



**DWARAKA DOSS GOVERDHAN DOSS VAISHNAV COLLEGE**  
**(Autonomous)**  
**College with Potential for Excellence**  
**Linguistic Minority Institution. Affiliated to University of Madras**

**POST GRADUATE AND RESEARCH**  
**DEPARTMENT OF MATHEMATICS**

**B.Sc. Mathematics With Computer Applications**

**CURRICULUM AND SCHEME OF EXAMINATIONS**  
**Choice Based Credit System (CBCS)**  
**&**  
**Outcome Based Education (OBE)**

**(with Effect from the Academic Year 2024-2025)**

## COURSESTRUCTURE

### FIRSTSEMESTER

Course Content	Name of the Course	Ins.Hrs	Credits	Int.Marks	Ext.Marks	Total
Part-I	Language Paper-I	4	3	50	50	100
Part- II	English Paper-I	4	3	50	50	100
Part- III	CorePaper-I: Algebra and Trigonometry	6	4	50	50	100
	CorePaper-II: Differential Calculus	6	4	50	50	100
	Elective Paper I:Programming with Python	4	3	50	50	100
	Practical Paper I:Python Programming–Lab	2	2	50	50	100
Part-IV	BasicTamil/Adv.Tamil /NonMajor Elective-I	2	2	50	50	100
	SoftSkills-I	2	3	50	50	100
	Value Added Course		-			
	Total	30	24			

### SECONDSEMESTER

Course Content	Name of the Course	Ins.Hrs	Credits	Int.Marks	Ext.Marks	Total
Part-I	LanguagePaper -II	4	3	50	50	100
Part- II	EnglishPaper -II	4	3	50	50	100
Part- III	CorePaper-III: Analytical Geometry	6	4	50	50	100
	CorePaper-IV: Integral Calculusand VectorAnalysis	6	4	50	50	100
	Elective Paper- II:JAVA Programming	4	3	50	50	100
	Practical Paper II: JAVA Programming –Lab	2	2	50	50	100
Part-IV	BasicTamil/Adv.Tamil/ Non Major Elective -II	2	2	50	50	100
	Soft Skills-II	2	3	50	50	100
	Total	30	24			

### THIRD SEMESTER

Course Content	Name of the Course	Ins.Hrs	Credits	Int.Marks	Ext.Marks	Total
Part-I	Language Paper -III	6	3	50	50	100
Part- II	English Paper -III	4	3	50	50	100
Part- III	Core Paper-V: Differential Equations	5	4	50	50	100
	Elective III : Database Management Systems	4	3	50	50	100
	Practical PaperIII: RDBMS –Lab	2	2	50	50	100
	Allied Paper- I-Probability and statistics-I	6	5	50	50	100
Part-IV	Environmental Studies	1		EXAM IN THE IV SEMESTER		
	SoftSkills-III	2	3	50	50	100
	Extradisciplinary		1			
	Value added course					
	Total	30	24			

### FOURTH SEMESTER

Course Content	Name of the Course	Ins.Hrs	Credits	Int.Marks	Ext.Marks	Total
Part-I	Language Paper-IV	6	3	50	50	100
Part- II	English Paper-IV	4	3	50	50	100
Part- III	Core Paper-VI: Integral Transforms	5	4	50	50	100
	Core Paper VII: Discrete Mathematics	6	4	50	50	100
	Allied Paper- II-Probability and statistics-II	6	5	50	50	100
Part-IV	Environmental Studies	1	2	50	50	100
	Soft Skills-IV	2	3	50	50	100
	Extradisciplinary		1			
	Total	30	25			

**FIFTH SEMESTER**

<b>Course Content</b>	<b>Name of the Course</b>	<b>Ins.Hrs</b>	<b>Credits</b>	<b>Int.Marks</b>	<b>Ext.Marks</b>	<b>Total</b>
Part- III	Core Paper-VIII: Algebraic Structures	6	4	50	50	100
	Core Paper- IX: Real Analysis-I	6	4	50	50	100
	Core Paper-X: Mechanics	6	4	50	50	100
	Core Paper-XI: Operations Research	6	4	50	50	100
	Elective Paper-IV : Artificial Intelligence And Expert Systems	6	3	50	50	100
	Internship / Industrial Training (Summer vacation at the end of IV semester activity)		1			
Part-IV	Value Education		2	50	50	100
	Value added course		-			
	<b>Total</b>	<b>30</b>	<b>22</b>			

**SIXTH SEMESTER**

<b>Course Content</b>	<b>Name of the Course</b>	<b>Ins.Hrs</b>	<b>Credits</b>	<b>Int.Marks</b>	<b>Ext.Marks</b>	<b>Total</b>
Part- III	Core Paper-XII: Linear Algebra	6	4	50	50	100
	Core Paper-XIII: Real Analysis-II	6	4	50	50	100
	Core Paper-XIV: Complex Analysis	6	4	50	50	100
	Core Paper-XV: Operating Systems	6	4	50	50	100
	Elective Paper V: WEB DESIGN	4	3	50	50	100
	Practical Paper V: Web Design - Lab	2	2	50	50	100
Part-V	Extension Activity		1			
	Project		1			
	<b>Total</b>	<b>30</b>	<b>23</b>			

## Extra Disciplinary Course

- Financial Mathematics with R
- Numerical Methods
- Basic data analysis using excel
- Mathematics for competitive examinations & general studies

## Value Added course:

Power BI / Tableau / SQL

Advance Excel

Machine Learning with R

Data Science with Python

Full Stack Development

## TallyTable:

Subject	No. of Subjects	Total Marks	credits
Core– Theory Papers	15	1500	60
Elective Papers	5	500	15
Allied Papers	2	200	10
Practical	4	400	8
Language	4	400	12
English	4	400	12
Softskills	4	400	12
Non Major electives/Basic Tamil	2	200	4
Environmental Science	1	100	2
Value Education	1	100	2
Extension Activity	1		1
Internship	1		1
Extra disciplinary Papers	2		2
Value added course	3		-
Project			1
Grand Total		4200	142

**Components of Continuous Internal Assessment**

<b>Components</b>		<b>Marks</b>	<b>Total</b>
<b>Theory</b>			
CIA I	50		50
CIA II	50		
Generic Activity		15	
Attendance		5	

## FIRST SEMESTER(SYLLABUS)

Title of the Course		ALGEBRA AND TRIGONOMETRY				
Paper Number		I				
Category	Core	Year	I	Credits	4	Course Code
		Semester	I			
<b>Objectives of the Course</b>						
<ul style="list-style-type: none"> <li>• Basic ideas on the Theory of Equations, Matrices and Number Theory.</li> <li>• Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems.</li> </ul>						
<b>Course Outline</b>		<b>Unit 1</b> Reciprocal equations – Standard form-Increasing or Decreasing the roots of the given equation-Removal of terms-Approximate solutions of roots of polynomials by Horner's method-Related Problems. <b>Chapter 6: Sections: 16, 16.1, 17, 19, 30</b>				
		<b>Unit 2</b> Summation of Series: Binomial-Exponential-Logarithmic series (Theorems without proof)-Related Problems. <b>Chapter-3: Sections: 10 Chapter-4: Sections: 3 to 7</b>				
		<b>Unit 3</b> Characteristic equation-Eigenvalues & Eigen Vectors-Similar matrices- Cayley - Hamilton Theorem (Statement only)-Finding powers of square matrix-Inverse of a square matrix up to order 3-Diagonalization of square matrices-Related Problems. <b>Chapter 2: Sections: 16, 16.1 to 16.4</b>				
		<b>Unit 4</b> Expansions of $\sin n\theta, \cos n\theta$ in powers of $\sin\theta, \cos\theta$ – Expansions of $\tan n\theta$ in terms of $\tan\theta$ -Expansions of $\cos^n\theta, \sin^n\theta, \cos^m\theta \sin^n\theta$ -Expansions of $\tan(\theta_1 + \theta_2 + \dots + \theta_n)$ -Expansions of $\sin\theta, \cos\theta$ and $\tan\theta$ in terms of $\theta$ – Related Problems. <b>Chapter 2: Sections: 2.1, 2.1.1, 2.1.2</b> <b>Chapter 3: Sections: 3.1, 3.1.1, 3.2.1, 3.4, 3.4.1 to 3.4.3</b>				
		<b>Unit 5</b> Hyperbolic functions-Relation between circular and hyperbolic functions- Formulas in hyperbolic functions – Inverse hyperbolic functions-Logarithm of complex quantities, Summation of Trigonometric series – Related problems. <b>Chapter 4: Sections: 4.1 to 4.7.</b> <b>Chapter 5: Sections: 5.1 to 5.3</b> <b>Chapter 6: Sections: 6.1 to 6.6</b>				

<b>Contents and treatment as in</b>	<ol style="list-style-type: none"> <li>Algebra, Volume I by T. K. Manicavachagam Pillay, T. Natarajan, K.S. Ganapathy, Viswanathan Publication 2007. Unit – 1 and 2.</li> <li>Algebra, Volume II by T.K. Manicavachagam Pillay, T. Natarajan, K.S. Ganapathy, Viswanathan Publication 2008. Unit – 3.</li> <li>Trigonometry by P. Duraipandian and Kayalal Pachaiyappa, Muhil Publishers, Unit-4, Unit-5</li> </ol>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>W.S. Burnstine and A.W. Panton, Theory of equations</li> <li>David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007</li> <li>G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005</li> <li>C. V. Durell and A. Robson, Advanced Trigonometry, Courier Corporation, 2003</li> <li>J. Stewart, L. Redlin, and S. Watson, Algebra and Trigonometry, Cengage Learning, 2012.</li> <li>Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010.</li> </ol>
<b>e-Resources</b>	<ol style="list-style-type: none"> <li><a href="http://mathworld.wolfram.com">http://mathworld.wolfram.com</a></li> <li><a href="http://www.themathpage.com/">http://www.themathpage.com/</a></li> <li><a href="http://mathworld.wolfram.com">http://mathworld.wolfram.com</a></li> <li><a href="http://ocw.mit.edu/courses/mathematics/">http://ocw.mit.edu/courses/mathematics/</a></li> </ol>

**Course Outcomes: At the end of the course, the student will be able to**

<b>CO1</b>	Classify and Solve reciprocal equations
<b>CO2</b>	Find the sum of binomial, exponential and logarithmic series
<b>CO3</b>	Find Eigen values, eigen vectors, verify Cayley – Hamilton theorem and diagonalize a given matrix
<b>CO4</b>	Expand the powers and multiples of trigonometric functions in terms of sine and cosine
<b>CO5</b>	Determine relationship between circular and hyperbolic functions and the summation of trigonometric series

**Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	3	2	3	1	2	2	2	3	2	1
<b>CO2</b>	3	3	2	2	1	2	2	2	3	2
<b>CO3</b>	2	2	3	2	3	2	2	1	2	2
<b>CO4</b>	3	2	1	2	2	2	1	3	2	2
<b>CO5</b>	3	2	3	2	2	2	1	3	2	2

1 - Low

2 – Medium

3 – High



<b>Title of the Course</b>		<b>Differential Calculus</b>					
<b>Paper Number</b>		<b>II</b>					
<b>Category</b>	<b>Core</b>	<b>Year</b>	<b>I</b>	<b>Credits</b>	<b>4</b>	<b>Course Code</b>	

### Course Objectives

- To develop the ability to use Leibnitz Rule
- To know about the method to find the maxima and minima
- To develop the skills of the students in the area of Curvature
- To learn methods and techniques of finding asymptotes.

