

**Name of the Department** : **Mathematics**  
**Programme** : **UG**

| S.No                | Course Code | Course Name                                   | Course Outcome  |
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| <b>SEMESTER - I</b> |             |   |   |
| 1.                  | 15UMAC11    | Foundation Course –<br>Basic Mathematics      | <ul style="list-style-type: none"> <li>• Apply the rules of limits to calculate limits.</li> <li>• Use the limit concept to determine the point of continuity of a function.</li> <li>• Calculate derivatives of functions defined implicitly.</li> <li>• Calculate a definite integral as a limit of approximating sums.</li> <li>• Develop skill in 2 dimensional space</li> <li>• Find the distance between two points.</li> <li>• Find the centroid, incentre of the triangle.</li> </ul> |
| 2.                  | 15UMAC12    | Differential Calculus<br>and its applications | <ul style="list-style-type: none"> <li>• Understand the concept of differentiation.</li> <li>• Find the higher derivatives.</li> <li>• Gain an in-depth knowledge of partial differentiation using Euler’s theorem.</li> <li>• Find critical points, and use them to locate maxima and minima.</li> <li>• Use the derivative to find tangent lines to curves.</li> <li>• Demonstrate the method of curve tracing</li> </ul>   |
| 3.                  | 15UMAN11    | Fundamentals of<br>Mathematics                | <ul style="list-style-type: none"> <li>• Able to find LCM and HCF of numbers</li> <li>• Use sets and/or Venn diagrams to solve a stated problem</li> <li>• Learn the differentiation rules for products, quotients and the chain rule</li> <li>• Find critical points, and use them to locate maxima and minima.</li> </ul>   |
| 4.                  | 15UMAE11    | MS-Office                                     | <ul style="list-style-type: none"> <li>• Demonstrate fundamental knowledge of MS Word.</li> <li>• Relate real-life MS Word applications for professional or personal use.</li> <li>• Develop an informal business letter.</li> <li>• Apply MS Word techniques to create promotional hand-outs.</li> <li>• Understand a Word Processor Create, Edit and</li> </ul>   |

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|                      |          |                          | <p>Format documents</p> <ul style="list-style-type: none"> <li>• Work with Tables, Import and Export data between Files Proofing a Document Save, Protect and Print documents</li> <li>• Determine and use various workplace application software to develop, document, and manage office projects, procedures and systems</li> </ul>   |
| <b>SEMESTER - II</b> |          |                          |   |
| 1.                   | 15UMAC21 | Theory of Equations      | <ul style="list-style-type: none"> <li>• Attain the basic knowledge about equations and to solve equations in different Methods</li> <li>• Learn the concept of rational roots, irrational roots, imaginary roots and the relation between the roots and coefficient of the equations.</li> <li>• Gain knowledge of symmetric function of the roots.</li> <li>• Make a good background on basic concepts of algebra.</li> <li>• Gain knowledge of removal of terms using theorems like Rolle's theorem and Sturm's theorem.</li> <li>• Find the roots of biquadratic and cubic equations by using Cardan's method.</li> </ul> |
| 2.                   | 15UMAC22 | Analytical Geometry – 3D | <ul style="list-style-type: none"> <li>• Define and represent geometrical shapes in a numerical way and extracting numerical information from shapes' numerical definitions and representations.</li> <li>• Enable the students to develop their skill in 3 dimensional Cartesian Co-ordinates system</li> <li>• Learn the properties of straight lines and spheres.</li> <li>• Derive the conditions for parallelism and perpendicularity of two lines.</li> </ul>   |
| 3.                   | 15UMAN21 | Statistical Methods      | <ul style="list-style-type: none"> <li>• Enable the students to understand the meaning, definition, nature, importance and limitations of statistics.</li> <li>• Able to create, read, and interpret graphs, charts, histograms, and diagrams.</li> <li>• Understand and use the basic measure of central tendency.</li> </ul>  |

