An** |
| CO - 5 | Explain limits, metric space and continuous function on a real line. | **PSO -4** | **R,U** |
| CO - 6 | Test convergence property using Comparison test, Cauchy's condensation test, D'Alembert's ratio test and Raabe's test - Skill Development | **PSO-2** | **U,An** |

| Course Title | SKILL BASED ELECTIVE 3 -APTITUDE MATHEMATICS | | |
|---|---|---|---|
| Code | U15MA3SBT03 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Demonstrate number system, simplification using formula and rule and evaluation of LCM and HCF | PSO - 3 | U,E |
| CO - 2 | Compute averages, percentage and data representation through diagram | PSO -2 | U, E |
| CO - 3 | Evaluate profit and loss ,ratio and proposition. | PSO -1 | U, E |
| CO - 4 | Recognize time and work concept and apply to cisterns and pipes. | PSO -5 | U, E |
| CO - 5 | Recall time and distance and apply trains, boats and streams. | PSO -4 | U, E |
| CO - 6 | Do Faster Computation for Competitive Exams-Employability | PSO -1 | U,E |

| Course Title | Allied 4(Optional) - APPLIED MATHEMATICS III (for BCA and B.Sc. Computer Science students) | | |
|---|---|---|---|
| Code | **U15MA3AOT13** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Recall matrices and its operations and Solving simultaneous linear equations | **PSO - 3** | **R,U,E** |
| CO - 2 | Compute Eigen values ,Eigen vector using Cayley Hamilton Theorem | **PSO -2** | **Ap, E** |
| CO - 3 | Evaluate algebraic and transcendental equation using numerical methods | **PSO -1** | **E** |
| CO - 4 | Formulation of Polynomial using interpolation . | **PSO -5** | **E** |
| CO - 5 | Examine direct and iterative numerical methods of simultaneous equation. Solve differential equation using Euler method, Runge Kutta method. | **PSO -4** | **U,E** |
| CO - 6 | impart the knowledge on matrices and enable the students to know about different methods of solving numerical equations, methods of interpolation, numerical differentiation and integration- Skill Development | **PSO -2** | **U,E** |

| Course Title | ALLIED 4(Optional) – WINDOWS ACCESSORIES AND MS – OFFICE (for B.Sc. Mathematics students) | | |
|---|---|---|---|
| Code | **U15MA3AOP12** | | |
| **CO No.** | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO – 1 | Recall _Text formatting, mail merge', mathematical equations water marking create backup files in MS word | **PSO – 3, PSO – 5** | **R,U** |
| CO – 2 | Recognize MS power point presentation with animation and sound effects. | **PSO -2** | **R,U** |
| CO – 3 | Arrange pay details, student mark ,different charts, import external data soft and filter in MS excel | **PSO -1** | **R,U** |
| CO – 4 | Create data base for at least three tables, queries, report generators | **PSO -4** | **R,U** |
| CO – 5 | Languages needed for further computer courses- Employability | **PSO-4** | **R,U** |

| Course Title | Allied 4 (Optional)- DIFFERENTIAL CALCULUS AND TRIGONOMETRY (For B.Sc. Chemistry students) | | |
|---|---|---|---|
| Code | U15MA3AOT14 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recall successive differentiation and Leibnitz theorem | PSO –1 | R,U |
| CO - 2 | Compute maxima and minima applying Derivatives | PSO -3 | Ap, E |
| CO - 3 | Explain and Discuss PDE and Eulers theorem | PSO – 5 | R,U |
| CO - 4 | Evalute the expansion of trigonometry function | PSO -2 | E |
| CO - 5 | Recognize and Compute Hyperbolic function and inverse hyperbolic functions | PSO -4 | U,E |
| CO - 6 | Acquire knowledge in differentiation and some of its applications ,to understand partial differentiation, to expand trigonometric functions and to learn the relation between hyperbolic functions Skill Development | PSO- 2,3 | Ap, E |

| Course Title | MAJOR CORE – 6: MODERN ALGEBRA I | | |
|---|---|---|---|
| Code | **U15MA4MCT06** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Recall relation and its types ,functions and binary operations. | **PSO – 3** | **R,U** |
| CO - 2 | Recognize groups and its classifications. | **PSO -2** | **R,U** |
| CO - 3 | Explain cyclic groups ,normal groups,quotient groups ,Isomorphism and homomorphism. | **PSO -1** | **R,U** |
| CO - 4 | Relate rings, its types,and elementary properties. | **PSO -5** | **R,U** |
| CO - 5 | Describe the concept of ideals ,Maximal ,prime ideals and homomorphism of rings | **PSO -4** | **R,U** |
| CO - 6 | Make the students understand the concept of relations and mappings, characteristics of Algebraic structures like Groups and Rings- Skill Development | **PSO-2,3** | **R,U** |

| Course Title | MAJOR ELECTIVE– 1: NUMERICALMETHODS | | |
|---|---|---|---|
| Code | **U15MA4MET01** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Explain various methods for solving algebraic and transcendental equations. | **PSO –1** | **U,E** |
| CO - 2 | Solving the system of simultaneous equations using numerical methods | **PSO -2** | **Ap, E** |
| CO - 3 | Compute numerical solution to ordinary differential equations using direct method. | **PSO -5** | **E** |
| CO - 4 | Formulate polynomial using interpolation for equal and unequal intervals. | **PSO -3** | **E** |
| CO - 5 | Evaluate finite integrals using Trapezoidal and Simpson's rule. Explain numerical differentiation and evaluation of maxima and minima. | **PSO -4** | **U,E** |
| CO - 6 | make the students know about different methods of solving numerical equations and differential equations, methods of interpolation and numerical differentiation and integration- Skill Development | **PSO -2** | **Ap, E** |

| Course Title | MAJOR ELECTIVE 1 - COMBINATORICS | | |
|---|---|---|---|
| Code | U15MA4MET04 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recognize the basic concepts involved in Combinatorics. | PSO – 2 | R,U |
| CO - 2 | Recognize the principlesof Inclusion and Exclusion.. | PSO -3 | Ap, E |
| CO - 3 | Recognize the concepts of generating functions involved in power series, function models and exponential generating functions. | PSO -1 | E |
| CO - 4 | Recognize the concepts of recurrence relations using models and calculates the solution of recurrence relations and generating functions. | PSO -4 | An |
| CO - 5 | Recall the concepts of integer partitions and systems of distinct representatives | PSO -5 | R,U |
| CO - 6 | To acquaint the students become familiar with techniques of recurrence relation and integer partitions and apply them to solve problems - Skill Development | PSO-2 | Ap |