<b>CONTENTS OF MODULE</b>
<p><b>UNIT-I:</b> Successive differentiation - <math>n^{\text{th}}</math> derivative- standard results – Trigonometrical transformation – formation of equations using derivatives - Leibnitz’s theorem and its applications</p> <p>Chapter 3 section 1.1 to 1.6, 2.1 and 2.2</p>
<p><b>UNIT-II:</b> Total differential of a function – special cases – implicit functions - partial derivatives of a function of two functions - Maxima and Minima of functions of two variables- Lagrange’s method of undetermined multipliers.</p> <p>Chapter 8 : Section 1.3 to 1.5 and 1.7, Section 4, 4.1 and 5.</p>
<p><b>UNIT-III:</b> Envelopes – method of finding envelopes – Curvature- circle, radius and centre of curvature- Cartesian formula for radius of curvature – coordinates of the centre of curvature – evolute-and involute - radius of curvature and centre of curvature in polar coordinates – p-r equation</p> <p>Chapter 10 Section 1.1 to 1.4 and Section 2.1 to 2.7</p>
<p><b>UNIT-IV:</b> Polar coordinates - angle between the radius vector and the tangent – slope of the tangent in the polar coordinates – the angle of intersection of two curves in polar coordinates- polar sub tangent and polar sub normal – the length of arc in polar coordinates.</p> <p>Chapter 9 Section 4.1 to 4.6</p>
<p><b>UNIT-V:</b> Definition-Asymptotes parallel to the axes – special cases – another method for finding asymptotes -asymptotes by inspection – intersection of a curve with an asymptote.</p> <p>Chapter 11 - Section 1 to 7.</p>

### **Recommended Text Book:**

1. “Calculus”, Volume - 1 by S. Narayanan and T.K. Manicavachagompillay  
S. Viswanathan publishers – 2006.

### **Reference Books:**

1. Calculus , Dr. P.R. Vittal & Dr. V. Malini, Margham Publications, Chennai.
2. Calculus by Thomas and Fenny, Pearson Publication. Calculus by Stewart
3. Introduction to Calculus and Analysis ,R. Courant and F. John, (Volumes I & II),  
Springer- Verlag, New York, Inc., 1989.
4. Calculus, T. Apostol, Volumes I and II.
5. Calculus and mathematical analysis, S. Goldberg.

**Website and e-Learning Source**

<https://nptel.ac.in> <https://mathhelp.com>

**Course Outcomes: At the end of the course, the student will be able to**

<b>CO1</b>	Evaluate the nth derivative Using Leibnitz Rule
<b>CO2</b>	Finding the maxima and minima for the functions of two variables
<b>CO3</b>	Calculate the Envelope, Evolute, radius of curvature and circle of curvature
<b>CO4</b>	Finding the angle between radius vector and tangent.
<b>CO5</b>	Calculate the asymptotes of the curve

**Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>1</b>
<b>CO2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>
<b>CO3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>
<b>CO4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>2</b>
<b>CO5</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>2</b>

**1 - Low****2 - Medium****3 - High**

**CourseTitle: Elective Paper-I:Programming with Python**

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<b>CourseCode:</b>	<b>Credits</b>	<b>03</b>
<b>L:T:P:S :</b>	<b>CIAMarks</b>	<b>:50</b>
<b>ExamHours:03</b>	<b>ESEMarks</b>	<b>:50</b>

**Courseobjectives**

- *To make students understand the concepts of PYTHONprogramming.*
- *To apply the OOPs concept in PYTHON programming.*
- **To make the students learn best practices in PYTHON programming.**

**CourseOutcomes:At the end of the course, students will be able to**

<b>CO1</b>	Understand the concept of operators,data types in python programming.
<b>CO2</b>	Understand control statements and Looping
<b>CO3</b>	Apply the concept of functions in python programming.
<b>CO4</b>	Understand the concept of formatting operator and strings
<b>CO5</b>	Analyze the structures of list,tuples and maintaining dictionaries

S.NO	CONTENTS OF MODULE	Hrs	COs
1.	Basics of Python Programming: Features – History – Future – Python Interpreter and Interactive Mode – Writing and Executing First Python Programme – Values and Types – Data Types – Operators and Expressions – Operations on Strings – Type Conversion – Comments – Functions and Modules. Chapter 2: Section 2.1–2.22	12	CO1
2.	Control Flow Statements: Introduction to Decision Control Statements – Conditional Branching – Loops Structures – Nested Loops – Break – Continue – Pass – Else Statement Used with Loops. Chapter 3: Section 3.1–3.8	12	CO2
3.	Functions: Introduction – Defining a function – Function Call – Variable Scope and Lifetime – Fruitful Function – Lambda – Function Composition – Documentation Strings – Recursive Functions Chapter 4: Section 4.1–4.8, 4.10 (Omit 4.9)	12	CO3
4.	Strings: Concatenating, Appending, and Multiplying Strings – Immutable – Formatting Operator – Built-in String Methods and Functions – Slice Operation – Comparing Strings – Iterating String. Lists, Tuples and Dictionaries: Sequence – Lists. Chapter 5: Section 5.1 – 5.5, 5.8, 5.9 (Omit 5.6, 5.7) Chapter 6: Section 6.1 to 6.2	12	CO4
5.	Lists, Tuples and Dictionaries: Tuple – Dictionaries File Handling: Opening and Closing Files – Reading and Writing Files. Error and Exception Handling: Introduction – Handling Exceptions. Chapter 6: Section 6.4 to 6.5 (Omit 6.3) Chapter 7: Section 7.4, 7.5 Chapter 8: Section 8.1, 8.2	12	CO5

#### Text Book:

1. “Problem Solving and Programming with Python”, by Reema Thareja (Second Edition, 2019, OXFORD University Press)

#### Reference books:

1. Problem Solving and Python Programming” by Mr. Ashok Namdev Kamthane and Mr. Amit Ashok Kamthane (McGraw Hill Education (India) Private Limited).
2. “Python Programming” by Ch. Sathyanarayana, M. Radhika

#### Mapping of Course Outcome to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	0	0	3	2	3	1	2
CO2	1	2	2	0	0	2	1	2	3	3
CO3	3	1	2	0	0	1	2	3	2	2
CO4	2	3	1	0	0	2	2	1	2	1
CO5	3	2	2	0	0	1	1	2	1	3

3-Strong Correlation    2-Medium Correlation    1-Low Correlation

## FIRST SEMESTER(SYLLABUS)

**CourseTitle: Practical Paper-I: PythonProgramming–Lab**

**CourseCode:**

**Credits - 2**

### **WriteaPythonProgramforthefollowing**

1. Compute theArea and Circumference of a Circle
2. To find the greatest among three numbers
3. Program to calculate roots of a quadratic equation
4. Determine the given number is an Armstrong number
5. Compute the G.C.D. of two Numbers
6. Sum theseries: $1/1+2^2/2+3^2/3+\dots+n^2/n$
7. Finding Factorial of a number
8. To print the Fibonacci Series using recursion
9. Count the occurrences of a character in a string
10. Program to reverse a string
11. Calculate distance between two points
12. To add two matrices
13. Print a histogram of frequencies of characters occurring in a message
14. Generate Floyd's triangle.
15. Implement Tower of Hanoi problem

## SECOND SEMESTER

<b>Title of the Course</b>		<b>ANALYTICAL GEOMETRY</b>					
<b>Paper Number</b>		<b>III</b>					
<b>Category</b>	<b>Core</b>	<b>Year</b>	<b>I</b>	<b>Credits</b>	<b>4</b>	<b>Course Code</b>	
		<b>Semester</b>	<b>II</b>				
<b>Objectives of the Course</b>							
<ul style="list-style-type: none"> <li>• Necessary skills to analyze characteristics and properties of two- and three-dimensional geometric shapes.</li> <li>• To present mathematical arguments about geometric relationships.</li> <li>• To solve real world problems on geometry and its applications</li> </ul>							
<b>Course Outline</b>		<b>UNIT-I:</b> Polar and pole, conjugate points and conjugate lines-diameters –conjugate diameters of an ellipse -semi diameters-conjugate diameters of hyperbola. <b>Chapter 7: Sections: 7.2, 7.3, Chapter 8 Section 8.2–8.5.</b>					
		<b>UNIT-II:</b> Polar coordinates: General polar equation of straight line –Polar equation of a circle given a diameter, Equation of a straight line, circle, conic–Equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola. <b>Chapter 10: Sections: 10.1–10.8.</b>					
		<b>UNIT-III:</b> The plane–Transformation to the normal form– Determination of a plane under given conditions–System of Planes– Two sides of a plane–Length of the perpendicular from a point to a plane – Joint equation of two planes – Orthogonal projection on a plane. <b>Chapter 2: Sections : 2.3–2.9.</b>					
		<b>UNIT-IV:</b> Representation of line–line and a plane-co-planar lines– constants in the equations of a straight line–the shortest distance between two skew lines- Length of the perpendicular from a point to a line-intersection of three planes. <b>Chapter 3: Sections: 3.1 to 3.8.</b>					
		<b>UNIT-V:</b> Equation of a sphere – Definition – the sphere through four given points - Section of a sphere by a plane - equation of a circle -tangent plane - angle of intersection of two spheres- condition for the orthogonality of two spheres-radical plane. <b>Chapter 6: Sections: 6.1–6.8.</b>					
<b>Contents and treatment as in</b>		<b>1. Analytical Geometry of 2D by P.Duraipandian- Muhil Publishers for Unit 1 and Unit 2</b>					