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|                       |          |                      | <ul style="list-style-type: none"> <li>• Explain the relevance and use of statistical tools for analysis and forecasting.</li> </ul>  |
| 4.                    | 15UMAE21 | Integral Calculus    | <ul style="list-style-type: none"> <li>• Classify angles as acute, right, obtuse, or straight.</li> <li>• Find measures of angles, parallel and perpendicular lines.</li> <li>• Find the missing measurements in a pair of similar triangles.</li> <li>• Understand the meaning of the derivative in terms of a rate of change and local linear approximation.</li> <li>• Familiarize themselves with the techniques of integration and differentiation of functions with real variables.</li> <li>• Able to compute the limit of a function when <math>x \rightarrow \infty</math></li> <li>• Write the equation of a line tangent to the curve of <math>f(x)</math> at a given point.</li> <li>• Write given function in terms of sine and cosine terms in Fourier series and also to get knowledge in Fourier transforms.</li> <li>• Able to solve finite difference equations using Z transforms.</li> <li>• Able to solve improper integrals using beta, gamma functions.</li> <li>• Apply method of least square to find the curve of best fit for the given data.</li> </ul> |
| <b>SEMESTER - III</b> |          |                      |   |
| 1.                    | 15UMAC31 | Sequences and Series | <ul style="list-style-type: none"> <li>• Provide a formal introduction to the concept of limit and compute the limits of sequences.</li> <li>• Gain knowledge of some simple techniques for testing the convergence of sequences.</li> <li>• Apply the properties of limits summarized in Theorems and recognize when a sequence is increasing, decreasing, bounded and monotonic.</li> <li>• Gain knowledge of the various aspects of divergence of sequences.</li> <li>• Relate the convergence or divergence of the series using the sequence of partial sums.</li> </ul>  |

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|    |          |                   | <ul style="list-style-type: none"> <li>• Recognize the infinite series and determine whether they converge or diverge.</li> <li>• Study about the integral test which shows the equivalence between the convergence of a series and that of an associated integral.</li> <li>• Know about the alternating series and its properties.</li> <li>• Gain knowledge for testing the convergence of series of positive terms.</li> </ul>  |
| 2. | 15UMAC32 | Numerical Methods | <ul style="list-style-type: none"> <li>• Give procedures for solving numerically different kinds of problems occurring in engineering and technology</li> <li>• Find solution of system of linear equations, roots of non-linear equations</li> <li>• Learn the concept of interpolation</li> <li>• Able to approximate the functions and to estimate the errors.</li> <li>• Use the numerical techniques to solve algebraic and differential equations</li> <li>• Develop skills in solving problems using numerical techniques.</li> </ul>            |
| 3. | 15UMAA31 | Programming in C  | <ul style="list-style-type: none"> <li>• Understand the basic terminology used in computer programming</li> <li>• Write, compile and debug programs in C language.</li> <li>• Use different data types in a computer program.</li> <li>• Design programs involving decision structures, loops and functions.</li> <li>• Explain the difference between call by value and call by reference</li> <li>• Understand the dynamics of memory by the use of pointers.</li> <li>• Use different data structures and create/update basic data files.</li> </ul> |
| 4. | 15UMAS31 | Theory of Numbers | <ul style="list-style-type: none"> <li>• Understand the basic knowledge of numbers and its types.</li> <li>• Introduce the notion of Euler's function .</li> <li>• Develop the skill about the criteria of divisibility of number by 3,9 and 11</li> </ul>  |