| Course Title | MAJOR ELECTIVE 1 - MATHEMATICAL MODELLING | | |
|---|---|---|---|
| Code | U15MA4MET05 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recognize the basic concepts involved in Mathematical Modelling. | PSO – 2 | R,U |
| CO - 2 | Recognize the concepts of Mathematical Modelling through the system of first order ordinary differential equations. | PSO -3 | Ap, E |
| CO - 3 | Recognize the concepts of Mathematical Modelling through the system of second order ordinary differential equations | PSO -1 | E |
| CO - 4 | Recognize the concepts of Mathematical Modelling through difference equations. | PSO -4 | An |
| CO - 5 | Recall the concepts of graphs and solves the mathematical models using graphs. | PSO -5 | R,U |
| CO - 6 | To acquaint the students become familiar with mathematical models and apply them using ordinary differential equations to solve problems - Skill Development | PSO-2 | Ap |

| Course Title | ALLIED 5: INTERNET AND WEB DESIGNING | | |
|---|---|---|---|
| Code | U15MA4AOT16 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recall the concept of internet and its technology and browsers. | PSO –5 | R,U |
| CO - 2 | Discuss and describe HTML and its comment line | PSO -4 | R,U |
| CO - 3 | Recognize the design of a body section and ordered and unordered list. | PSO -2 | U,Ap |
| CO - 4 | Formulate HTML Table with specification. | PSO -3 | Ap |
| CO - 5 | Record styles and its classification. | PSO -1 | Ap |
| CO - 6 | Relate frames and forms. | | An |
| CO - 7 | Languages needed for further computer courses- Employability | PSO -4 | Ap |

| Course Title | ALLIED 5: ALGEBRA AND INTEGRAL CALCULUS (For Chemistry students) | | |
|---|---|---|---|
| Code | **U15MA4AOT17** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Recall matrices and its operations | **PSO –4** | **R,U** |
| CO - 2 | Compute rank of the matrices and solve the system of equations | **PSO -2** | **E** |
| CO - 3 | Recognize groups with its elementary properties and classifications | **PSO -3** | **R,U** |
| CO - 4 | Evaluate integration of irrational functions | **PSO -1** | **E** |
| CO - 5 | Examine reduction formula and the properties of definite integrals | **PSO -5** | **Ap,E** |
| CO - 6 | Make the learners understand arithmetic facts related to numbers , ratios, percentages, etc .and to train them in problem solving techniques- Skill Development | **PSO - 1** | **Ap,E** |

| Course Title | ALLIED 6: PROGRAMMING IN C | | |
|---|---|---|---|
| Code | **U15MA4AOT19** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Recall the concepts of C language. | **PSO - 5** | **R,U** |
| CO - 2 | Recognize decision making and control statements. | **PSO -3** | **U** |
| CO - 3 | State Arrays and its types. | **PSO -2** | **U** |
| CO - 4 | List user defined function and Recursion. | **PSO -1** | **U** |
| CO - 5 | Describe file management and I/O operations on file. | **PSO -4** | **U** |
| CO - 6 | Languages needed for further computer courses- Employability | **PSO -4** | **U** |

| Course Title | MAJOR ELECTIVE – 3: NUMBER THEORY | | |
|---|---|---|---|
| Code | U15MA6MET07 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recognize the basic concepts of Divisibility involving Euclid's Division Lemma and Linear Diophantine Equation. | PSO – 2 | R,U |
| CO - 2 | Recognize the basic principles on Permutations and Combinations using Fermat's Little Theorem and Wilson's Theorem. | PSO -3 | Ap, E |
| CO - 3 | Recognize the basic Properties of Congruences Residue Systems by using the theorems of Fermat and WilsonRevisited . | PSO -1 | E |
| CO - 4 | Recognize the concepts of  Polynomial Congruences using Chinese Remainder theorem. | PSO -4 | An |
| CO - 5 | Recall the concepts the concepts of  Arithmetic functions using Mobius Inversion formula. | PSO -5 | R,U |
| CO - 6 | To acquaint the students become familiar with the concepts of divisibility and arithmetic functions and apply them to solve problems - Skill Development | PSO-2 | Ap |

| Course Title | ALLIED 6 : ANALYTICAL GEOMETRY OF THREE DIMENSIONS, VECTOR CALCULUS AND DIFFERENTIAL EQUATIONS (For Chemistry students) | | |
|---|---|---|---|
| Code | **U15MA4AOT20** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Recall plane and its standard forms of equations. | **PSO - 4** | R,U |
| CO - 2 | Recognize coplanar lines, skewlines and evaluating shortest distance between two lines. | **PSO -3** | U,E |
| CO - 3 | Evaluate differential equation of using variable separable method. | **PSO -2** | E |
| CO - 4 | Apply vector differentiation in physics. | **PSO -1** | Ap,E |
| CO - 5 | Compute line, surface integral and volume integral | **PSO -5** | E |
| CO - 6 | Make the students understand the concepts of three dimensional geometry , linear ordinary differential equations and vector differentiation and integration- Skill development | **PSO - 2** | E |

| Course Title | MAJOR CORE- 7: MODERN ALGEBRA II | | |
|---|---|---|---|
| Code | U15MA5MCT07 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO – 1 | Recall vector space and its properties | PSO - 1 | R,U |
| CO – 2 | Recognize basis, dimension, rank, matrix linear transformation | PSO -2 | R,U |
| CO – 3 | Describe inner product space and its properties | PSO -5 | R,U |
| CO – 4 | Recall matrix theory | PSO -3 | R,U |
| CO – 5 | Compute eigen values and eigen vector and its application | PSO -4 | U,E |
| CO – 6 | Study vector spaces as an abstract algebraic system and establish some of the properties of such systems- Skill Development | PSO -2 | R,U |

| .Course Title | MAJOR CORE- 8: OPTIMIZATION TECHNIQUES | | |
|---|---|---|---|
| Code | **U15MA5MCT08** | | |
| **CO No.** | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Recall L.P.P and Solving LPP by Graphical and Simplex Method | **PSO - 3** | **U,E** |
| CO - 2 | Solve L.P.P by Big M method and Two phase Method | **PSO -2** | **E** |
| CO - 3 | Recognize and solve sequencing problem | **PSO -4** | **E** |
| CO - 4 | Discuss inventory control theory and compute EOQ. | **PSO -1** | **U,E** |
| CO - 5 | Evaluate PERT and CPM | **PSO -5** | **E** |
| CO - 6 | Enable the students to convert any real life situation into a mathematical model and solve them using an appropriate algorithm- Skill Development | **PSO – 1, PSO -2** | **U,E** |

| Course Title | MAJOR CORE - 9: GRAPH THEORY | | |
|---|---|---|---|
| Code | **U15MA5MCT09** | | |
| **CO No.** | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Recall and relate graph and its operations | **PSO - 4** | **R, U** |
| CO - 2 | Recognize the characteristics of graph | **PSO -5** | **U** |
| CO - 3 | List and relate special graphs. | **PSO -2** | **U** |
| CO - 4 | Describe directed graphs and its properties. | **PSO -3** | **U** |
| CO - 5 | Apply graph theory to travelling salesman problem. | **PSO -1** | **U,Ap** |
| CO - 6 | Understand the concepts of graph theory as an application of mathematics in information technology related fields- Skill Development | **PSO-2** | **U, Ap** |

