

DEPARTMENT OF MATHEMATICS

VALUE ADDED COURSE-I

Mathematics for Competitive Examinations-I

(for the II UG students admitted from the academic year 2019-2020)

Course Code: 19UMAVAC2

Course Duration: 30 Hours

UNIT I	6 Hours
Numbers-H.C.F and L.C.M of Numbers-Decimal Fractions.	
UNIT II	6 Hours
Simplification-Square Roots and Cube Roots-Average.	
UNIT III	6 Hours
Problems on Numbers-Problems on Ages-Surds and Indices.	
UNIT IV	6 Hours
Percentage-Profit and Loss - Ratio and Proportion- Partnership.	
UNIT V	6 Hours
Chain Rule-Time and Work-Pipes and Cistern-Time and Distance-Problems on Trains	

Books for Reference:

1. Quantitative Aptitude by R.S.Agarwal, Sultan Chand and Company Ltd, New Delhi,2012
2. Quantitative Aptitude for Competitive Examinations by Abhijit Guha, McGraw Hill Education,2011.

Web Reference:

1. <https://www.indiabix.com/aptitude/questions-and-answers/>
2. <http://placement.freshersworld.com/aptitude-questions-and-answers>

Course Outcomes:

1. To nurture the fundamental Mathematical skills for preparing and cracking competitive examination.
2. To Kindle the problem solving ability of the students.

VALUE ADDED COURSE-II

Mathematics for Competitive Examinations-II

(for the III UG students admitted from the academic year 2019-2020)

Course Code: 19UMAVAC5

Course Duration: 30 Hours

UNIT I **6 Hours**

Boats and Streams-Mixture-Simple Interest-Compound Interest.

UNIT II **6 Hours**

Logarithms-Area-Volume and Surface Areas.

UNIT III **6 Hours**

Races and Games of Skill-Calendar-Clocks.

UNIT IV **6 Hours**

Stocks and Shares - Permutations and Combinations-Probability.

UNIT V **6 Hours**

True Discount-Banker's Discount - Heights and Distances - Odd Man Out and Series

Books for Reference:

1. Quantitative Aptitude by R.S.Agarwal, Sultan Chand and Company Ltd, New Delhi,2012
2. Quantitative Aptitude for Competitive Examinations by Abhijit Guha, McGraw Hill Education,2011.

Web Reference:

1. <https://www.indiabix.com/aptitude/questions-and-answers/>
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Course Outcomes:

1. To nurture the fundamental Mathematical skills for preparing and cracking competitive examination.
2. To Kindle the problem solving ability of the students.

VALUE ADDED COURSE-III

R-Programming

(For DBT Star College Scheme -2017 & 2020 Regulation II UG Students)

Course Code: 19UMAVAC1

Course Duration: 30 Hours

List of Practical

1. Simple Programs using Mathematical constant
2. Programs using complex functions
3. Numerical solutions of nonlinear equations and systems
4. Solving system of linear equations using Jacobi method
5. Program using Trigonometric and Hyperbolic Expressions
6. Finding Eigen values and Eigen vectors
7. Plotting Points in the Plane and Space
8. Analyse data using Central Tendency and Measures of dispersion and distributions
9. Find the Laplace integral transforms for different functions.
10. Obtain the solution of the initial value problem

Books for Reference:

1. Programming with R by S.R. Mani Sekhar, T.V. Suresh Kumar, Madhavi Kasa, Sunil Kumar S. Manvi, Cengage Learning India Pvt. Ltd, 2017
2. R for Statistics by Pierre-Andre Cornillon, Arnaud Guyader, Francois Husson, Nicolas Jegou, Julie Josse, Maela Kloareg, Eric Matzner-Lober, Laurent Rouvière, Chapman and Hall, 2012
3. Statistics with R Programming by Dr. Sandip Rakshit, McGraw Hill Education (India) Pvt. Ltd, 2018

Course Outcomes:

1. To learn a new programming language, beginner in the field of data science.
2. To kindle the problem solving ability of the students in statistics.

VALUE ADDED COURSE -IV (A)

MATHEMATICA

(For DBT Star College Scheme -2017 & 2020 Regulation III UG Students)

Course Code: 19UMAVAC4

Course Duration: 30 Hours

List of Practical

1. Solving higher degree equations.
2. Solving system of equations by matrix method and find the eigen values and eigen vectors of a matrix of order 4 by 4 or #higher order#.
3. Solving system of non-linear equations.
4. Finding the differentiation of different functions of second and third derivatives.
5. Finding the Integration of different functions with limits.
6. Evaluation of double integrals and #triple integrals#.
7. Solving ordinary differential equations with initial condition.
8. Solving system of ordinary differential equations.
9. Creating and plotting 2-D and 3-D graphs.
10. Solving Linear programming problems.

-- # Self-study portion.

Text Books:

T.B-1 : Eugene Don, *Mathematica*, Scham's Outline Series, Mc Graw Hill Publisher, New York. (2009)

T.B-2 : Pragathi Gautam and Swapnil Verma, *Practical Mathematica*, Ane Books Publisher (2019).