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|                      |          |                     | <ul style="list-style-type: none"> <li>• Explain congruences and its properties.</li> <li>• Get in insight into divisibility using Fermat's Theorem and generalized Fermat's Theorem.</li> <li>• Learn about the characterization of prime numbers using Wilson's theorem.</li> </ul>   |
| 5.                   | 15UMAV31 | Data Interpretation | <ul style="list-style-type: none"> <li>• Able to independently read mathematical and statistical literature of various types, including survey articles, scholarly books, and online sources.</li> <li>• Communicate statistical ideas clearly in both oral and written form using appropriate statistical terminology.</li> <li>• Generate reports that show statistical expertise in writing and model implementation.</li> <li>• Methods to summarize a collection of data by describing what was observed using numbers or graphs.</li> <li>• Ability to deal with the collection, organization, presentation, computation and interpretation of data.</li> </ul> |
| <b>SEMESTER - IV</b> |          |                     |   |
| 1.                   | 15UMAC41 | Mechanics           | <ul style="list-style-type: none"> <li>• Able to construct free-body diagrams and to calculate the reactions necessary to ensure static equilibrium.</li> <li>• Understand the analysis of distributed loads.</li> <li>• Able to calculate centroids and moments of inertia.</li> <li>• Gain knowledge of kinetic energy and momentum methods for particles and systems of particles.</li> <li>• Acquire knowledge of the general principles of dynamics.</li> </ul>  |
| 2.                   | 15UMAC42 | Graph Theory        | <ul style="list-style-type: none"> <li>• Understand the basic concepts of graphs</li> <li>• Able to present a graph by matrices.</li> <li>• Understand the properties of trees</li> <li>• Understand Eulerian and Hamiltonian graphs.</li> <li>• Apply the Planarity Algorithm</li> <li>• Demonstrate the usage of Euler's Formula</li> </ul>   |

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| 3. | 15UMAA41 | Object Oriented Programming with C++ and Visual Basic | <ul style="list-style-type: none"> <li>• Explain the need and importance of OOP using C++.</li> <li>• Distinguish basic data types, custom input/output operators and illustrate class definition</li> <li>• Using member functions.</li> <li>• Apply concept of overloading, type conversion and virtual functions.</li> <li>• Demonstrate templates, use and handle exceptions.</li> <li>• Describe inheritance, polymorphism and concepts related to files.</li> <li>• Discuss the concept of pointers, make use of constructors and destructors themselves and manage a class' resources using dynamic memory allocation and de-allocation.</li> </ul>   |
| 4. | 15UMAO41 | Trigonometry  | <ul style="list-style-type: none"> <li>• Able to use formulae for arc length and sector area in terms of radians.</li> <li>• Familiarize themselves with basic properties of sine, cosine and tangent functions.</li> <li>• Determine the six trigonometric function values for any angle in standard position</li> <li>• When the coordinates of a point on the terminal side are given.</li> <li>• Evaluate inverse trigonometric functions.</li> <li>• Learn about the hyperbolic functions.</li> <li>• Apply logarithms to the solution of problems encountered in mathematics and the sciences.</li> <li>• Apply trigonometric techniques as tools in the analysis of mathematical, physical, and scientific problems.</li> </ul> |
| 5. | 15UMAO42 | Fourier Series and Laplace Transform                  | <ul style="list-style-type: none"> <li>• Gain knowledge of Even and odd Functions .</li> <li>• Introduce the concept of half range Fourier series.</li> <li>• Gain an in-depth knowledge of the various aspects of cosine series and change of interval.</li> <li>• Inculcate the insight knowledge of Laplace Transforms and the conditions for its existence.</li> <li>• Demonstrate the idea of inverse Laplace</li> </ul>  |

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|                     |          |                       | <p>Transforms</p> <ul style="list-style-type: none"> <li>• Find the inverse Laplace Transform of certain functions by the method of partial fractions.</li> <li>• Evaluate the ordinary differential equations with constant coefficients by using Laplace Transform.</li> <li>• Able to solve certain equations involving integrals by Laplace Transform.</li> </ul>  |
| 6.                  | 15UMAO43 | Mathematical Modeling | <ul style="list-style-type: none"> <li>• Familiarize themselves with the basic knowledge of mathematical modelling and its techniques.</li> <li>• Gain knowledge of Mathematical modelling through Geometry, Algebra and Calculus.</li> <li>• Learn about the limitations of Mathematical modelling.</li> <li>• Understand the idea of Mathematical modelling through Differential Equations.</li> <li>• Study about Linear Growth and non linear growth with Decay Models.</li> <li>• Gain an in-depth knowledge of Mathematical modelling in dynamics through ordinary differential equations</li> <li>• Study the concept of Models in terms of directed Graphs and signed Graphs</li> <li>• Develop the idea of Mathematical Modelling in terms of Unoriented Graphs.</li> </ul> |
| <b>SEMESTER - V</b> |          |                       |  |