| Course Title | MAJOR CORE – 10 : REAL ANALYSIS - II | | |
|---|---|---|---|
| Code | U15MA5MCT10 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recall open set and closed set. | PSO - 4 | R |
| CO - 2 | Describe connectedness and boundedness | PSO -1 | R,U |
| CO - 3 | Describe completeness, compactness and uniform continuity | PSO -5 | U |
| CO - 4 | Recognize derivatives, Rolle's theorem, Taylor's theorem. | PSO -3 | R,U |
| CO - 5 | Discuss Riemann integral and properties of Riemann integrals. | PSO -2 | U |
| CO - 6 | Introduce the concepts of open sets, closed sets , connected and bounded sets in a metric space. To enable the students to know about completeness, compactness , derivatives and Riemann integration.-SkillDevelopment | PSO -1,2 | R,U |

| Course Title | MAJOR ELECTIVE-2: MECHANICS | | |
|---|---|---|---|
| Code | U15MA5MET02 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recall equilibrium of forces and related theorem. | PSO –5 | R,U |
| CO - 2 | Recognize and list parallel forces ,couple, resultant of couple and a force | PSO -2 | R,U |
| CO - 3 | Discuss equilibriumofstrings and its application to catenary | PSO -1 | U |
| CO - 4 | Describe projectile and evaluation of its characteristics | PSO -3 | U,E |
| CO - 5 | Illustrate impulsive forces, & different types of impact | PSO -4 | U,E |
| CO - 6 | Enable the students to know about the concepts of types of forces, moments ,couples, Equilibrium of strings, projectiles, impulsive forces and collision elastic bodies- Skill Development | PSO-2,3 | R,U |

| Course Title | MAJOR ELECTIVE-2: ASTRONOMY | | |
|---|---|---|---|
| **Code** | **U15MA5MET06** | | |
| **CO No.** | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| **CO - 1** | Recall the concept of sphere and its formulae. | **PSO –5** | **R,U** |
| **CO - 2** | Recognize and list the types of stars. | **PSO -2** | **R,U** |
| **CO - 3** | Discuss refraction and laws of refractions. | **PSO -1** | **U** |
| **CO - 4** | Describe Kepler's laws and its verification | **PSO -3** | **U,E** |
| **CO - 5** | Illustrate moon and its phases. | **PSO -4** | **U,E** |
| **CO - 6** | Enable the students to know about the exciting world of astronomy and help them to study spherical trigonometry in the field ofastronomy and understand the movements of the celestialobjects .- Skill Development | **PSO-2,3** | **R,U** |

| Course Title | SKILL BASED ELECTIVE - IV: MATLAB APPLICATION | | |
|---|---|---|---|
| Code | **U15MA5SBT04** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Recall MATLAB | **PSO - 5** | **R** |
| CO - 2 | Recognize and relate matrix vector indexing and creating vector in MATLAB platform. | **PSO -4** | **R,U** |
| CO - 3 | Describe matrix and array operation. | **PSO -1** | **U** |
| CO - 4 | Formulate inline and built in function. | **PSO -3** | **U** |
| CO - 5 | Sketch 2D and 3D diagrams | **PSO -2** | **U** |
| CO - 6 | Developing skills for high performance language for technical computing it also integrates computation, visualization and programming – Employability | **PSO-4** | **U** |

| Course Title | NON MAJOR ELECTIVE – 1: QUICK MATHEMATICS | | |
|---|---|---|---|
| Code | U15MA5NMT01 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Demonstrate number system, simplification using formula and rule and evaluation of LCM and HCF | PSO - 2 | E |
| CO - 2 | Compute averages, percentage and data representation through diagram | PSO 3 | E |
| CO - 3 | Evaluate profit and loss ,ratio and proposition. | PSO -1 | E |
| CO - 4 | Recognize time and work concept and apply to cisterns and pipes. | PSO -4 | R,E |
| CO - 5 | Recall time and distance and apply trains, boats and streams. | PSO -5 | R,E |
| CO - 6 | Faster Computation for Competitive Exams-Employability. | PSO -1 | E |

| Course Title | MAJOR CORE–11:  THEORY OF FUNCTIONS OF ACOMPLEX VARIABLE | | |
|---|---|---|---|
| Code | **U15MA6MCT11** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Recall complex variable,Analytic functions and holmonic functions. | **PSO - 1** | **R,U** |
| CO - 2 | Explain and relate bilinear transformation and its properties | **PSO -2** | **U,E** |
| CO - 3 | Apply Cauchy's theorem and cauchy's integral formula to compute definite integrals | **PSO -5** | **Ap,E** |
| CO - 4 | Recognize zeros, pole and singularities of an analytic functions and their expressions using Taylor's theorem and Laurent's theorem | **PSO -3** | **U,E** |
| CO - 5 | Calculate residues using cauchy's residue theorem. | **PSO -4** | **E** |
| CO - 6 | Compute definite integrals between limits$-\infty$ to $\infty$ | **PSO -5** | **E** |
| CO - 7 | Extend the idea of integration in the complex field by using residues and evaluating contour integrals and to understand the concept of bilinear transformation and visualizing their images- Skill Development | **PSO -2,3** | **U,E** |

| Course Title | MAJOR CORE- 12:DIFFERENTIAL EQUATIONS ,LAPLACE TRANSFORMS AND FOURIER SERIES | | |
|---|---|---|---|
| Code | **U15MA6MCT12** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Apply Variation of parameters to solve ordinary differential equation | **PSO - 4** | **Ap,E** |
| CO - 2 | Form PDE and to solve PDE | **PSO -3** | **U,Ap** |
| CO - 3 | Recall Laplace transform and Compute Laplace transforms for standard Functions | **PSO -2** | **U,E** |
| CO - 4 | Recognize inverse Laplace transforms and to apply ILT solving ordinary differential equations | **PSO -1** | **U,E** |
| CO - 5 | Recall Fourier series and evaluate Full range and half range cosine and sine Series | **PSO -5** | **U,E** |
| CO - 6 | Expose the standard forms of partial differential equations, Laplace transform, inverse of Laplace transform ,Fourier series and applications of partial differential equations and enable the students to apply in problems- Skill Development | **PSO-2,3** | **U,Ap** |