	<b>2. Analytical Solid Geometry of 3D by Shanthi Narayan and Dr. P.K. Mittal-S.Chand&amp;Co.Pvt.Ltd.-for Unit3 to Unit5</b>
<b>Reference Books</b>	1. Calculus and Analytical Geometry, G.B. Thomas and R.L. Finny, Pearson Publication, 9 <sup>th</sup> Edition, 2010. 2. Analytic Geometry with Calculus, Robert C. Yates, Prentice Hall, Inc., New York, 1961. 3. Algebra and Trigonometry with Analytic Geometry, Earl W. Swokowski and Jeffrey A. Cole, Twelfth Edition, Brooks/Cole, Cengage Learning, CA, USA, 2010. 4. Analytical Geometry of Three Dimensions, William H. McCrea, Dover Publications, Inc, New York, 2006. 5. Calculus and Analytic Geometry, John F. Randolph, Wadsworth Publishing Company, CA, USA, 1969. 6. Analytic Geometry and Calculus with Vectors, Ralph Palmer Agnew, McGraw-Hill Book Company, Inc. New York, 1962.
<b>e-Resources</b>	1. <a href="https://nptel.ac.in">https://nptel.ac.in</a> 2. <a href="https://www.mathhelp.com/">https://www.mathhelp.com/</a>

**Course Outcomes: At the end of the course, the student will be able to**

<b>CO1</b>	Find pole, polar for conics, diameters, conjugate diameters for ellipse and hyperbola
<b>CO2</b>	Find the polar equations of straight line and circle, equations of chord, tangent and normal and to find the asymptotes of hyperbola
<b>CO3</b>	Explain in detail the system of Planes
<b>CO4</b>	Explain in detail the system of Straight lines
<b>CO5</b>	Explain in detail the system of Spheres

**Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	3	2	3	1	2	2	2	3	2	1
<b>CO2</b>	3	3	2	2	1	2	2	2	3	2
<b>CO3</b>	2	2	3	2	3	2	2	1	2	2
<b>CO4</b>	3	2	1	2	2	2	1	3	2	2
<b>CO5</b>	3	2	3	2	2	2	1	3	2	2

**1 - Low**

**2 - Medium**

**3 - High**

Title of the Course		Integral Calculus and Vector Analysis					
Paper Number		IV					
Category	Core	Year	I	Credits	4	Course Code	

### Course Objectives

- To develop the ability to use Reduction formula
- To know about the method to find the Volume
- To develop the skills of the students in the Indefinite Integral.
- To learn methods and techniques of solving line and surface Integral.

CONTENTS OF MODULE
<p><b>UNIT-I:</b> Reduction formulae– Types, <math>\int x^n e^{ax} dx</math>, <math>\int x^n \cos ax dx</math>, <math>\int x^n \sin ax dx</math>, <math>\int \cos^n x dx</math>, <math>\int \sin^n x dx</math>, <math>\int \sin^m x \cos^n x dx</math>, <math>\int \tan^n x dx</math>, <math>\int \cot^n x dx</math>, <math>\int e^{cx} dx</math>, <math>\int \operatorname{cosec}^n x dx</math>, <math>\int x^n (\log x)^m dx</math>-Bernoulli's formula.</p> <p><b>Chapter 1 Section 13, 13.1 to 13.10, 14, 15.1.</b></p>
<p><b>UNIT-II:</b> Multiple Integrals- definition of the double integrals- evaluation of the double integrals- double integrals in polar coordinates – triple integrals – change of variables – Jacobians- Properties without proof.</p> <p><b>Chapter 5 Section 1, 2.1, 2.2, 3.1, 4</b></p> <p><b>Chapter 6 Section 1.1, 1.2</b></p>
<p><b>UNIT-III:</b> Beta and Gamma functions - infinite integral – definitions – recurrence formula of Gamma functions - properties of Gamma-functions - relation between Beta and Gamma functions. Evaluation of double and triple integrals using Beta gamma functions.</p> <p><b>Chapter 7 Section 2.1, 2.2, 2.3, 3, 4, 5</b></p>
<p><b>UNIT-IV:</b> Introduction - directional derivative- Gradient- divergence- curl- Laplacian Differential Operator.</p> <p><b>Chapter 2 Sections 2.1 - 2.13.</b></p>
<p><b>UNIT-V:</b> Line, surface and volume integrals - Integral Theorems - Gauss, Greens and Stokes (Without proof) – Problems.</p> <p><b>Chapter 3 Sections 3.1 to 3.6</b></p> <p><b>Chapter 4 Sections 4.1 to 4.5.</b></p>



**Recommended Text Book:**

1. Calculus”, Vol-II by S.Narayanan and T.K.Manicavachagampillay  
S. Viswanathan publishers– 2007 for Unit 1 , Unit 2 , Unit3.

2. “Vector Analysis” by P.Duraipandian and Kayalal Pachaiyappa, S.Chand  
For Unit 4, Unit 5.

**Reference Books:**

1. Integral Calculus and differential equations : Dipak Chatterjee  
(TATA McGrawHill Publishing company Ltd.).
2. Vector Algebra and Analysis by Narayanan and T.K.Manickvachagam  
Pillay S. Viswanathan Publishers.
3. Vector Analysis: Murray Spiegel (Schaum Publishing Company, New York).

**Website and e-Learning Source** <https://nptel.ac.in> <https://mathhelp.com>

**Course Outcomes:**

**At the end of the course, the student will be able to**

<b>CO1</b>	Evaluate the Integral using Reduction formula
<b>CO2</b>	Calculate Area and Volume using double and triple Integral
<b>CO3</b>	Evaluate the Indefinite Integral using the properties of Beta and Gamma function.
<b>CO4</b>	Calculate directional derivatives, Curl, divergence.
<b>CO5</b>	Solve Line and Surface Integral using Greens, Stokes and Gauss theorem

**Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>1</b>
<b>CO2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>
<b>CO3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>CO4</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>2</b>
<b>CO5</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>

**1 Low**

**2 – Medium**

**3 – High**

**CourseTitle: Elective Paper II:JAVA PROGRAMMING**

<b>CourseCode:</b>	<b>Credits</b>	<b>03</b>
<b>L:T:P:S : 3:1:0:0</b>	<b>CIAMarks</b>	<b>:50</b>
<b>ExamHours:03</b>	<b>ESEMarks</b>	<b>:50</b>

**Course Objectives:**

- *To get in-depth Knowledge about the evolution of java and its Features.*
- *Bring out the difference and similarities between C, C++ and java.*
- *Develop programmers in Java with its special Features.*
- *Implementing the code in internet using Applet with AWT controls.*
- *Course Outcomes: At the end of the Course, the Student will be able to:*

**Course Outcomes: At the end of the Course, the Student will be able to:**

CO1	Knows the reason about the evolution of Java its development. Study the basic of Java and to develop code. Importance of Java comparing the other language.
CO2	Develop program using constructors and its types. Definition of inheritance and Writing programmed related to it. Differentiate string class and string buffer.
CO3	Concept of packages, interface, threads. Implementing the concept Exception handling various application. Significance of exception handling. Life cycle of thread.
CO4	Explain I/O streams. Create file using Byte Stream and character Stream classes.
CO5	Usage of Java in internet. Definition of Applet and Developing code to connect to internet. Life Build Applet code using AWT controls and Layout managers

**Mapping of Course Outcomes to Program Specific Outcomes:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
<b>CO1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>CO2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>
<b>CO3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>
<b>CO4</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>CO5</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>

**3-Strong Correlation 2-Medium Correlation 1-Low Correlation**

SI No.	Contents of Module	Hrs	COs
1	Introduction to Java - Features of Java –Java Tokens - Data Types - Variables -Arrays - Operators - Control Statements: Decision Making-Looping Statements.	10	CO1
2	Classes - Objects - Constructors - Overloading method - Static and Final members - String Objects - String Class - String Buffer - Inheritance - Overriding methods -Using super-Abstract class.	15	CO2
3	Packages - Interfaces - Exception Handling –User-Defined Exception – Multithreading - Thread - Runnable Interface.	10	CO3
4	I/O Streams: Stream classes – Byte stream classes - Character stream classes –FileStreams – Using File class – File exceptions – Creation of file – Reading or writing characters/bytes – Random access files.	10	CO4
5	Applets – Preparing to write applets – Building Applet code – Applet life cycle – Applet tag – Passing parameters to Applets - AWT Controls - Layout Managers.	15	CO5

**Recommended Text Books:**

1. E.Balagurusamy, “Programming with Java”, Fourth Edition, 2010, Tata McGraw-Hill.
- 2.P Radha Krishna, “Object Oriented Programming through Java”, Second Edition, 2007, UniversitiesPress.

**Reference Books:**

1. K. Arnold and J. Gosling, “The Java Programming Language”, Second Edition, 1996, AddisonWesley.
2. P. Naughton and H. Schildt, “Java2 (The Complete Reference)”, Eight Edition, 2005, Tata McGraw-Hill.
3. Kathy Sierra and Bert Bates, “Head First Java”, Second Edition, 2003, Oreilly

## SECOND SEMESTER (SYLLABUS)

**Course Title: Practical Paper–II: JAVA Programming Lab**

**Course Code:**

**Credits - 2**

### **Course Objectives:**

- *To apply the Java concepts through various applications and to develop a web page.*

### **JAVA & APPLETS**

Course Outcome: At the end of the Course the student shall be able to

CO1: Write basic Java applications using String Class and String Buffer .

CO2: Create classes, objects and apply Inheritance.

CO3: Build Java applications using interface and Exception Handling.

CO4: Create Packages and build applications using default packages.

CO5: Manage Files and develop multithreaded applications.

CO5: Create GUI applications using AWT components.

### **Lab Exercises:**

1. Program using String Class.
2. Program using String Buffer.
3. Programming using Inheritance.
4. Program using interface.
5. Program using Exception Handling.
6. Program using packages.
7. Program using Files.
8. Implementing Thread based applications
9. Working with Colors, Fonts and Shapes.
10. Usage of AWT components in suitable applications.