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| 1. | 15UMAC51 | Modern Algebra      | <ul style="list-style-type: none"> <li>• Understand the relationships between abstract algebraic structures with familiar numbers systems such as the integers and real numbers.</li> <li>• Learn the concepts of the relationships between operations satisfying various properties.</li> <li>• Learn the concepts and properties of various algebraic structures.</li> <li>• Use results from elementary group theory to solve contemporary problems</li> <li>• Demonstrate ability to think critically by interpreting theorems and relating results to problems in other mathematical disciplines</li> <li>• Learn the elementary theorems and proof techniques of group and ring theory</li> <li>• Apply the theorems, proof techniques and standard computations of group and ring theory to solve problems.</li> </ul> |
| 2. | 15UMAC52 | Real Analysis       | <ul style="list-style-type: none"> <li>• Learn the basic ingredients of reals and understand the properties of functions defined on the Real line.</li> <li>• Develop a sound knowledge and appreciation of the ideas and concepts related to metric spaces</li> <li>• Give a strong foundation to take up advanced level courses in analysis.</li> <li>• Construct proofs, counter arguments or counter examples in reals.</li> <li>• Construct the field axioms of the reals, covers, density, monotonicity, boundedness,</li> <li>• Demonstrate completeness, limits, continuity.</li> <li>• Describe and prove continuity conditions for real</li> <li>• Demonstrate compactness and its characterization.</li> <li>• Make the student a good background on basic real analysis.</li> </ul>                               |
| 3. | 15UMAC53 | Operations Research | <ul style="list-style-type: none"> <li>• Identify and develop operational research models from the verbal description of the real System.</li> <li>• Understand the mathematical tools that are needed to solve optimisation problems.</li> <li>• Develop a report that describes the model and the</li> </ul>  |



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|    |          |                           | <p>solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes.</p> <ul style="list-style-type: none"> <li>• Able to design new simple models, like: CPM, PERT ,etc to improve decision –making and develop critical thinking and objective analysis of decision problems.</li> <li>• Formulate simple reasoning, learning and optimization problems, in terms of the representations and methods presented.</li> <li>• Evaluate analytically the limitations of these algorithms, and assess tradeoffs between these algorithms.</li> <li>• Demonstrate the hand execution of basic reasoning and optimization algorithms on simple problems.</li> </ul>   |
| 4. | 15UMAC54 | Mathematical Statistics I | <ul style="list-style-type: none"> <li>• Gain knowledge in basic mathematical statistics.</li> <li>• Able to collect, organise, and represent data, and be able to recognise and describe relationships</li> <li>• Demonstrate the relevance and use of statistical tools for analysis and forecasting</li> <li>• Gain the basic knowledge of measures of dispersion like mean, median and mode.</li> <li>• Obtain a point estimate for the variance and standard deviation of the conditional distribution of the response variable given a value for the predictor.</li> <li>• Know about the concept of correlation and regression.</li> <li>• Construct a confidence interval for the slope of the regression line.</li> <li>• Gain an in-depth knowledge of the various aspects of curve fitting of curves.</li> <li>• Know about the concept of Index numbers.</li> <li>• Understand the concept of Attributes.</li> </ul> |
| 5. | 15UMAO51 | History of Mathematics    | <ul style="list-style-type: none"> <li>• Acquire knowledge of the history of mathematics.</li> <li>• Able to communicate mathematical ideas with others.</li> <li>• Know and demonstrate understanding of the</li> </ul>   |