| Course Title | MAJOR CORE – 13: INTRODUCTION TO FUZZY MATHEMATICS | | |
|---|---|---|---|
| Code | U15MA6MCT13 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recall and relate fuzzy set theory | PSO - 2 | R,U |
| CO - 2 | Recognize and relate the operation on fuzzy sets. | PSO -4 | U,Ap |
| CO - 3 | Recall and evaluate fuzzy relations and its operators | PSO -1 | U,E |
| CO - 4 | Describe and discuss fuzzy implications and approximate reasoning. | PSO -3 | U,Ap |
| CO - 5 | Reproduce fuzzy logic and fuzzy inference | PSO -5 | U,Ap |
| CO - 6 | Enable the students to have better applications of uncertainty through fuzzy mathematics for problems in physical and social sciences - Skill Development | PSO-2 | U,Ap |

| Course Title | MAJOR ELECTIVE – 3: PROGRAMMING IN C++ | | |
|---|---|---|---|
| Code | U15MA6MET03 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recall the keywords, identifier, data type, symbolic constants, variable of C++. | PSO - 2 | R,U |
| CO - 2 | Recognize operations of functions of C++. | PSO -1 | U |
| CO - 3 | Reproduce Classes, Objects and constructors of C++. | PSO -5 | U |
| CO - 4 | Relate constructors and its types | PSO -3 | U |
| CO - 5 | Apply constructors overload binary and urinary operations | PSO -4 | U,Ap |
| CO - 6 | Languages needed for further computer courses- Employability | PSO -4 | U,Ap |

| Course Title | SKILL BASED ELECTIVE– 5: APPLICATION OF ALGORITHMS | | |
|---|---|---|---|
| Code | U15MA6SBT05 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recognize Matrix representation and its type | PSO - 5 | R,U |
| CO - 2 | Recall and relate the relationship between matrices and cut set matrices | PSO -3 | U |
| CO - 3 | Apply Prism's algorithm and Kruskal algorithm for finding minimal spanning tree | PSO -2 | U,Ap |
| CO - 4 | Reproduce    Fundamental circuit algorithm and toapply Dijikstras algorithm | PSO -1 | U,Ap |
| CO - 5 | Apply travelling salesman problem algorithm and David Huffman         algorithm | PSO -4 | U,Ap |
| CO - 6 | To get equip in getting optimum solutions to data driven problems and to provide working solutions in time especially with dynamic problem definition - Skill Development | PSO-2 | U,Ap |

| Course Title | SKILL BASED ELECTIVE - 6: RESEARCH METHODOLOGY | | |
|---|---|---|---|
| Code | U15DS6SBT06 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recognize the types of research literature review and data collection | PSO – 1, PSO - 4 | R,U |
| CO - 2 | Recall the objectives, Hypothesis and area of research. | PSO -2 | U |
| CO - 3 | Discuss and evaluatedissertation | PSO -5 | Ap,E |
| CO - 4 | Demonstrate dissertation | PSO -3 | E |
| CO - 5 | Students get introduced to concept of research and to carrying out of research projects-- Skill Development | PSO-2,5 | Ap,E |

| Course Title | NON MAJOR ELECTIVE 2-- ART OF PROGRAMMING | | |
|---|---|---|---|
| Code | **U15MA6NMT02** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Recall flow chart and preparation of flow chart | **PSO - 1** | **R,U** |
| CO - 2 | Design algorithm for square, rectangle, circle and triangle, calculate simple interest and compound interest. | **PSO -2** | **U** |
| CO - 3 | Reproduce and relate Hardware and Software | **PSO -5** | **U** |
| CO - 4 | Recognize statements and application of statements for simple programs. | **PSO -3** | **U** |
| CO - 5 | List arrays and its types | **PSO -3** | **U** |
| CO - 6 | Languages needed for further computer courses - Skill Development. | **PSO - 4** | **U** |

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# M.Sc. MATHEMATICS

| PO No. | Programme outcomes<br>Upon completion of the M.Sc. Degree Programme, the graduate will be able to |
|---|---|
| PO – 1 | Obtain through knowledge in pure and applied Mathematics |
| PO – 2 | Obtain a basic knowledge in research and methodology |
| PO – 3 | Promote a research platforms to do projects |
| PO – 4 | Receive training to face SET /NET examinations |
| PO – 5 | Develop an skill to analysis a scientific and social problems for multidiscipline subjects |

| PSO No. | Programme Specific outcomes<br>Upon completion of these Courses the Students would |
|---|---|
| PSO - 1 | Become an individual academic excellence in the discipline of Mathematics |
| PSO - 2 | Acquire knowledge forresearch program |
| PSO - 3 | Be an entrepreneur for training SET / NET examinations |
| PSO - 4 | Become a software Developer |
| PSO - 5 | Executing research projects for multidiscipline subjects |

| Course Title | MAJOR CORE 1: LINEAR ALGEBRA | | |
|---|---|---|---|
| **Code** | **P15MA1MCT01** | | |
| **CO No.** | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| **CO - 1** | Acquire knowledge about bases and dimension | **PSO - 2** | **R** |
| **CO - 2** | Understand the linear transformation using matrices | **PSO - 4** | **U** |
| **CO - 3** | Understand the polynomial ideals and the prime factorization of polynomials | **PSO - 1** | **U** |
| **CO - 4** | Acquire knowledge about characteristic values and annihilating polynomials | **PSO - 2** | **R** |
| **CO - 5** | Differentiate the triangulization and diagonalization | **PSO - 1** | **U** |
| **CO - 6** | Gives a thorough knowledge of the various aspects of Linear Algebra and to train the students in problem-solving as a preparatory to NET/SET - Employability | **PSO -1,5** | **U,E** |

| Course Title | MAJOR CORE 2: ORDINARY DIFFERENTIAL EQUATIONS | | |
|---|---|---|---|
| **Code** | **P15MA1MCT02** | | |
| **CO No.** | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| **CO 1** | Evaluate higher order differential equations by applying Wronskian and variation ofparameters. | **PSO 1** | **R,U** |
| **CO 2** | Find solutions to power series by Legendre and Bessel's equations. | **PSO 3** | **E** |
| **CO 3** | Understand the existence and uniqueness theorem for the system of linear differential equations. | **PSO 5** | **R,U** |
| **CO 4** | Analyses the stability of non-linear systems using Quasi linear, Autonomous and Lyapunov function. | **PSO 2** | **An** |
| **CO 5** | Explain the elements of control theory. | **PSO 4** | **R,U** |
| **CO 6** | Enable The Students To Appreciate And Critically Evaluate The Linear Differential Equations With Constant And Variable Coefficients And Also With Regular Singular Points - Skill Development | **PSO 2,3,5** | **U, An** |