## THIRD SEMESTER

### Differential Equations

<b>Course</b>	<b>B.Sc. Maths</b>	<b>Credits</b>	<b>04</b>
<b>Exam Hours</b>	<b>03</b>	<b>CIA Marks</b>	<b>50</b>
		<b>ESE Marks</b>	<b>50</b>

#### Course objectives

- To solve first order Ordinary differential equations
- To evaluate particular integrals of special forms
- To solve non homogeneous simultaneous linear differential equations
- To compute complete, singular and general integrals of partial differential equations
- To apply Charpits method

<b>Course Outline</b>	<p><b>Unit I: Ordinary Differential Equations:</b> Concept of existence and uniqueness . Variable separable-Homogeneous Equation-Non-Homogeneous Equations of first degree in x and y-Linear Equation-Bernoulli's Equation-Exact differential equations. Chapter 2: Section 1 to 6.</p>
	<p><b>Unit II: Equation of first order but not of higher degree:</b> Equation solvable for dy/dx- Equation solvable for y- Equation solvable for x- Clairauts form- Linear Equations with constant coefficients-Particular integrals <math>e^{ax}, \sin ax, \cos ax, x^m, Ve^{ax}</math> where <math>V</math> is <math>\sin ax</math> or <math>\cos ax</math> or <math>x^m</math> .</p> <p>Chapter 4: Section 1, 2.1, 2.2, 3.1, Chapter 5: Section 4.</p>
	<p><b>Unit III:</b> Simultaneous linear differential equations- Linear Equations of the Second Order -Complete solution in terms of a known integrals- Reduction to the Normal form- Change of the Independent Variable - Method of Variation of Parameters(constant coefficients).</p> <p>Chapter 6: Section- 6 ,Chapter 8:Section- 1,2,3,4.</p>
	<p><b>Unit IV: Partial differential equation:</b> Formation of PDE by Eliminating arbitrary constants and arbitrary functions-complete integral-singular integral-General integral- Lagrange's Linear Equations <math>Pp+Qq=R</math>.</p> <p>Chapter 12: Section- 1, 2, 3.1, 3.2, 4.</p>
	<p><b>Unit V:</b> Special methods - Standard forms - Charpit's Methods - Related problems</p> <p>Chapter 12: Section-5.1, 5.2, 5.3, 5.4, 6.</p>

#### Recommended Text:

1. Differential Equations and its applications”, by S.Narayanan, T.K.Manikavachagam Pillay — S.Viswanathan (Printers and Publishers ) Pvt. Ltd(2006).



**Course Title: Elective Paper III: DATABASE MANAGEMENT SYSTEMS**

<b>Course Code:</b>	<b>Credits</b>	<b>03</b>
<b>L:T:P:S : 3:1:0:0</b>	<b>CIAMarks</b>	<b>:50</b>
<b>Exam Hours:03</b>	<b>ESEMarks</b>	<b>:50</b>

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**Course Objectives:**

- · Detailed description for the structure of Database, file and records.
- · Structuring the models for Normalization of different Normal Forms.
- · Emphasizing the types of statements for control languages.
- · Demonstration of Subprograms, Functions and Procedures
- · Elaborating the concepts of Triggers and Cursors

Course Outcomes: At the end of the Course, the Student will be able to:

<b>CO1</b>	To demonstrate the characteristics of Database Management Systems. To study about the concepts and models of database. To impart the concepts of System Development Life Cycle and E-R Model.
<b>CO2</b>	To classify the keys and the concepts of Relational Algebra. To impart the applications of various Normal Forms Classification of Dependency.
<b>CO3</b>	To elaborate the different types of Functions and Joins and their applications. Introduction of Views, Sequence, Index and Procedure.
<b>CO4</b>	To give the Representation of PL-SQL Structure. To impart the knowledge of Sub Programs, Functions and Procedures.
<b>CO5</b>	To give the Representation of Exception and Pre-Defined Exception. To Point out the Importance of Triggers, Implicit and Explicit Cursors.

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	2	3	3	3	3	3	3	2	3	3
<b>CO2</b>	2	3	3	3	3	2	3	3	2	3
<b>CO3</b>	3	3	3	3	3	3	3	3	3	3
<b>CO4</b>	3	3	3	3	2	3	2	2	3	3
<b>CO5</b>	3	3	3	2	1	2	3	1	3	3

**1 Low                      2 – Medium                      3 – High**

Sl No.	Contents of Module	Hrs	Cos
1	Introduction - Database System - Characteristics of Database Management Systems - Architecture of Database Management Systems - Database Models - System Development Life Cycle - Entity Relationship Model	15	CO1
2	Introduction to Relational Database Model - Structure of Relational Model – Keys - Relational Algebra - Normalization: Functional Dependency - First Normal form - Second Normal Form Third Normal form - Boyce-Code Normal Form - Fourth Normal Form.	15	CO2
3	SQL: Introduction-Data Retrieval - Single row function - Group function - Set Function - Sub query -Joins. Data Manipulation Language: Insert, Update and Delete Statements - Transaction Control Language – View – Sequence – Synonym – Index - Defining Constraints	15	CO3
4	PL/SQL: Introduction-PL/SQL Basic-Character Set- PL/SQL Structure-SQL Cursor Subprograms-Functions-Procedures.	15	CO4
5	Exception Handler Introduction - Predefined Exception - User Defined Exception – Triggers -Implicit and Explicit Cursors - Loops in Explicit Cursor.	15	CO5

**TEXT BOOK:**

1. Pranab Kumar Das Gupta and P. Radha Krishnan, “Database Management System Oracle SQL and PL/SQL”, Second Edition, 2013, PHI Learning Private Limited.

**REFERENCE BOOKS:**

1. RamezElmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, 2007, Pearson Publications.
2. Abraham Silberschatz, Henry Korth, S. Sudarshan, “Database System Concepts”, Sixth Edition, 2010, Mc- 1Graw Hill Education.

**E-REFERENCE:**

1. [http://www.amazon.in/DATABASE-MANAGEMENT-SYSTEM-ORACLE-SQL/dp/B00LPGBWZ0#reader\\_B00LPGBWZ0](http://www.amazon.in/DATABASE-MANAGEMENT-SYSTEM-ORACLE-SQL/dp/B00LPGBWZ0#reader_B00LPGBWZ0)



## **THIRD SEMESTER (SYLLABUS)**

**Course Title: Practical Paper –III: RDBMS LAB**

**Course Code:**

**Credits - 2**

### **Course Objectives:**

- *To make the student aware of the Back-End tool.*

### **Lab Exercises:**

1. DDL commands.
2. Specifying constraints-primary key, foreign key, unique, check, not null.
3. DML commands.
4. Joins.
5. Sub queries.
6. Creation of simple PL/SQL block using control constructs
7. Creation of PL/SQL blocks using exceptional handlers.
8. PL/SQL program using implicit and explicit cursor.
9. PL/SQL program using procedures.
10. PL/SQL program using triggers.
11. Data Manipulation using PL/SQL.

<b>Title Of The Course</b>		<b>PROBABILITY AND STATISTICS – I</b>			
<b>Paper Number</b>		<b>II</b>			
<b>Category</b>	Allied	<b>Year</b>	<b>II</b>	<b>Credits</b>	<b>5</b>
		<b>Semester</b>	<b>III</b>		

### Course Objectives

Students will acquire knowledge of

- The laws of Probability and Baye’s theorem.
- Measures of Location, Dispersion, Correlation and Regression
- The Discrete and Continuous Probability Distribution

<b>COs</b>	<b>CONTENTS OF MODULE</b>
<b>CO1</b>	<b>UNIT-I:</b> Concept of sample space – Events – Definition of Probability (classical, Statistical & Axiomatic) – Addition and Multiplication laws of Probability– Independence – Conditional Probability – Baye’s theorem - Simple Problems Chapter – 4: Sections - 4.3,4.3.1,4.5,4.5.1,4.5.2,4.5.3,4.6.1,4.6.2,4.7,4.9.
<b>CO2</b>	<b>UNIT- II:</b> Random Variables (Discrete and Continuous) Distribution function- Expected values and Moments- Moment generating function – cumulants- Examples Chapter – 5: Sections – 5.1,5.2,5.3,5.4,5.4.1,5.4.3 Chapter – 6: Sections – 6.1,6.7,6.9,6.10.
<b>CO3</b>	<b>UNIT–III:</b> Characteristic function- Uniqueness and Inversion theorems (Statements and applications only)- Chebychev’s Inequality – Simple Problems. Convergence in probability, Weak Law of large numbers with numerical examples. Chapter – 6: Sections – 6.11,6.12.
<b>CO4</b>	<b>UNIT-IV:</b> Concepts of bivariate distributions- Correlation and Regression- Linear Prediction- Rank Correlation coefficient, Intra class correlation coefficient, Concepts of partial and multiple correlation coefficients- Simple problems. Chapter – 10: Sections – 10.1 – 10.7.4.
<b>CO5</b>	<b>UNIT-V:</b> Standard Distributions – Bernoulli Distribution, Binomial- Poisson- Normal- Uniform distributions- Geometric- Exponential- Gamma -Beta distributions- Inter relationship between distributions. Chapter – 7: Sections – 7.1,7.2,7.3.1. Chapter – 8: Sections – 8.1- 8.6.

<b>Contents and treatment as in</b>	Elements of Mathematical Statistics, by S.C.Gupta & V.K.Kapoor, Sultan Chand & Sons, New Delhi.
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Hogg R.V. &amp; Craig A.T. (1988) : Introduction to Mathematical Statistics, McMillan.</li> <li>2. Mood A.M. &amp; Graybill F.A. &amp; Boes D.G. (1974): Introduction to theory of Statistics, McGraw Hill.</li> <li>3. Snedecor G.W. &amp; Cochran W.G (1967) : Statistical Methods, Oxford and IBH.</li> </ol>
<b>e-Resources:</b>	<ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in">https://nptel.ac.in</a></li> <li>2. <a href="https://www.wikipedia.org">https://www.wikipedia.org</a>.</li> <li>3. <a href="http://ebooks.lpude.in.statistics">http://ebooks.lpude.in.statistics</a>.</li> </ol>

**Course Outcomes: At the end of the Course, the Student will be able to**

<b>CO1</b>	Illustrate and describe sample spaces and events for random experiments. calculate probabilities of event in discrete sample spaces and conditional probabilities of events using Baye's theorem.
<b>CO2</b>	Calculate the expected value of a probability distribution, obtain moments and its generating function and also obtain probability generating function
<b>CO3</b>	Apply the concepts of characteristic function and Chebychev's Inequality and demonstrate the theorems related to convergence in probability
<b>CO4</b>	Study the relationship between two or more variables
<b>CO5</b>	Illustrate the concept of a probability distribution and sketch the same to real world problems involving various distributions like Binomial, Poisson and Normal distribution, Uniform distributions Geometric, Exponential, Gamma, Beta distributions and identify the Inter relationship between distributions.