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|    |          |   | <p>concepts from the five branches of mathematics (number, algebra, geometry and trigonometry, statistics and probability, and discrete mathematics)</p> <ul style="list-style-type: none"> <li>• Use appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.</li> <li>• Understand and be able to articulate the differences between inductive and deductive reasoning.</li> </ul>  |
| 6. | 15UMAO52 | Vector Calculus                         | <ul style="list-style-type: none"> <li>• Gain knowledge about the dot product of vectors, lengths of vectors, and angles between vectors.</li> <li>• Evaluate line integrals of scalar functions or vector fields along curves.</li> <li>• Recognize conservative vector fields, and apply the fundamental theorem for line integrals of conservative vector fields.</li> <li>• Evaluate surface integrals; compute surface area.</li> <li>• Evaluate integrals over parametric surfaces.</li> <li>• Identify various quadric surfaces through their equations.</li> <li>• Apply the divergence theorem to give a physical interpretation of the divergence of a vector field.</li> <li>• Evaluate the velocity and acceleration of a particle moving along a space curve.</li> </ul> <p>Apply triple integrals to find volumes and center of mass.</p> |
| 7. | 15UMAO53 | Mathematical Methods in Social Sciences | <ul style="list-style-type: none"> <li>• Understand the mathematical methods that are most widely used in economics, both from a formal, abstract perspective, and an intuitive perspective.</li> <li>• Know how to read, understand, and construct mathematical proofs, and appreciate their role in the derivation of mathematical concepts and structures.</li> <li>• Apply mathematical methods and techniques that are formulated in abstract settings to</li> </ul>   |

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|                      |          |                              | <p>concrete economic applications.</p> <ul style="list-style-type: none"> <li>• Static (or equilibrium) analysis in which the economic unit (such as a household) or economic system (such as a market or the economy) is modeled as not changing.</li> </ul>  |
| 8.                   | 15UMAS51 | Lattices and Boolean Algebra | <ul style="list-style-type: none"> <li>• Able to recognize, identify, classify and describe the problems of set theory so that they can differentiate between functions and relations</li> <li>• Understand abstract algebra, posets, lattices, Boolean algebra.</li> <li>• Gain an the insight into the types of lattices and its properties.</li> <li>• Demonstrate the concepts of Boolean algebra.</li> <li>• Draw a Karnaugh map for a logic system with up to four inputs and use it to minimise the Boolean expression.</li> <li>• By studying mathematical logic, they will be able to learn to use logically valid forms of arguments.</li> </ul> |
| 9.                   | 15UMAS52 | Quantitative Aptitude I      | <ul style="list-style-type: none"> <li>• Able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.</li> <li>• Understanding the properties of proportion and its usage.</li> <li>• Able to add, subtract, multiply and divide whole numbers, decimal numbers and fractions.</li> <li>• Manipulate equations and formulas in order to solve for the desired variable.</li> <li>• Able to perform operations with surds and indices.</li> <li>• Determine the square roots, cube roots of positive whole numbers, decimals and common fractions.</li> </ul>   |
| <b>SEMESTER - VI</b> |          |                              |  |
| 1.                   | 15UMAC61 | Linear Algebra               | <ul style="list-style-type: none"> <li>• Present basic concepts of vector spaces</li> <li>• Inculcate basic concepts of matrices and matrix algebra</li> <li>• Present methods of solving systems of linear equations</li> </ul>   |