| Course Title | MAJOR CORE 3: MATHEMATICAL ANALYSIS | | |
|---|---|---|---|
| Code | P15MA1MCT03 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO 1 | Describe the topological properties on metric space. | PSO 1 | R,U |
| CO 2 | Differentiate continuity and uniform continuity with examples and infer the compactness in continuity and connectedness. | PSO 1 | U |
| CO 3 | Derive the differentiability from limiting of functions and clarify the properties and mean value theorems of differentiable functions. | PSO 2 | R,U |
| CO 4 | Explain the concept of Riemann- Stielije'sIntegrability and its properties and discuss Rectifiable curves. | PSO 3 | R,U |
| CO 5 | Explain the sequence of family of continuous and equicontinuous functions and their convergence limits and determine whether the sequence of functions which are pointwise convergent and uniform convergent | PSO 3 | AN |
| CO 6 | Enable The Students To Appreciate Various Aspects Of Metric Spaces And Understand Continuous Functions, Riemann-Stieltje's Integral, Sequences And Series Of Functions In Detail - Skill Development. | PSO 1,2,3 | R,U |

| Course Title | MAJOR CORE 4: GRAPH THEORY | | |
|---|---|---|---|
| Code | P15MA1MCT04 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recognize trees and connectivity | PSO - 2 | R,U |
| CO - 2 | Recall the concept of Hamiltonian and Eulerian graph. | PSO -5 | R,U |
| CO - 3 | Illustrate the proper Coloring and chromatic polynomial. | PSO -1 | Ev |
| CO - 4 | Identify the structure of planar graph. | PSO - 3 | R |
| CO - 5 | Understand the concept reachability in directed graph. | PSO -5 | R,U |
| CO - 6 | Give the rigorous introduction to the basic concepts of Graph Theory. To enlighten the students with many applications of this subject - Skill Development. | PSO-2,5 | R,U |

| Course Title | MAJOR CORE -5: COMPLEX ANALYSIS | | |
|---|---|---|---|
| Code | P15MA1MCT01 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Define analytic function and carry out conformal mappings with complex numbers. | PSO - 1 | R,U |
| CO - 2 | Evaluate a contour integral using fundamental theorem in complex integration and Cauchy's integral formula. | PSO - 5 | Ev |
| CO – 3 | Compute the residue of a function and use the Cauchy's theorem and Residue theorem to evaluate a contour integral. | PSO - 2 | Ev |
| CO -4 | Find the Taylor's series of a function and determine its circle or annulus of convergence. | PSO - 3 | Ev |
| CO – 5 | Understand the concept of infinite products of complex numbers through Jensen's formula and Hadamard's theorem. | PSO -1 | R,U |
| CO - 6 | Enable the students to appreciate and critically evaluate the analytic, harmonic functions and infinite products - Skill Development. | PSO-2,5 | Ev |

| Course Title | MAJOR CORE 6: ALGEBRA | | |
|---|---|---|---|
| Code | P15MA2MCT06 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO 1 | Summarize the concept of Sylow's theorem, direct products and finite Abelian groups. | PSO -1 | R |
| CO 2 | Differentiate polynomial rings over the rational field and polynomial rings over the commutate rings. | PSO - 1 | U |
| CO 3 | Describe the properties of vector spaces and modules. | PSO - 2 | R |
| CO 4 | Explain the concepts of roots of the polynomials and galois theory. | PSO - 3 | U |
| CO 5 | Finding the characteristic roots, matrices, canonical forms and triangular forms of linear transformation. | PSO - 3 | A |
| CO 6 | Give a detailed knowledge about the Counting Principle, Euclidean Rings, dual spaces and develop the concept of module theory, Galois theory and Linear Transformation - Skill Development. | PSO-1,2,5 | U,AP |

| Course Title | MAJOR CORE 7: PARTIAL DIFFERENTIAL EQUATIONS AND INTEGRAL TRANSFORMS | | |
|---|---|---|---|
| **Code** | **P15MA2MCT07** | | |
| **CO No.** | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO 1 | Evaluate the first order partial differential equation for finding solutions. | PSO -3 | A |
| CO 2 | Understand the second order partial differential equations with constant and variable coefficients. | PSO -5 | K |
| CO 3 | Solving the integral equations using Fredholm ,Volterra and Green's functions. | PSO - 1 | An |
| CO 4 | Compute the iterative methods for solving second order integral equations. | PSO - 2 | A n |
| CO 5 | Summarize the concept of Fourier transforms to transform some special functions. | PSO - 3 | U |
| CO 6 | Give an in-depth knowledge of solving differential equations using various methods and to introduce existence and uniqueness theorems in Differential equations - Skill Development. | PSO-1,2 | U,An |

| Course Title | MAJOR CORE 8: OPERATIONS RESEARCH | | |
|---|---|---|---|
| **Code** | **P15MA2MCT08** | | |
| **CO No.** | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO 1 | Understand the methods of solving integer programming problems. | PSO - 3 | R |
| CO 2 | Determine the solution for LPP in multistage. | PSO - 2 | A |
| CO 3 | Understand game theory to find solutions to problems. | PS0 -1 | U |
| CO 4 | Understand the concept of EOQ models and its types. | PSO -5 | A |
| CO 5 | Analyze some advanced topics in goal and geometric programming. | PSO- 1 | An |
| CO 6 | Discusses The Methods Of Solving Integer Programming Problems ,Nlpp Programming Algorithms And Inventory Models - Skill Development. | PSO – 1,5 | U, An |

| Course Title | MAJOR CORE 9: CLASSICAL MECHANICS | | |
|---|---|---|---|
| Code | P15MA2MCT09 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Recall and relate the basic notions of the mechanical system. | PSO-1 | R |
| CO - 2 | Derive Lagrange's equations from D'Alembert's and Hamilton's principles and apply these equations to holonomic and non holonomic systems. | PSO-3 | U |
| CO - 3 | Compare Lagranges equation and Hamilton's equations. | PSO-2 | R |
| CO - 4 | Build the nature of the dynamics is reflected in the properties of the phase space trajectories. | PSO-1 | U |
| CO - 5 | Analyze the Hamilton Jacobi equation through Stackel'stheorem. | PSO-3 | R |
| CO - 6 | Contributes A Thorough Knowledge About The Mechanical System Of Particles, Applications Of Lagrange's Equations , Hamilton's Equations And The Theory Of Hamilton Jacobi - Skill Development. | PSO-1,2 | U,R |

| Course Title | NON-MAJOR ELECTIVE 1: QUANTITATIVE TECHNIQUES | | |
|---|---|---|---|
| Code | P15MA2NMT01 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Understand the network scheduling through PERT/CPM methods. | PSO - 1 | R |
| CO - 2 | Classify the types of EOQ in inventory control to solve problems. | PSO - 2 | U |
| CO - 3 | Analyse decision making problem in different environments. | PSO- 5 | A |
| CO - 4 | Understand the game theory to seek solutions to problems. | PSO-1 | U |
| CO - 5 | Evaluate the technique of replacement. | PSO -2 | R |
| CO - 6 | Faster Computation For Competitive Exams – Skill Development. | PSO-1 | R |