Books for Reference:

1. Ananta Kumar Bora, *Mathematica: A Research Book of Mathematics*, Scholarink Publishers (2017)

2. Sal Mangano, *Mathematica Cookbook*, O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, USA (2010)

Prepared by:

Dr. A. Mohamed Ismayil

VALUE ADDED COURSE -IV (B)

MAPLE

(For DBT Star College Scheme -2017 & 2020 Regulation III UG Students)

Course Code: 19UMAVAC3

Course Duration: 30 Hours

List of Practical

1. Simple Programs using Mathematical constant
2. Programs using complex functions
3. Numerical solutions of nonlinear equations and systems
4. Solving system of linear equations using Jacobi method
5. Program using Trigonometric and Hyperbolic Expressions
6. Finding Eigen values and Eigen vectors
7. Plotting Points in the Plane and Space
8. Analyse data using Central Tendency and Measures of dispersion and distributions
9. Find the Laplace integral transforms for different functions.
10. Obtain the solution of the initial value problem

Text Book

Maple and Mathematica, A Problem Solving Approach for Mathematics *Second Edition*, Dr. Inna Shingareva & Dr. Carlos Lizárraga-Celaya, Springer Wien New York

Prepared by:

Dr. M. Mohammed Jabarulla

DEPARTMENT OF MATHEMATICS

VALUE ADDED COURSE-I

(for the II UG students admitted from the academic year 2020-2021)

SAGEMATH

Course Code : 21UMAVAC1

Course Duration: 30 Hours

Course outcome

1. Using SageMath as a calculator.
2. Implement and illustrate 2-D graphs and 3-D graphs.
3. Solving mathematical problems and to plot using SageMath.
4. Implement SageMath using templates and exceptional and handling concepts.
5. Make use of theoretical concepts to solve problems and visualize the output.

List of Practical

1. Finding all local extrema and inflection points of a function.
2. Creating and plotting 2-D graphs and 3-D graphs.
3. Finding the surface area of given surface using package.
4. Finding the approximate roots using Newton's method.
5. Plotting and finding area between curves using integrals.
6. Finding the average of a function.
7. Finding the volume of solid of revolution.
8. Finding the solution for a system of linear equations.
9. Finding the divergence and curl of vector valued functions.
10. Using differential calculus to analyse a quintic polynomials features, for finding the optimal graphing window.

Books for Reference:

1. Razvan A. Mezei, An Introduction to SAGE Programming: With Applications to SAGE, Wiley, 2016
2. <https://doc.sagemath.org/pdf/en/tutorial/SageTutorial.pdf>

DEPARTMENT OF MATHEMATICS

VALUE ADDED COURSE-II

(for the III UG students admitted from the academic year 2020-2021)

SCILAB

Course Code : 21UMAVAC2

Course Duration: 30 Hours

Course outcome

1. Evaluate, analyse and plot results.
2. Develop programs in SciLab
3. Understanding of linear algebra and numerical methods
4. Analyse various SciLab commands
5. Implement and illustrate 2-D graphs and 3-D graphs.

List of Practical

1. Check whether the following Boolean statements are true or false based on the values of a, b, c, x, and y given below.
 - (i) $a > c$
 - (ii) $a = b$
 - (iii) $(2a+b)/x^2 < 1$
 - (iv) $x^2 + 2ab + b^2 \leq 23$
 - (v) $2ac = 2cb$
2. Determine the result of the following calculations if $a = 2.3$, $b = -2.3$, $c = \pi/2$, $x = 2/\pi$, and $y = \sqrt{3}$:
 - (i) $(a^2 + bc + x)$
 - (ii) $\sin(c) + y/c$
 - (iii) $(a+c)/(x+y)$
 - (iv) $1/(\cos(c) + \ln(x))$
 - (v) $(a+c)^3 / b$
3. For the vectors u and v, calculate the following:
 - (i) $w = u+v$
 - (ii) $r = u./v$
 - (iii) $z = v*u$
 - (iv) $t = v*.u$
4. Write a program for the following operations of the matrices A, B and C :
 - (i) Sum of two matrices
 - (ii) Product of two matrices
 - (iii) Product of Three matrices
5. Verify whether the given matrix is singular or non-singular and compute its inverse if exists.
6. Write a program for Cramer's rule to solve the simultaneous equations (maximum of three unknowns).
7. Write a program for Gauss Jacobi iteration Method to solve the system of linear equations.
8. Solving the ordinary differential equations with initial condition and solving the system of ordinary differential equations.

9. Creating and plotting 2-Dgraphs.
10. Creating and plotting 3-Dgraphs.

Book for Reference:

1. Er. Hema Ramachandran and Dr. Achutsankar Nair, SCILAB ,S. Chand Publishers, 2011.
- Stephen L. Campbell, Jean-Philippe Chancelier, and Ramine, Modelling and Simulation in Scilab/Scicos, 1st Edition, Spri