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|    |          |   | <ul style="list-style-type: none"> <li>• Demonstrate concepts of linear transformations</li> <li>• Learn about the span of a set and linear independence.</li> <li>• Demonstrate ability to work within vector spaces and to distil vector space properties.</li> <li>• Present methods of computing and using eigen values and eigenvectors.</li> <li>• Present the concept of and methods of computing determinants</li> <li>• Able to find the change-of-basis matrix with respect to two bases of a vector space</li> </ul>   |
| 2. | 15UMAC62 | Complex Analysis                            | <ul style="list-style-type: none"> <li>• Explain the fundamental concepts of complex analysis and their role in modern mathematics and applied contexts</li> <li>• Demonstrate accurate and efficient use of complex analysis techniques</li> <li>• Gain knowledge about the elementary transformation and bilinear transformation</li> <li>• Compute the fixed points of a bilinear transformation.</li> <li>• Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations;</li> <li>• Evaluate integrals along a path in the complex plane and understand the statement of Cauchy's Theorem</li> <li>• Compute the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues</li> <li>• Identify the isolated singularities of the function and determine whether they are removable, poles or essential.</li> <li>• Compute innermost Laurent Series at an isolated singularity and determine the residue.</li> <li>• Use the Residue theorem to compute complex line integral and real integrals.</li> </ul> |
| 3. | 15UMAC63 | Differential Equations and its Applications | <ul style="list-style-type: none"> <li>• Understand some basic definitions and terminology associated with differential equations and their solutions</li> </ul>  |

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|    |          |                            | <ul style="list-style-type: none"> <li>• visualize the direction field associated with a first-order differential equation</li> <li>• Use analytical methods of solution by direct integration; separation of variables; and the integrating factor method.</li> <li>• identify a general method for constructing solutions to inhomogeneous linear constant-coefficient second-order equations</li> <li>• Show an awareness of initial and boundary conditions to obtain particular values of constants in the general solution of second-order differential equations.</li> <li>• Determine solutions to first order linear differential equations.</li> <li>• Determine solutions to first order exact differential equations.</li> <li>• Determine solutions to second order linear homogeneous differential equations with constant coefficients.</li> <li>• Convert separable and homogeneous equations to exact differential equations by integrating factors.</li> <li>• Classify the differential equations with respect to their order and linearity.</li> </ul> |
| 4. | 15UMAC64 | Mathematical Statistics II | <ul style="list-style-type: none"> <li>• Learn the concepts and methods of probability and distribution theory.</li> <li>• Gain wide knowledge in probability which plays a main role in solving real life problems.</li> <li>• Frame distribution functions and its types.</li> <li>• Learn the applications of Binomial and Poisson distributions.</li> <li>• Apply the standard discrete probability distribution to different real life situations.</li> <li>• Determine a probability distribution of random variable (one or two dimensional) in the given situation</li> <li>• Able to understand the significance of the connection between statistics and probability and their applicability to the real world</li> </ul>  |

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|    |          |                      | <ul style="list-style-type: none"> <li>• Gain knowledge about the multivariate distributions.</li> </ul>  |
| 5. | 15UMAO61 | Fuzzy sets and Logic | <ul style="list-style-type: none"> <li>• Explain the fundamental concepts of fuzzy set.</li> <li>• Demonstrate the concept of <math>\alpha</math>-cut and its properties.</li> <li>• Learn about Linguistic variables using fuzzy number.</li> <li>• Compute the fuzzy number using the arithmetic operations.</li> <li>• Able to know the relation of fuzzy set.</li> <li>• Get the inference from conditional, quantified proposition.</li> <li>• Understand the basic applications of fuzzy in engineering</li> <li>• Get insight into interpersonal communication as an application of fuzzy.</li> </ul>  |
| 6. | 15UMAO62 | Stochastic Processes | <ul style="list-style-type: none"> <li>• Apply the specialised knowledge in probability theory and random processes to solve practical problems.</li> <li>• Gain advanced and integrated understanding of the fundamentals of and interrelationship between discrete and continuous random variables and between deterministic and stochastic processes.</li> <li>• Analyse the performance in terms of probabilities and distributions achieved by the determined solutions.</li> <li>• Demonstrate essential stochastic modelling tools like Markov chains .</li> <li>• Evaluate the n-step transition probability.</li> <li>• Learn about renewal theory.</li> <li>• Demonstrate the transition function</li> <li>• Know about the Birth – Death and Yule process</li> <li>• Study the properties of Poission process and their characterization.</li> <li>• Understanding of the relationship between the purpose of a model and the appropriate level of complexity and accuracy.</li> </ul> |
| 7. | 15UMAO63 | Optimization         | <ul style="list-style-type: none"> <li>• Understand and identify the need of using</li> </ul>   |