| Course Title | NON MAJORELECTIVE1:DISCRETE MATHEMATICS | | |
|---|---|---|---|
| **Code** | **P18MA2NMT01** | | |
| **CO No.** | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO 1 | Recognize Truth table and Tautological implications. | **PSO - 2** | U |
| CO 2 | Recall the concept of Set theory and its properties. | **PSO - 1** | R |
| CO 3 | Illustrate the Euler graph and Hamiltonian graph. | **PSO- 5** | U |
| CO 4 | Identify the the rooted binary tree and spanning trees. | **PSO-1** | R |
| CO 5 | Understand the concept reachability in directed graph. | **PSO -2** | U |
| CO 6 | Gain the Basic Knowledge Both Theoretical And Empherical Necessary To Understand - Skill Development. | **PSO-1,5** | U |

| Course Title | MAJOR CORE 10: TOPOLOGY | | |
|---|---|---|---|
| **Code** | **P15MA3MCT10** | | |
| **CO No.** | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO 1 | Demonstrate how to generate topology from the bases and sub bases. | **PSO-1** | U |
| CO 2 | Identify the continuity of the function and Exemplify product and metric topology. | **PSO-5** | U |
| CO 3 | Implement the properties of connected and compact spaces toprovethe    generalized version of theorems on R to these topologicalspaces. | **PSO-2** | AP |
| CO 4 | Differentiate first and second countable spaces. | **PSO-1** | AN |
| CO 5 | Categorize the separation axioms which separate a point from another point, a point from a set that does not contain this point and a set from another set. | **PSO-3** | E |
| CO 6 | Generalize The Concepts Of Real Analysis To Topological Spaces And Develop Analytical Thinking. | **PSO-1** | AN |

| Course Title | MAJOR CORE 11 : MEASURE AND INTEGRATION | | |
|---|---|---|---|
| Code | P15MA3MCT11 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO 1 | Demonstrate how to generate topology from the bases and sub bases. | PSO-1 | U |
| CO 2 | Identify the continuity of the function and Exemplify product and metric topology. | PSO-5 | U |
| CO 3 | Implement the properties of connected and compact spaces to prove the generalized version of theorems on R to these topological spaces. | PSO-2 | AP |
| CO 4 | Differentiate first and second countable spaces. | PSO-1 | AN |
| CO 5 | Categorize the separation axioms which separate a point from another point, a point from a set that does not contain this point and a set from another set. | PSO-3 | E |
| CO 6 | Generalize The Concepts Of Real Analysis To Topological Spaces And Develop Analytical Thinking- Skill Development. | PSO-1 | AN |

| Course Title | MAJOR CORE 12: NUMBER THEORY | | |
|---|---|---|---|
| Code | P15MA3MCT12 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Acquire knowledge about divisibility and congruences. | PSO - 2 | R |
| CO - 2 | Understand the techniques of numerical calculationsof prime moduli and power moduli using congruences. | PSO - 1 | U |
| CO - 3 | Understand the ideas of quadratic residues and quadratic reciprocity. | PSO - 1 | U |
| CO - 4 | Acquire knowledge about binary quadratic forms and recurrence relation. | PSO - 2 | R |
| CO - 5 | Apply the idea of Diophantine equations to solve problem. | PSO - 3 | A |
| CO - 6 | Know About Divisiblity, Congruences, Legendre Function, Binary Quadratic Forms And Diophantine Equations - Skill Development | PSO -1,2 | U,R |

| Course Title | MAJOR ELECTIVE -1: THEORY OF FUZZY SETS | | |
|---|---|---|---|
| Code | P15MA3MET01 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Summarize the basic concepts of fuzzy sets and various types of operations in fuzzy sets. | PSO-5 | R |
| CO - 2 | Differentiate possibility theory and probability theory. | PSO-2 | AN |
| CO - 3 | Illustration of fuzzy ranking methods. | PSO-4 | R |
| CO - 4 | Apply various decision making techniques in solving problems. | PSO-3 | AP |
| CO - 5 | Explain fuzzy LPP and transportation techniques. | PSO-1 | U |
| CO - 6 | Introduce The Concept Of Fuzzy Sets And Import The Features Of Fuzzy In Various Representations Like Relations, Numbers & Decision Making - Skill Development. | PSO-2,5 | AN,R |

| Course Title | MAJOR ELECTIVE -1: AUTOMATA THEORY | | |
|---|---|---|---|
| Code | P15MA3MET02 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Understand the basic concepts of Deterministic and Nondeterministic finite Automata. | PSO-5 | R |
| CO - 2 | Explains Regular expressions and their relationship with automation | PSO-2 | AN |
| CO - 3 | Illustration of Pushdown Automaton. | PSO-4 | R |
| CO - 4 | Implementation of a lexical analyzer. | PSO-3 | AP |
| CO - 5 | Explain the basic parsing techniques | PSO-1 | U |
| CO - 6 | Introduce the concept nuances of Automata and Grammar and to understand the applications of these techniques in computer science.-Skill Development. | PSO-2,5 | AN,R |

| Course Title | NON MAJOR ELECTIVE-2 : STATISTICAL METHODS | | |
|---|---|---|---|
| Code | P15MA3NMT02 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Compute the measures of central tendency and measures of dispersion for different types of data's, by using standard formulae. | PSO-1 | U |
| CO - 2 | Knowledge about correlation coefficients and regression. | PSO -2 | U |
| CO - 3 | Understand the Binomial and Poisson distributions. | PSO - 3 | R |
| CO - 4 | Understand the normal distribution. | PSO -5 | U |
| CO - 5 | Analyse the testing of hypothesis for large samples. | PSO - 5 | U |
| CO - 6 | Analyse various measures of central tendency Understand discrete and continuous random variable and its properties and testing of hypothesis – Skill Development | PSO - 5 | U |

| Course Title | MAJOR CORE 13: FUNCTIONAL ANALYSIS | | |
|---|---|---|---|
| Code | **P15MA4MCT13** | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Acquire knowledge about the topological properties on a metric space including convergence and completeness and the higher dimensional functional spaces. | PSO-2 | R |
| CO - 2 | Understand Banach spaces with illustrations and their properties. | PSO- 2 | U |
| CO - 3 | Derive the concept of continuity and boundedness on Banach spaces and infer projection theorem on Banach spaces. | PSO - 3 | U |
| CO - 4 | Acquire knowledge about various Hilbert spaces and categorise operators and functionals defined on them. | PSO-2 | R |
| CO - 5 | Understand spectral theoretical indices and spectral theorem. | PSO-3 | U |
| CO - 6 | Enable The Study Of Vector Spaces Endowed With Some Kind Of Limit Relations - Skill Development. | PSO-2,3 | U,R |

| Course Title | MAJOR CORE 14: COMPUTATIONAL MATHEMATICS LAB | | |
|---|---|---|---|
| Code | P15MA4MCT14 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Understand MATLAB windows and matrix input. | PSO-1 | R |
| CO - 2 | Apply various matrix operations. | PSO- 2 | U |
| CO - 3 | Understand script files and function files. | PSO - 1 | R |
| CO - 4 | Apply the various MATLAB tools in Linear Algebra, Interpolation, Statistics and ODE. | PSO- 4 | R |
| CO - 5 | Apply the various methods to draw 2-D and 3-D plots. | PSO- 5 | U |
| CO - 6 | Develop Skills For High Performance Language For Technical Computing It Also Integrates Computation, Visualization And Programming – Employability. | PSO- 4 | R |