### Mapping of Course Outcomes to Program Outcome & Program Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
<b>CO1</b>	3	3	2	1	2	2	2	3	3	2
<b>CO2</b>	3	2	2	1	2	2	2	2	2	3
<b>CO3</b>	3	3	2	1	1	1	2	3	2	2
<b>CO4</b>	3	2	1	2	2	2	2	2	2	2
<b>CO5</b>	3	2	1	1	2	2	2	2	3	3

3-High

2-Medium

1-Low

## Integral Transforms

<b>Course</b>	<b>B.Sc Maths</b>
<b>Exam Hours</b>	<b>03</b>

<b>Credits</b>	<b>04</b>
<b>CIA Marks</b>	<b>50</b>
<b>ESE Marks</b>	<b>50</b>

### Course objectives

- To understand Laplace Transform
- To apply Laplace transform to solve differential equations
- To analyse Fourier series and its applicability
- To compute Fourier Transform

Course Outline	<p><b>Unit I:</b> The Laplace Transforms-Definitions-Sufficient conditions for the existence of the Laplace transform(without proof)-Laplace transform of periodic functions-some general theorems-evaluation of integrals using Laplace transform-Problems.</p> <p>Chapter 5: Section-1 to 5.</p>
	<p><b>Unit II:</b> The inverse Laplace Transforms- Applications of Laplace Transforms to ordinary differential equations with constant co-efficients and variable co-efficients, simultaneous equations and equations involving integrals-Problems.</p> <p>Chapter 5: Section-6 to 12.</p>
	<p><b>Unit III:</b> Fourier series- Expansion of periodic functions of period <math>2\pi</math>- Expansion of even and odd functions, Half range Fourier series- Change of intervals –Problems.</p> <p>Chapter 6: Section-1 to 6</p>
	<p><b>Unit IV:</b> Fourier Transform- Infinite Fourier Transform(Complex form) – Properties of Fourier Transform .</p> <p>Chapter 6: Section-8 to 10.</p>
	<p><b>Unit V:</b> Fourier cosine and Fourier sine Transform – Properties – Parseval’s identity – Convolution theorem - Problems.</p> <p>Chapter 6: Section-11 to 15.</p>

### **Recommended Text Book:**

1. “Calculus-Volume III” – S.Narayanan and T.K.ManicavachagamPillai.  
S. Viswanathan Publishers Pvt. Ltd. 2006

## Reference Books

1. Engineering Mathematics Volume III, P. Kandasamy and Others, (S. Chand and Co)
2. Advanced Engineering Mathematics – Stanley Grossman and William R. Devit
3. Engineering Mathematics III, A. Singaravelu, Meenakshi Agency, Chennai 2008.
4. Engineering Mathematics for Semester III- Third Edition – T.Veerarajan ,Tata McGraw-Hill Publishing Company Ltd, New Delhi

## Website and e-Learning source

<https://nptel.ac.in> <https://www.mathhelp.com/>

### **Course Outcomes: At the end of the course, students will be able to**

<b>CO1</b>	Analyse Laplace transform and the conditions of existence of Laplace transform
<b>CO2</b>	Implement the Laplace transform technique to solve differential equations
<b>CO3</b>	Study the expansion of periodic functions using Fourier Series
<b>CO4</b>	Demonstrate the Fourier transform and its properties
<b>CO5</b>	Illuminate problems using Fourier cosine and Fourier sine Transform .

### **Mapping of Course Outcomes to Program Outcome & Program Specific Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	3	2	2			2	2	2	2	2
<b>CO2</b>	2	3	1			1	2	1	2	2
<b>CO3</b>	2	2	2			2	2	2	3	2
<b>CO4</b>	2	3	2			2	3	2	2	2
<b>CO5</b>	3	2	2			2	2	2	2	2

3-High

2-Medium

1-Low

<b>Title of the Course</b>		<b>DISCRETE MATHEMATICS</b>				
<b>Paper Number</b>		<b>VII</b>				
<b>Category</b>	<b>Core</b>	<b>Year</b>	<b>II</b>	<b>Credits</b>	<b>4</b>	<b>Course Code</b>
		<b>Semester</b>	<b>IV</b>			

**Course Objectives:** Students will acquire knowledge

- To apply tools and ideas in Mathematics for solving Applied Problems.
- To Evaluate Boolean functions and to express a logic sentence in terms of predicates, quantifiers, and logical connectives.

<b>COs</b>	<b>CONTENTS OF MODULE</b>
<b>CO1</b>	<b>UNIT-I:</b> Integers: Set, some basic properties of integers, Mathematical induction, divisibility of integers, representation of positive integers <b>Chapter 1 - Sections 1.1 to 1.5</b>
<b>CO2</b>	<b>UNIT- II:</b> Boolean algebra & Applications: Boolean algebra, two element Boolean algebra, Disjunctive normal form, Conjunctive normal form <b>Chapter 5 - Sections 5.1 to 5.4</b>
<b>CO3</b>	<b>UNIT-III:</b> Application, Simplification of circuits, Designing of switching circuits, Logical Gates and Combinatorial circuits. <b>Chapter 5 - Section 5.5, 5.6</b>
<b>CO4</b>	<b>UNIT-IV:</b> Recurrence relations and Generating functions: Sequence and recurrence relation, Solving recurrence relations by iteration method, Modeling of counting problems by recurrence relations, Linear (difference equations) recurrence relations with constant coefficients, Generating functions, Sum and product of two generating functions, Useful generating functions, Combinatorial problems. <b>Chapter 6 - Section 6.1 to 6.6</b>
<b>CO5</b>	<b>UNIT-V:</b> Propositional logic and Predicate logic: Propositional logic, Adequate system of connectives, Translation of sentences in a Natural Language into Statement Formula, Logical validity of arguments, Predicate Logic, Negation of a statement obtained by qualification of a predicate, Logical operations on predicates or quantified predicates, Symbolization of sentences by using predicates, Quantifiers and connectives, Logical validity of arguments. <b>Chapter 8 - Sections 8.1, 8.5 to 8.8 (Omit Section 8.2 to 8.4)</b>

<b>Contents and treatment as in</b>	“Introduction to Discrete Mathematics”, 2 <sup>nd</sup> edition, 2002 by M. K. Sen and B. C. Chakraborty, Books and Allied Private Ltd., Kolkata.
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Discrete mathematics for computer scientists and mathematicians by J. L. Mertz, Abraham Kendel and T. P. Baker prentice-hall, India.</li> <li>2. Discrete mathematics for computer scientists by John Truss- Addison Wesley.</li> <li>3. Elements of Discrete Mathematics, C. L. Liu, New York McGraw-Hill, 1977.</li> </ol>
<b>e-Resources:</b>	<ol style="list-style-type: none"> <li>1. <a href="https://brilliant.org/wiki/discrete-mathematics/">https://brilliant.org/wiki/discrete-mathematics/</a>.</li> <li>2. <a href="https://www.tutorialspoint.com/discrete_mathematics/">https://www.tutorialspoint.com/discrete_mathematics/</a>.</li> </ol>

**Course Outcomes: At the end of the Course, the Student will be able to**

<b>CO1</b>	Analyze the divisibility of integer and also representation of
<b>CO2</b>	Apply Boolean algebra concepts in disjunctive and conjunctive normal form
<b>CO3</b>	Identifying, designing and analyzing circuits, logical gates and combinatorial circuits
<b>CO4</b>	Demonstrate recursive function and classify homogeneous and non-homogeneous linear recurrence relations
<b>CO5</b>	Demonstrate Proportional logic and Predicate logic

**Mapping of Course Outcomes to Program Outcome & Program Specific Outcomes**

	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>
<b>CO1</b>	3	2	1	1	1	1	1	1	2	2
<b>CO2</b>	3	2	1	1	1	2	1	2	2	2
<b>CO3</b>	2	3	2	1	1	1	1	1	2	2
<b>CO4</b>	2	2	1	1	1	2	1	1	2	2
<b>CO5</b>	2	3	2	1	1	1	1	1	3	3

3-High

2-Medium

1-Low

<b>Title Of The Course</b>		<b>PROBABILITY AND STATISTICS – II</b>		
<b>Paper Number</b>		<b>IV</b>		
<b>Category</b>	Allied	<b>Year</b>	<b>II</b>	<b>Credits</b>
		<b>Semester</b>	<b>IV</b>	
				<b>5</b>

**Learning outcomes:** Students will acquire knowledge

- To provide the foundation of statistical analysis used in varied application
- Of Sampling methods, Tests of significance and testing of hypothesis.

<b>COs</b>	<b>CONTENTS OF MODULE</b>
<b>CO1</b>	<b>UNIT-I:</b> Sampling Distributions – Concept of Standard error – Sampling distribution based on normal distribution- t, z, Chi Square and F distributions. Chapter – 12: Sections –12.1 – 12.3.1. Chapter – 13: Sections – 13.1 – 13.3.3. Chapter – 14: Sections – 14.1 – 14.5.2.
<b>CO2</b>	<b>UNIT- II</b> Point estimation – Concepts of unbiasedness – consistency – efficiency and sufficiency- Cramer Rao inequality – Methods of estimation- Maximum likelihood- moments - minimum square and their properties (Statement only). Chapter – 15: Sections – 15.1 – 15.4
<b>CO3</b>	<b>UNIT–III:</b> Test of significance – Standard error- Large sample test, Exact test based on normal, t, chi-square and F distribution with respect to population mean/means, proportion/proportions, variance and correlation coefficient. Test of independence of attributes based on contingency tables- Goodness of fit based on chi-square. Chapter – 12: Sections – 12.3.2.- 12.9 Chapter – 13: Sections – 13.5.2,13.5.3
<b>CO4</b>	<b>UNIT-IV:</b> Analysis of Variance: One way, two way classification concepts & Problems. Interval estimation – Confidence intervals for population mean/means- Proportion/proportions and variances based on t, Chi-Square and F. Chapter – 17: Sections – 17.1 – 17.3
<b>CO5</b>	<b>UNIT-V:</b> Test of hypothesis- Type I and II errors- Power of test – Neymann Pearson lemma- Likelihood ratio test-concepts of most powerful test- statements and results only-simple problems. Chapter – 16: Sections – 16.1 – 16.5

**Recommended Text:**

Elements of Mathematical Statistics, by S.C.Gupta & V.K.Kapoor, Sultan Chand & Sons, New Delhi.