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|    |          | Techniques               | <p>Operations Research techniques.</p> <ul style="list-style-type: none"> <li>• Find optimum solution for real life problems.</li> <li>• Gain the knowledge of transportation problem using many techniques.</li> <li>• Find optimum solution using assignment method.</li> <li>• Develop the ability to solve the transshipment problems.</li> <li>• Inculcate the basic knowledge of sequencing problems.</li> <li>• Enhance the ideas for solving the problems in crew scheduling.</li> <li>• Describe about the concept of Dynamic programming.</li> <li>• Make a wide knowledge in Dynamic programming for solving real life problems.</li> </ul>   |
| 8. | 15UMAS61 | Quantitative Aptitude II | <ul style="list-style-type: none"> <li>• Able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.</li> <li>• Examine how to calculate using Simple and Compound formulas.</li> <li>• Able to demonstrate an understanding of the difference between area and perimeter.</li> <li>• Apply general mathematical models to solve a variety of problems.</li> <li>• Apply the properties of logarithms to write logarithmic expressions in different forms, and evaluate the resulting expressions.</li> <li>• Able to solve applications involving permutations and combinations.</li> <li>• Understanding event, outcome, trial, simple event, sample space and calculate the probability that an event will occur.</li> </ul> |
| 9. | 15UMAV61 | Astronomy                | <ul style="list-style-type: none"> <li>• Apply scientific reasoning to future astronomical discoveries to understand their validity as well as to everyday situations.</li> <li>• Demonstrate an understanding that science is based upon observations of the universe and how that is used to understand some basic</li> </ul>  |

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|                      |                       |                | <p>phenomenon of our world.</p> <ul style="list-style-type: none"> <li>• Develop analytical skills and the ability to solve problems.</li> <li>• Achieve a good understanding of physical laws and principles.</li> <li>• Gain experience with measurement techniques and equipment, and develop the ability to assess uncertainties and assumptions.</li> <li>• Understand the scale of items within the Universe</li> <li>• Appreciate the wide variety of objects contained in the Universe</li> <li>• Understand the relative sizes of the planets within the Solar System</li> <li>• Calculate how long it takes for light to reach the Earth from the Sun.</li> <li>• Describe the solar nebula model.</li> </ul>   |
| <b>SEMESTER - I</b>  |                       |                |   |
| 1.                   | 15UPHA11<br>/15UCHA11 | Mathematics-I  | <ul style="list-style-type: none"> <li>• Impart knowledge in basic mathematical statistics.</li> <li>• Inculcate the basic knowledge of measures of dispersion like mean, median and mode.</li> <li>• Know about the concept of correlation and regression.</li> <li>• Gain in-sight knowledge in the various aspects of fitting curves.</li> <li>• Understand the concept of Index numbers.</li> <li>• Understand and identify the need of using Operations Research.</li> <li>• Find optimum solution of real life problems.</li> <li>• Gain knowledge of linear programming technique using graphical solution method.</li> <li>• Find optimum solution using assignment method.</li> <li>• Gain knowledge of transportation problem using many techniques.</li> </ul> |
| <b>SEMESTER - II</b> |                       |                |   |
| 1.                   | 15UPHA21<br>/15UCHA21 | Mathematics-II | <ul style="list-style-type: none"> <li>• Attain the basic knowledge about equations and to solve equations in different Methods.</li> </ul>   |