| Course Title | MAJOR ELECTIVE 2: CODING THEORY | | |
|---|---|---|---|
| Code | P15MA4MET01 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO – 1 | Understand the concept of Maximum-Likelihood Decoding and Syndrome Decoding. | PSO – 1 | U |
| CO – 2 | Analyze Double Error-Correcting B.C.H. code and Finite Fields Polynomials | PSO – 4 | An |
| CO – 3 | Understand Cyclic Codes | PSO – 2 | U |
| CO – 4 | Apply Quadratic Residue ($Q.R.$) Codes and find its applications. | PSO – 4 | Ap |
| CO – 5 | Study the concept of Bose-Chaudhuri-Hocquenghem ($B.C.H.$) Codes and Weight distributions | PSO – 5 | U |
| CO – 6 | Enable to know about decoding, cyclic codes, The Group of a code, Quadratic residue codes and Bose-Chaudhuri- Hocquenghem codes. Skill Development. | PSO – 1,4,5 | U, An |

| Course Title | MAJOR ELECTIVE 2: FLUID DYNAMICS | | |
|---|---|---|---|
| Code | P15MA4MET02 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Understand the Classification of fluids based on the physical properties of a fluid. | PSO - 2 | U |
| CO - 2 | Acquire knowledge about the kinematical properties of a fluid element. | PSO - 2 | R |
| CO - 3 | Apply the images in solid spheres, Antisymmetric flows and Stoke's stream function over the three dimensional flows. | PSO - 3 | A |
| CO - 4 | Analyse the Complex Velocity Potential for Two Dimensional Irrotational, Incompressible Flow and Standard Two-Dimensional Flows. | PSO - 4 | An |
| CO - 5 | Apply the coefficient of viscosity in viscous fluid. | PSO - 3 | A |
| CO - 6 | Know About The Analytical Formulation Of Fluid Mechanics Problems Using Newton's Laws Of Motion And Thermodynamics - Skill Development. | PSO – 2,3,5 | U, An |

| Course Title | MAJOR ELECTIVE 3 –STOCHASTICPROCESSES | | |
|---|---|---|---|
| Code | P15MA4MET03 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Understand the classification of stochastic processes and the idea of Markov chains in various field. | PSO - 1 | U |
| CO - 2 | Apply the concept of higher transition probabilities with their class of states. | PSO - 3 | A |
| CO - 3 | Understand the various distributions involved in in Poisson process through practical problems. | PSO - 5 | U |
| CO - 4 | Analyze the concept of renewal process with its application. | PSO - 2 | R |
| CO - 5 | Compute queuing model with its characteristics | PSO - 5 | A |
| CO - 6 | Understand the concept of discrete and continuous time Marko chains and their properties. Along with renewal process and related results and about several queuing models and their performance measures - Skill Development. | PSO-5 | U |

| Course Title | Self Study paper LATEX-Type Setting | | |
|---|---|---|---|
| Code | P17MA4SST01 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Understand simple type setting of Latex with font size and font type. | PSO -1 | U |
| CO - 2 | Acquire knowledge about page setting and numbering of documents. | PSO -2 | R |
| CO - 3 | Acquire knowledge about parts of a document and understand how to divide the document. | PSO -2 | R |
| CO - 4 | Exemplify Illustrates basic commands and custom commands. | PSO -3 | An |
| CO - 5 | Analyse Mathematics miscellany with new operators and understands many faces of mathematics symbols. | PSO -3 | An |
| CO - 6 | Acquire knowledge about type setting of LATEX in the preparation of documents and promote them to create research article in portable document file format-Entrepreneurship | PSO - 4 | An |

# M.Phil. MATHEMATICS

| PO No. | Programme Outcomes<br>*Upon completion of the M.Phil., Degree Programme, the graduate will able to* |
|---|---|
| PO-1 | To develop research level thinking in the field of pure and applied mathematics |
| PO-2 | To improve self learning . |
| PO-3 | To acquire adequate theoretical knowledge to write dissertation |
| PO-4 | To assimilate complex mathematical ideas and arguments. |
| PO-5 | To publish research articles in reputed journals. |

| PSO No. | Programme Specific outcomes<br>*Upon completion of these Courses the Students will be able to* |
|---|---|
| PSO - 1 | Apply the concept of research methodology to pursue research in the specified field. |
| PSO - 2 | Inculcate logical reasoning through abstract mathematical thinking. |
| PSO - 3 | Enhance their professional skills through teaching, communicating and learning strategies. |
| PSO - 4 | Strengthen self learning |
| PSO - 5 | Publish research articles in reputed journals |
| PSO - 6 | Face SET/ NET examinations |

| .Course Title | GENERAL RESEARCH METHODOLOGY | | |
|---|---|---|---|
| Code | Code: MPH16MA1C01 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Develop the Art of writing a Research paper and thesis. | PSO - 3 | U,E |
| CO - 2 | Explain Exploration andStratification . | PSO -2 | E |
| CO - 3 | Explain Fuzzy Bridges and Fuzzy Cut nodes. | PSO -4 | E |
| CO - 4 | Examine Uncoupled Linear systems. | PSO -1 | U,E |
| CO - 5 | Discuss Elementary properties of Mellin and Hankeltransforms . | PSO -5 | E |
| CO - 6 | Impart fundamental knowledge, thinking and technical skills for superior mastery in the areas of mathematical science and applications. To understand certain mathematical concepts, structures and their inter relationships - Skill Development | PSO – 1, PSO -2 | U,E |

| .Course Title | ALGEBRA AND ANALYSIS | | |
|---|---|---|---|
| Code | Code: MPH16MA1C02 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Develop the algebraic structure through modules. | PSO - 3 | U,E |
| CO - 2 | Explain Noetherian rings. | PSO -2 | E |
| CO - 3 | Explain positive Borel measures. | PSO -4 | E |
| CO - 4 | Examine LP spaces. | PSO -1 | U,E |
| CO - 5 | Discuss Banach algebra. | PSO -5 | E |
| CO - 6 | Empower scholars with knowledge of pure | PSO – 1, | U,E |

| | mathematics. To introduce the algebraic structure through modules - Skill Development | PSO -2 | |