<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Hogg R.V. &amp; Craig A.T. (1988 ): Introduction to Mathematical Statistics,McMillan.</li> <li>2. Mood A.M. &amp;Graybill F.A. &amp;Boes D.G. (1974): Introduction to theory of Statistics,McGrawHill.</li> <li>3. Snedecor G.W. &amp; Cochran W.G(1967) : StatisticalMethods, Oxford andIBH.</li> <li>4. Hoel P.G. (1971) : Introduction to MathematicalStatistics, Wiley.</li> <li>5. Wilks S.S. Elementary Statistical Analysis, Oxford andIBH.</li> </ol>
<b>e-Resources:</b>	<ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in">https://nptel.ac.in</a></li> <li>2. <a href="https://www.wikipedia.org">https://www.wikipedia.org</a>.</li> <li>3. <a href="http://ebooks.lpude.in/statistics">http://ebooks.lpude.in/statistics</a>.</li> </ol>

**Course Outcomes: At the end of the Course, the Student will be able to**

<b>CO1</b>	Identify a statistic and point out its importance in application and summarize the theoretical aspect of normal and non-normal populations.
<b>CO2</b>	Explain the bound for defining most efficient estimates derived from Rao Cramer inequality and compare the process of finding interval estimation with the process of finding point estimation.
<b>CO3</b>	Fit best approximation for a given set of data and also compare and analyze whether two sets of data are coming from same population or different population
<b>CO4</b>	Analyze the variability of samples under the given distributions and also obtain its confidence intervals
<b>CO5</b>	Point out the existence of most powerful test by summarizing the theoretical aspects of Neymann Pearson result.

**Mapping of Course Outcomes to Program Outcome & Program Specific Outcomes**

	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	3	2	2	1	1	2	2	3	3	2
<b>CO2</b>	3	3	2	1	1	1	3	3	2	2
<b>CO3</b>	2	3	3	1	1	2	1	2	2	2
<b>CO4</b>	3	3	2	1	1	2	2	3	3	2
<b>CO5</b>	3	3	2	1	1	2	1	2	2	2

**1 Low**

**2 – Medium**

**3 – High**

## FIFTH SEMESTER

<b>Title of the Course</b>		<b>ALGEBRAIC STRUCTURES</b>				
<b>Paper Number</b>		<b>VIII</b>				
<b>Category</b>	Core	<b>Year</b>	<b>II</b>	<b>Credits</b>	<b>4</b>	<b>Course Code</b>
		<b>Semester</b>	<b>IV</b>			

### Course Objectives:

Students will acquire knowledge about the concepts of Sets, Groups and Rings.

COs	CONTENTS OF MODULE
<b>CO1</b>	<b>Unit I:</b> Introduction to groups- Subgroups- cyclic groups - Lagrange's Theorem- A counting principle-Examples <b>Chapter 2: Section 2.4 and 2.5.</b>
<b>CO2</b>	<b>Unit II:</b> Normal subgroups and Quotient group- Homomorphism- Automorphism- Examples. <b>Chapter 2: Section 2.6 to 2.8.</b>
<b>CO3</b>	<b>Unit III:</b> Cayley's Theorem- Permutation groups-Examples. <b>Chapter 2: Section 2.9 and 2.10.</b>
<b>CO4</b>	<b>Unit IV:</b> Definition and examples of ring- Some special classes of rings- homomorphism of rings- Ideals and quotient rings- More ideals and quotient rings. <b>Chapter 3: Section 3.1 to 3.5.</b>
<b>CO5</b>	<b>Unit V:</b> The field of quotients of an integral domain- Euclidean Rings- The particular Euclidean ring-Examples. <b>Chapter 3:Section 3.6to 3.8.</b>

### Contents and treatment as in

Topics in Algebra – I. N. Herstein, Wiley Eastern Ltd Second Edition (1st January 2006)

### Reference Books

1. A First Course in Abstract Algebra, John B. Fraleigh, 7th Ed., Pearson, 2002.
2. Abstract Algebra, M. Artin, 2nd Ed., Pearson, 2011.
3. Contemporary Abstract Algebra, Joseph A Gallian, 4th Ed., Narosa, 1999
4. Modern Algebra by M.L.Santiago, McGraw Hill EducationIndia pvt Ltd
5. Modern Algebra by S. Arumugam and others, NewGamma publishing House, Palayamkottai.
6. Modern Algebra by Visvanathan Nayak, Emerald Publishers, Reprint1992

### Website and e-Learning Source

1. <https://nptel.ac.in>
2. <http://garsia.math.yorku.ca/~sdenton/algstruct>.
3. <https://nptel.ac.in> <https://www.mathhelp.com/>

**Course Outcomes: At the end of the Course, the Student will be able to**

<b>CO1</b>	Summarize the structure of Group, Subgroups and Demonstrate operations satisfying various properties in group structure.
<b>CO2</b>	Explain normal subgroups, quotient groups, homomorphism, automorphism and demonstrate with an example.
<b>CO3</b>	Explain Cayley's theorem, the permutations groups with an example.
<b>CO4</b>	Define Rings, some special classes of rings with an example and Explain ideals and quotient Rings
<b>CO5</b>	Illustrate Imbedding of Integral domain over Field and demonstrate the Euclidean Rings.

**Mapping of Course Outcomes to Program Outcomes & Program Specific Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	3	3	2	2	1	2	2	3	3	2
<b>CO2</b>	3	3	2	2	1	2	2	3	2	3
<b>CO3</b>	3	3	1	1	1	2	1	3	1	2
<b>CO4</b>	3	3	1	1	1	2	1	2	2	2
<b>CO5</b>	3	2	1	2	1	2	2	3	2	2

**1 Low      2 – Medium      3 – High**

### Course Title: Real Analysis-I

<b>Course</b>	<b>B.Sc. Maths</b>
<b>Exam Hours</b>	<b>03</b>

<b>Credits</b>	<b>04</b>
<b>CIA Marks</b>	<b>50</b>
<b>ESE Marks</b>	<b>50</b>

#### Course objectives

- To make the students capable of analysing any given sequence and series
- To calculate limit superior, limit inferior and the limit of a sequence
- To learn certain proof techniques and write precise proof of theorems
- To recognize alternating, conditionally convergent and absolutely convergent series

<b>CONTENTS OF MODULE</b>
<b>Unit I:</b> Sets and Functions: Sets and elements- Operations on sets- functions- real valued functions- equivalence- countability - real numbers- least upper bounds. <b>Chapter 1 Section 1.1 to 1.7</b>
<b>Unit II:</b> Sequences of Real Numbers: Definition of a sequence and subsequence- limit of a sequence- convergent sequences- divergent sequences- bounded sequences- monotone sequences <b>Chapter 2 Section 2.1 to 2.6</b>
<b>Unit III:</b> Operations on convergent sequences- operations on divergent sequences- limit superior and limit inferior- Cauchy sequences. <b>Chapter 2 Section 2.7 to 2.10</b>
<b>Unit IV:</b> Series of Real Numbers: Convergence and divergence- series with non-negative terms- alternating series- conditional convergence and absolute convergence- tests for absolute convergence- series whose terms form a non-increasing sequence- the class $l^2$ . <b>Chapter 3 Section 3.1 to 3.4,3.6,3.7 and 3.10</b>
<b>Unit V:</b> Limits and Metric Spaces: Limit of a function on a real line-. Metric spaces - Limits in metric spaces. Continuous Functions on Metric Spaces: Function continuous at a point on the real line- Reformulation- Function continuous on a metric space. <b>Chapter 4 Section 4.1 to 4.3 Chapter 5 Section 5.1 to 5.3</b>

#### Recommended Text: Contents and treatment as in

1. *Richard R. Goldberg*, Methods of Real Analysis, Oxford and IBH Publishing Co.

### Reference Books:

1. Principles of Mathematical Analysis by Walter Rudin, Tata McGraw Hill.
2. Mathematical Analysis Tom M Apostol, Narosa Publishing House

### Website and e-Learning Source

<https://nptel.ac.in> <https://www.mathhelp.com/>

### Course outcomes: At the end of the course, students will be able to

<b>CO1</b>	Describe the fundamental properties of the real numbers that lead to the formal development of real analysis and recognize the basic properties of the field of real numbers, cardinality of a sets.
<b>CO2</b>	Demonstrate the concepts of limits in sequences and examine the basic principles of convergence and conditions of the convergent, divergent of a sequence.
<b>CO3</b>	Estimate the limit superior, limit inferior, limit of a sequence and explain Cauchy sequence.
<b>CO4</b>	Construct mathematical proofs of convergence test of a sequence and distinguish between conditional convergence and absolute convergence. Explain and demonstrate the basic concepts of absolute convergence of a sequence and derive the 'test for convergence' using summation by parts.
<b>CO5</b>	Explain the Euclidian distance function and the geometric meaning of each of the metric space properties and point out whether a given distance function is a metric.

### Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	2	3	2	1	2	2	2	2	2	2
<b>CO2</b>	3	2	2	1	2	2	2	3	2	2
<b>CO3</b>	2	2	2	1	1	3	2	2	2	2
<b>CO4</b>	3	2	1	1	1	3	1	3	2	3
<b>CO5</b>	3	2	2	1	2	2	2	3	2	3

1 Low

2 – Medium

3 – High

**Course Title: Mechanics**

<b>Course</b>	<b>B Sc (Maths)</b>
<b>Exam Hours</b>	<b>03</b>

<b>Credits</b>	<b>04</b>
<b>CIA Marks</b>	<b>50</b>
<b>ESE Marks</b>	<b>50</b>

**Course objectives**

- Students will acquire knowledge about
- Particles or body in rest under the given forces. Forces, equilibrium of a particle and centre of mass of various bodies.
- The motion of bodies under the influence of forces. Rectilinear motion of particles, Projectiles and Moment of Inertia of Particles.

<b>COs</b>	<b>CONTENTS OF MODULE</b>
<b>CO1</b>	<p><b>Unit 1</b>                      Force- Newtons laws of motion - resultant of two forces on a particle- Equilibrium of a particle, Limiting equilibrium of a particle on an inclined plane.                      Chapter 2 - Section 2 .1 , 2.2 ,                      Chapter 3 - Section 3.1 -3.2</p>
<b>CO2</b>	<p><b>Unit 2</b>                      Forces on a Rigid Body: Moment of a Force – General motion of a body – Equivalent systems of forces- Parallel Forces, Forces along the sides of a triangle – Couples.                      A hanging body in equilibrium, Hanging strings- equilibrium of a uniform homogeneous string – suspensionbridge.                      Chapter 4 : Sections 4.1 to 4.6                      Chapter 9 - Section 9.1, 9.2.</p>
<b>CO3</b>	<p><b>Unit 3</b>                      Kinematics -Basic units – velocity – acceleration- coplanar motion . Rectilinear motion under varying Force: Simple harmonic motion ( S.H.M.) – S.H.M. along a horizontal line- S.H.M. along a vertical line                      Chapter 1 - Section 1.1 to 1.4                      Chapter 12 - Section 12.1 to 12.3</p>
<b>CO4</b>	<p><b>Unit4</b>                      Projectiles -Forces on a projectile- projectile projected on an inclined plane. Moment of inertia, Perpendicular and parallel axes theorem                       Chapter 13 - Section 13.1, 13.2                      Chapter 17 - Section 17.1, 17.1.1</p>
<b>CO5</b>	<p><b>Unit 5</b>                      UNIT-V: Central Orbits: General orbits – Central orbit – Conic as a centered orbit                      Chapter 16 - Section 16.1 to 16.3</p>

### Contents and treatment as in

Mechanics, by P.Duraipandian, Lakmi Duraipandian and Muthamizh Jayapragasam, S.Chand and company private limited Reprint 2016.