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|                      |                                    |                            | <ul style="list-style-type: none"> <li>• Develop an analytic thinking in the concept of Transformation of equations.</li> <li>• Demonstrate reciprocal equations</li> <li>• Understand the concept of differentiation.</li> <li>• Introduction about the higher derivatives.</li> <li>• Endew with an in-depth knowledge of partial differentiation using Euler's theorem.</li> <li>• Equip with the basic knowledge of integration.</li> <li>• Expose to the various techniques like integration by parts and integration using reduction formula.</li> <li>• Develop the skill of solving differential equations.</li> <li>• Learn about exact differential equations and solving equations using integrating factor.</li> </ul> |
| <b>SEMESTER - I</b>  |                                    |                            |  |
| 1.                   | 15UCSA11<br>/15UCAA11<br>/15UITA11 | Mathematical<br>Foundation | <ul style="list-style-type: none"> <li>• Understand the basic knowledge of Mathematical logics.</li> <li>• Explain about the conditional statements and well formed formulas.</li> <li>• Demonstrate the idea of sets and operations on sets.</li> <li>• Understand the functions and relations which are defined on a set.</li> <li>• Gain knowledge about matrices and its basic operations.</li> <li>• Evaluate the inverse and rank of a matrix.</li> <li>• Present the idea of graph theory and basic definitions which are related to graphs.</li> <li>• Represent the graph as a matrix.</li> <li>• Learn about the operations on graphs.</li> <li>• Get acquainted with some special graphs.</li> </ul>                    |
| <b>SEMESTER - II</b> |                                    |                            |  |
| 1.                   | 15UCSA21<br>/15UCAA21<br>/15UITA21 | Operations Research        | <ul style="list-style-type: none"> <li>• Present the history, nature and scope of operation research.</li> <li>• Demonstrate the main Characteristics of Operations Research</li> <li>• Inculcate the insight knowledge of Linear programming problem.</li> </ul>  |

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|                       |          |                                     | <ul style="list-style-type: none"> <li>• Evaluate the solution of linear programming problem using Graphical method.</li> <li>• Understand the computational procedure of simplex method.</li> <li>• Find the solution of Linear programming problem using simplex method, Big M Method and Two phase method.</li> <li>• Find optimum solution using assignment method.</li> <li>• Learn the application of assignment problem in real life situations.</li> <li>• Study the computational procedure of Transportation problem.</li> <li>• Gain knowledge of transportation problem using many techniques.</li> </ul>                     |
| <b>SEMESTER - III</b> |          |                                     |   |
| 1.                    | 15UCSA31 | Fundamentals of statistics          | <ul style="list-style-type: none"> <li>• Understand the meaning, definition, nature, importance and limitations of statistics.</li> <li>• Able to create, read, and interpret graphs, charts, histograms, and diagrams.</li> <li>• Understand and use the basic measure of central tendency.</li> <li>• Demonstrate the relevance and use of statistical tools for analysis and forecasting.</li> <li>• Learn about the measures of dispersion.</li> <li>• Inculcate knowledge about Correlation and Regression</li> <li>• Understand the concept of probability.</li> <li>• Evaluate the addition and multiplication theorem.</li> </ul> |
| <b>SEMESTER - IV</b>  |          |                                     |   |
| 1.                    | 15UCSA41 | Computer Oriented Numerical Methods | <ul style="list-style-type: none"> <li>• Introduce the learners to the methods of solving equations.</li> <li>• Enable students to use numerical techniques to tackle problems that are not analytically solvable.</li> <li>• Inculcate the basic knowledge of algebraic and transcendental equations.</li> <li>• Introduce the concept of simultaneous linear</li> </ul>   |

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|  |  |  | <p>equations.</p> <ul style="list-style-type: none"><li>• Find the solutions of simultaneous linear equations using Gauss elimination, Gauss Jordan and Gauss seidal methods.</li><li>• Introduce the concept of Interpolation which will be used to predict the data.</li><li>• Understand the concept of numerical differentiation.</li><li>• Find the derivatives using numerical formulae.</li><li>• Use various techniques like trapezoidal rule , simpson's rule and weddle's rule in solving s numerical integration problems.</li><li>• Learn about the solution of differential equations using different techniques like taylor's series method and Runge Kutta method.</li></ul> |
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