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| .Course Title | PROFESSIONAL SKILLS FOR TEACHING - LEARNING | | |
|---|---|---|---|
| Code | Code: MPH18TS1C03 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Develop skills of ICT and apply them in Teaching Learning context and Research. | PSO - 3 | U,E |
| CO - 2 | Be able to use ICT for their professional development. | PSO -2 | E |
| CO - 3 | Leverage OERs for their teaching and research. | PSO -4 | E |
| CO - 4 | Appreciate the role of ICT in teaching, learning and Research. | PSO -1 | U,E |
| CO - 5 | Develop communication skills with special reference to Listening, Speaking, Reading and Writing. | PSO -5 | E |
| CO - 6 | Learn how to use instructional technology effectively in a classroom. | PSO – 1, PSO -2 | U,E |

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| .Course Title | ENVIRONMENTAL MANAGEMENT AND RISK ASSESSMENT | | |
|---|---|---|---|
| Code | MPH18MA1E04 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Examine features of risk/safety management systems; | PSO - 3 | U,E |
| CO - 2 | Conduct job safety analysis and carry out risk assessment; | PSO -2 | E |
| CO - 3 | Recommend and implement risk controls; | PSO -4 | E |
| CO - 4 | Use a case study approach to accident investigation | PSO -1 | U,E |

| | and reporting; and | | |
|---|---|---|---|
| CO - 5 | Design and implement a disaster management plan. | PSO -5 | E |
| CO - 6 | To provide knowledge related to clean technology and risks assessments - Skill Development | PSO – 1, PSO -2 | U,E |

| .Course Title | FUZZY QUEUEING | | |
|---|---|---|---|
| Code | MPH18MA1E05 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Understand how fuzzy sets model ambiguity. | PSO - 3 | U,E |
| CO - 2 | Manipulate fuzzy membership functions for simple operations. | PSO -2 | E |
| CO - 3 | Be familiar with the nature and use of fuzzy relations. | PSO -4 | E |
| CO - 4 | Derive the Performance measures of Queuing Models. | PSO -1 | U,E |
| CO - 5 | Develop and simulate simple queueing models with vacations and priorities | PSO -5 | E |
| CO - 6 | Familiar with a wide variety of queueing network. | PSO – 1, PSO -2 | U,E |

| .Course Title | FUZZY COGNITIVE MAP MODEL | | |
|---|---|---|---|
| Code | MPH18MA1E06 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | .Recall basic definitions and algorithm of FCM Methodology 2.Adapt FCM in various Intelligent Intrusion Detection systems | PSO - 3 | U,E |
| CO - 2 | Develop various modeling supervisory system using FCM | PSO -2 | E |
| CO - 3 | Apply FCM in appropriate complex and dynamic systems. | PSO -4 | E |
| CO - 4 | Identify Social issues with unsupervised data and analyse the factors and finds the most | PSO -1 | U,E |
| CO - 5 | impactful factor. | PSO -5 | E |
| CO - 6 | To understand the tool Fuzzy cognitive Map and its significance role in complex and dynamic | PSO – 1, PSO -2 | U,E |

| .Course Title | TRANSPORTATION THEORY | | |
|---|---|---|---|
| Code | MPH18MA1E07 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Discuss the nature, function, importance and challenges of contemporary transportation systems. | PSO - 3 | U,E |
| CO - 2 | Explain the diversity of transportation modes. | PSO -2 | E |
| CO - 3 | Summarise emerging issues such as globalization and supplychain management. | PSO -4 | E |
| CO - 4 | Relate transportation and economic development. | PSO -1 | U,E |
| CO - 5 | Examine the environmental impact of transportation. | PSO -5 | E |
| CO - 6 | Understand the nature, function, importance and challenges of contemporary transportation systems - Skill Development | PSO – 1, PSO -2 | U,E |

| .Course Title | INVENTORY CONTROL SYSTEMS | | |
|---|---|---|---|
| Code | MPH18MA1E08 | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Discussinventory metrics – dependent and independent demand. | **PSO - 3** | **U,E** |
| CO - 2 | Explainsensitivity analysis – advanced deterministic EOQ models,EPQ and fixed time period models. | **PSO -2** | **E** |
| CO - 3 | Summariseadditional properties of the model. | **PSO -4** | **E** |
| CO - 4 | RelateBasic concepts of single period inventory problem | **PSO -1** | **U,E** |
| CO - 5 | Examine Evolution , Standardization and Variety reduction on inventory control system | **PSO -5** | **E** |
| CO - 6 | Analyze the standardization, variety reduction and inventory control - Skill Development | **PSO – 1, PSO -2** | **U,E** |

| .Course Title | INVENTORY MANAGEMENT | | |
|---|---|---|---|
| Code | MPH18MA1E09 | | |
| CO No. | **Course Outcomes** | **PSOs Addressed** | **Cognitive Level** |
| CO - 1 | Discuss about the Elements, Techniques-Statistical inventory control system - Budgetary control system | **PSO - 3** | **U,E** |
| CO - 2 | Explain the diversity of the inventory ratios. | **PSO -2** | **E** |
| CO - 3 | Summarizerisingissue such as Financing of inventories | **PSO -4** | **E** |
| CO - 4 | Relate inventory and other variables. | **PSO -1** | **U,E** |
| CO - 5 | Examine the productivity and inventory. | **PSO -5** | **E** |
| CO - 6 | To acquire the knowledge of inventory systems and to know how to control the inventory - Skill Development | **PSO – 1, PSO -2** | **U,E** |

| .Course Title | INVENTORY MODELS AND ENVIRONMENTAL SUSTAINABILITY | | |
|---|---|---|---|
| Code | MPH18MA1E10 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Understand the factors and costs of an inventory system. | PSO - 3 | U,E |
| CO - 2 | Understand the inventory models for deteriorating and ameliorating products. | PSO -2 | E |
| CO - 3 | Understand environmental management theories and models and their applications to a variety of scenarios. | PSO -4 | E |
| CO - 4 | Understand and analyze various social issues in environmental management. | PSO -1 | U,E |
| CO - 5 | Explains about managing industrial pollution through impact studies and assessment. | PSO -5 | E |
| CO - 6 | Choose and apply appropriate inventory models to solve real-world case Problems -Skill Development | PSO – 1, PSO -2 | U,E |


| .Course Title | INVENTORY AND LOGISTICS MANAGEMENT | | |
|---|---|---|---|
| Code | MPH18MA1E11 | | |
| CO No. | Course Outcomes | PSOs Addressed | Cognitive Level |
| CO - 1 | Apply inventory models and techniques to create and recommend appropriate stocking solution in various business settings.. | PSO - 3 | U,E |
| CO - 2 | Examine the role of Government in controlling international trade and its impact on Logistics and  Supply Chain. | PSO -2 | E |

| CO - 3 | Discuss MRP. | PSO -4 | E |
|---|---|---|---|
| CO - 4 | Solve practical problems in the management. | PSO -1 | U,E |
| CO - 5 | Describe the importance of logistics in supply chain management. | PSO -5 | E |
| CO - 6 | To understand the importance of logistics in supply chain management - Skill Development | PSO – 1, PSO -2 | U,E |