### Reference Books

1. Engineering Mechanics: Statics, J.L. Meriam and L. G. Kraige, Seventh Edition, Wiley and sons Pvt Ltd., New York, 2012.
2. Engineering Mechanics: Dynamics, J.L. Meriam, L. G. Kraige, and J.N. Bolton, 8<sup>th</sup> edition Wiley and sons Pvt Ltd., New York, 2015.
3. Engineering Mechanics (Statics and Dynamics) A. K. Dhiman, P. Dhinam and D. Kulshreshtha, McGraw Hill Education (India) Private Limited, New Delhi, 2015.
4. Introduction to Statics and Dynamics, A. Ruina and R. Pratap, Oxford University Press, 2014.
5. The Elements of Statics and Dynamics, S.L. Loney, Cambridge University Press, 1904.
6. Dynamics – K. Viswanatha Naik and M. S. Kasi, Emerald Publishers.
7. Dynamics – A. V. Dharmapadam, S. Viswanathan Publishers.

### e-Resources:

1. <https://www.wikipedia.org/>
2. <https://physics.info>

### Course outcomes: At the end of the course, the student will be able to

CO1	Recall the basic definitions of forces, Newtons laws of motion, Equilibrium of a particle.
CO2	Distinguish problems under moments, parallel forces and couples. Explain hanging body in equilibrium and demonstrate problems under hanging strings.
CO3	Recall the basic definitions of velocity, acceleration, coplanar motion simple harmonic motion and demonstrate problems under Simple harmonic motion.
CO4	Recall concepts of projectiles, differentiate time of flight, horizontal range. Explain moment of Inertia of simple bodies and theorems of parallel and perpendicular axes
CO5	Define circular motion, central orbits, and evaluate various problems centered orbit .

**Mapping of Course Outcomes to Program Outcomes & Program Specific Outcomes:**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	3	3	2	1	1	2	2	3	3	2
<b>CO2</b>	3	3	2	1	1	2	2	3	2	3
<b>CO3</b>	3	3	1	1	1	2	1	3	1	2
<b>CO4</b>	3	3	1	1	1	2	1	2	2	2
<b>CO5</b>	3	2	1	2	1	2	2	3	2	2

**1 Low**

**2 – Medium**

**3 – High**



**Course Title: Operations Research**

<b>Course</b>	<b>B Sc (Maths)</b>
<b>Exam Hours</b>	<b>03</b>

<b>Credits</b>	<b>04</b>
<b>CIA Marks</b>	<b>50</b>
<b>ESE Marks</b>	<b>50</b>

**Course objectives**

- To formulate and solve the Linear Programming Problem from the real-world problems in business and industry.
- Develop mathematical skills to analyze and solve network models arising from a wide range of applications.

<b>CONTENTS OF MODULE</b>
<b>Unit -1: Linear programming</b> – Formulation – Graphical solution – Simplex method – Simple applications. Big-M method. <b>Chapter - 2,3,4</b>
<b>Unit -2: Linear programming</b> - Principle of Duality – Primal – Dual relation -Dual simplex method – Simple applications. <b>Transportation Problem:</b> Finding initial solution by North West Corner Rule – Vogel’s Approximation method and Matrix minimum method – Procedure for finding optimal solution –MODI method – Both minimisation and maximisation cases – Unbalanced and degenerate transportation problems. <b>Chapter 5 : 5.1 – 5.4, 5.7</b> <b>Chapter 10: 10.1-10.13</b>
<b>Unit -3: Assignment Problem:</b> Formulation – Minimisation cases – procedure for getting optimum solution – Unbalanced problem – Maximisation problem – Problems with restrictions. <b>Game Theory:</b> Two Person Zero-Sum game with saddle point – without saddle point – dominance rule – Solving 2 x n or m x 2 game by graphical method. <b>Chapter 11: 11.1 – 11.4</b> <b>Chapter 17: 17.1 -17.7</b>
<b>Unit -4: Networks:</b> Rules for network construction – Critical Path Method - Time calculation sin PERT – PERT algorithm (Crashing excluded) – Related problems. <b>Chapter 25</b>
<b>Unit -5: Sequencing Problem</b> – n jobs through 2 machines – n jobs through 3 machines – n jobs through m machines. Graphical method. <b>Chapter 12: 12.1 – 12.6</b>

**Recommended Text :**

*KanthiSwaroop, P.K. Gupta, Manmohan, Operations Research –Sultan Chand & sons (2021) reprint.*

**Reference Books:**

- 1.P.K. Gupta and D. S. Hira, Operations Research, S. Chand & Co.  
 1. *H.A. Taha*, Operations Research Prentice Hall of India, New Delhi  
 2. *Sundaresan, Ganapathy Subramanian, Ganesan.*,Resource Management Technique – Meenakshi Agency.

**Website and e-Learning Source** <https://nptel.ac.in> <https://www.mathhelp.com/>

**Course outcomes: At the end of the course, students will be able to**

<b>CO1</b>	Able to formulate linear programming problems and solve using Graphical, Simplex method.
<b>CO2</b>	Able to analyze and solve Transportation using appropriate method.
<b>CO3</b>	Able to analyze and solve Assignment problems and Game theory.
<b>CO4</b>	Able to design and solve Networks Models using CPM, PERT.
<b>CO5</b>	Estimate optimum solution for sequencing problems.

**Mapping of Course Outcomes to Program Specific Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	3	3	2	1	2	3	2	2	2	3
<b>CO2</b>	2	3	2	1	2	3	3	3	3	2
<b>CO3</b>	3	3	1	2	1	3	2	3	2	3
<b>CO4</b>	3	3	3	3	2	3	3	3	3	3
<b>CO5</b>	3	2	3	2	3	3	2	3	3	2

**1 Low      2 – Medium      3 – High**

**Course Title: Core Paper XI: ARTIFICIAL INTELLIGENCE AND EXPERTSYSTEMS**

<b>Course Code:</b>	<b>Credits</b>	<b>03</b>
	<b>CIAMarks</b>	<b>:50</b>
<b>Exam Hours:03</b>	<b>ESEMarks</b>	<b>:50</b>

CO1	To demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents. To impart the basic principles, techniques, and applications of Artificial Intelligence.
CO2	To create an understanding of the basic issues of knowledge representation. To analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them
CO3	To impart basic proficiency in representing difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing.
CO4	To apply basic principles of AI in solutions that require problem solving, inference, perception and learning.
CO5	To develop abilities to apply, build and modify decision models to solve real problems To explore the issues involved in the design and development of Artificial Intelligence Based Decision Support Systems and discuss the role these systems play in the business environment.

**Mapping of Course Outcomes to Program Specific Outcomes:**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	3	2	3	3	3	3	3	3	3	3
<b>CO2</b>	3	2	3	3	2	3	3	3	3	3
<b>CO3</b>	3	3	3	2	3	3	3	2	3	3
<b>CO4</b>	3	3	3	3	2	3	3	3	2	3
<b>CO5</b>	3	3	3	3	3	3	3	3	3	3

**3-Strong Correlation 2-Medium Correlation 1-Low Correlation**

Sl No.	Contents of Module	Hrs	COs
1	Introduction of Artificial Intelligence: Overview of Artificial Intelligence – Knowledge: General Concepts – Lisp and other AI Programming Languages.	10	CO1
2	Knowledge Representation– Formalized Symbolic logics – Dealing with Inconsistencies and Uncertainties – Probabilistic Reasoning - Structured Knowledge : Graphs, Frames and Related Structures – Object – Oriented Representations	10	CO2
3	Knowledge Organization and Manipulation: Search and Control Strategies – Matching Techniques – Knowledge Organization and Management	15	CO3
4	Perception and Communication: Natural Language Processing – Pattern Recognition – Visual Image Understanding.	15	CO4
5	Expert System Architectures: Rule-Based System Architectures – Nonproduction System Architectures – Dealing with Uncertainty – Knowledge Acquisition and Validation – Knowledge system Building Tools.	10	CO5

**TEXT BOOK:**

2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert System", 2005, PHI Learning.

**E- REFERENCES:**

1. <http://www.ddegjust.ac.in/studymaterial/mca-5/mca-402.pdf>

## SIXTH SEMESTER

### Course Title: Linear Algebra

<b>Course</b>	<b>B Sc (Maths)</b>
<b>Exam Hours</b>	<b>03</b>

<b>Credits</b>	<b>04</b>
<b>CIA Marks</b>	<b>50</b>
<b>ESE Marks</b>	<b>50</b>

#### Course Objectives

Students will acquire knowledge about the Vector Spaces, Dual spaces, Inner product spaces and linear transformations.

<b>COs</b>	<b>CONTENTS OF MODULE</b>
<b>CO1</b>	<b>UNIT-I:</b> Vector spaces – Subspaces – Linear Combinations and Linear span – System of linear equations – Elementary Matrices Chapter: 1 Sections:1.1–1.4..
<b>CO2</b>	<b>UNIT-II:</b> Linear Dependence and Linear independence – Bases - Dimensions – Homogenous Equations – Non-homogenous equations Row reduced – Echelon form. Chapter 1: Sections:1.5,1.6., Chapter 2: Section: 2.7 Chapter 3: Section 3.4
<b>CO3</b>	<b>UNIT-III:</b> Linear transforms, null spaces and ranges – Matrix representation of a linear transformation – Invertibility and isomorphisms – Dual spaces. Chapter 2: Sections:2.1 –2.4 and 2.6.
<b>CO4</b>	<b>UNIT – IV:</b> Eigen values, Eigen vectors, Diagonalizability – Invariant subspaces – Cayley – Hamilton theorem. Chapter 5: Sections:5.1,5.2 and 5.4.
<b>CO5</b>	<b>UNIT-V:</b> Inner Products Space:Inner Products and norms Gram-Schmidt Orthogonalization Process – Orthogonal complements. Chapter 6: Sections:6.1,6.2.

#### Recommended Text:

Linear Algebra - Stephen H Friedberg, Arnold J Insel and Lawrence E Spence, 5 th edition (2018) Pearson

#### Reference Books:

1. Topics in Algebra, I.N. Herstein, Wiley Eastern Ltd. Second Edition, 2006.
2. University Algebra, N.S. Gopalakrishnan, New Age International Publications, Wiley Eastern Ltd.
3. First course in Algebra, John B. Fraleigh, Addison Wesley.
4. Linear Algebra and its Applications, David C. Lay, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
5. Introduction to Linear Algebra, S. Lang, 2nd Ed., Springer, 2005.
6. Linear Algebra and its Applications, Gilbert Strang, Thomson, 2007.

**Website and e-Learning Source**<https://nptel.ac.in><https://www.mathhelp.com/>**Course Outcomes: At the end of the Course, the Student will be able to**

<b>CO1</b>	Acquire a detailed knowledge about vector spaces and subspaces
<b>CO2</b>	Explain the concepts of Linear Dependence, Linear Independence, Bases and Dimension of basis.
<b>CO3</b>	Explain the concept of Linear Transformations, their Matrix representation and the notion of dual spaces with an illustration.
<b>CO4</b>	Find the Eigen values and Eigen vectors, to apply the concepts for diagonalisation.
<b>CO5</b>	Explain about Inner product and norms and to apply Gram Schmidt Orthogonalization Process to problems on inner product spaces.

**Mapping of Course Outcomes to Program Outcomes & Program Specific Outcomes:**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	3	3	2	1	1	2	2	3	3	2
<b>CO2</b>	3	3	2	1	1	2	2	3	2	3
<b>CO3</b>	3	3	1	1	1	2	1	3	1	2
<b>CO4</b>	3	3	1	1	1	2	1	2	2	2
<b>CO5</b>	3	2	1	2	1	2	2	3	2	2

**1 Low****2 – Medium****3 – High**

### Course Title: Real Analysis II

<b>Course</b>	<b>B.Sc Maths</b>
<b>Exam Hours</b>	<b>03</b>

<b>Credits</b>	<b>04</b>
<b>CIA Marks</b>	<b>50</b>
<b>ESE Marks</b>	<b>50</b>

#### Course objectives

- To write clear and precise proof of theorems.
- Introduce the concepts of Riemann integrable and properties of Riemann integrable.
- To identify the correct theorems to deal with unknown problems.

<b>CONTENTS OF MODULE</b>
<b>Unit I:</b> Continuous Functions on Metric Spaces: Open sets- closed sets- Discontinuous function on $\mathbb{R}^1$ . Connectedness, Completeness and Compactness: More about open sets- Connected sets. <b>Chapter 5 Section 5.4 to 5.6</b> <b>Chapter 6 Section 6.1 to 6.2</b>
<b>Unit II:</b> Bounded sets and totally bounded sets -Complete metric spaces- compact metric spaces, continuous functions on a compact metric space, continuity of inverse functions, uniform continuity. <b>Chapter 6 Section 6.3 to 6.8</b>
<b>Unit III:</b> Calculus: Sets of measure zero, definition of the Riemann integral, - properties of Riemann integral. <b>Chapter 7 Section 7.1 to 7.4(omit 7.3)</b>
<b>Unit IV:</b> Derivatives- Rolle's theorem, Law of mean, Fundamental theorems of calculus. <b>Chapter 7 Section 7.5 to 7.8</b>
<b>Unit V:</b> Taylor's theorem- Pointwise convergence of sequences of functions, uniform convergence of sequences of functions. <b>Chapter 8 Section 8.5</b> <b>Chapter 9 Section 9.1 and 9.2</b>

#### Recommended Text Book:

*Richard R. Goldberg.* Methods of Real Analysis. Oxford and IBH Publishing Co)

**Reference Books:**

1. Principles of Mathematical Analysis by Walter Rudin, TataMcGrawHill.
2. Mathematical Analysis Tom M Apostol, Narosa Publishing House.

**Course outcomes: At the end of the course, students will be able to**

<b>CO1</b>	Examine the continuity of a functions via open and closed sets and give the definition of concepts related to metric spaces, such as continuity, compactness, completeness and connectedness
<b>CO2</b>	Describe about bounded, unbounded sets and distinguish between compact and complete metric spaces.
<b>CO3</b>	Determine the Riemann integrability of a bounded function, identify the size of a sets by outer measure and choose the Riemann integral properties to find the value of the integrals.
<b>CO4</b>	Demonstrate the usage of the Mean Value Theorem, Fundamental theorem of Calculus to problems in the context of real analysis and Roll's theorem, Mean value theorem for differentiable functions.
<b>CO5</b>	Distinguish between point wise and uniform convergence of a sequence of functions and illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability.

**Mapping of Course Outcomes to Program Outcomes and  
Program Specific Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>2</b>
<b>CO2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>CO3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>
<b>CO4</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>CO5</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>

**1 Low**

**2 – Medium**

**3 – High**



Title of the Course		Complex Analysis				
Paper Number		XIV				
Category	Core	Year	III	Credits	4	Course Code
		Semester	VI			
<p>Course Objective:</p> <ul style="list-style-type: none"> <li>➤ Explain the fundamental concepts of the functions of a complex variable and their role in modern mathematics and applied contexts.</li> <li>➤ Demonstrate understanding of analytic functions and complex integration.</li> <li>➤ Calculate series expansions for complex-valued functions, evaluate contour integrals and definite integrals.</li> </ul>						
<b>Course Outline</b>		<p><b>Unit I</b>  <b>Analytic functions:</b> Limits –Limits involving the point at infinity–Theorem on limits –Continuity – Derivatives – Differentiation formulas – Cauchy Riemann equation – Sufficient conditions for differentiability – Polar coordinates– Analytic functions– Examples - Harmonic functions.            Chapter 2- Sections- 15- 26</p>				
		<p><b>Unit II</b>  <b>Complex Integration:</b> Contour integrals – Examples - Upper bounds for moduli of contour integrals – Simply and Multiply connected domains– Cauchy integral formula – An extension of the Cauchy integral formula – some consequences of the extension – Liouville’s theorem and Fundamental theorem of Algebra– Maximum modulus principle.            Chapter 4- Sections- 40-43,48-54 (omit 44-47)</p>				
		<p><b>Unit III</b>  <b>Series:</b> Convergence of sequences – Convergence of series– Taylor series – Examples- Laurent series– Examples- Absolute and uniform convergence of power Series.            Chapter 5- Sections: 55-63.</p>				
		<p><b>Unit IV</b>  <b>Residues and Poles:</b> Isolated singular point – Residues – Cauchy Residue theorem – residue at infinity –The three types of isolated singular points.  <b>Application of residues</b> – Evaluation of Improper Integrals – Improper integrals from Fourier Analysis –Jordan’s Lemma (statement only) – Definite integrals involving Sines and cosines–Simple examples.            Chapter 6- Sections: 68-72 Chapter 7 – Section 78-81,85 (omit 82-84)</p>				
		<p><b>Unit V</b>  <b>Mappings:</b> Mappings – Mapping by exponential function – <b>Mapping by elementary function</b> - Linear transformation – The transformation <math>w= 1/z</math> – Mappings by <math>1/z</math> – Linear fractional transformations (bilinear) - An Implicit form.            Chapter 2- Sections: 13, 14 Chapter 8- Sections: 90-94</p>				
<b>Contents and treatment as in</b>		James Ward Brown and Ruel V. Churchill, Complex variables and application, 8/e, Mc-Graw Hill Book Company. (2019)				

<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Dennis G. Zill, Patrick D. Shanahan, Complex Analysis, 3/e Jones &amp; Bartlett Learning.</li> <li>2. <a href="#">Murray R. Spiegel</a>, <a href="#">Seymour Lipschutz</a>, <a href="#">John J. Schiller</a>, <a href="#">Dennis Spellman</a> ,Schaum's outlines Complex Variables 2/e.</li> <li>3. S.Arumugam, A.Thangapandi Isaac, &amp; A.Somasundaram, Complex Analysis, New Scitech Publications (India) Pvt Ltd (Latest Edition)</li> <li>4. B.S. Tyagi, Functions of A Complex Variable Kedarnath &amp; Ramnath, Meerut (Latest Edition)</li> <li>5. A.R. Vasishtha,Complex Analysis Krishna Prakashan Media Pvt. Ltd (Latest Edition)</li> <li>6. J.N. Sharma, Functions of a Complex variable, Krishna Prakashan Media Pvt Ltd, (Latest Edition)</li> </ol>
<b>e-Resources:</b>	<ol style="list-style-type: none"> <li>1. <a href="http://ebooks.lpude.in/complexanalysis">http://ebooks.lpude.in/complexanalysis</a>.</li> <li>2. <a href="https://nptel.ac.in">https://nptel.ac.in</a>.</li> </ol>

**Course Outcomes: At the end of the Course, the Student will be able to**

<b>CO1</b>	Solve problems on analytic and harmonic functions.
<b>CO2</b>	Outline proof of the theorems on complex integration.
<b>CO3</b>	Express functions as Taylor's and Laurent's series.
<b>CO4</b>	Apply the concepts of residues to evaluate some real improper integrals.
<b>CO5</b>	Construct mappings of exponential function and $1/z$

**Mapping of Course Outcomes to Program Specific Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	3	2	1	-	-	3	2	3	1	2
<b>CO2</b>	1	2	2	-	-	2	1	2	3	3
<b>CO3</b>	3	1	2	-	-	1	2	3	2	2
<b>CO4</b>	2	3	1	-	-	2	2	1	2	1
<b>CO5</b>	3	2	2	-	-	1	1	2	1	3

**1 Low      2 – Medium      3 – High**

**Course Title: Core Paper – XV Operating Systems**

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<b>Course Code :</b>	<b>Credits</b>	<b>04</b>
<b>L:T:P:S :</b>	<b>CIA Marks</b>	<b>: 50</b>
<b>Exam Hours : 03</b>	<b>ESE Marks</b>	<b>: 50</b>

**Course Objective:**

- To state the services provided to the user and hardware by operating system.
- To learn the mechanisms of OS to handle processes and threads and their communication.
- To communicate with the process through system calls.
- To define deadlocks and identify its presence in the system.
- To design appropriate memory management scheme.
- To explore various techniques of allocating memory to processes.
- To discuss file system including access methods, file locking, and directory structures.
- To describe the details of implementing local file systems and directory structures
- To discuss the goals and principles of protection in a modern computer system.

**Course Outcomes: At the end of the course, students will be able to**

<b>CO1</b>	Describe the basic structure and functionality of operating system. Inter process communication.
<b>CO2</b>	Allocation of process through scheduling algorithms. Define critical section problems and its usage.
<b>CO3</b>	Prevention of multiple process execution through the concept of semaphores. Apply the deadlock handling mechanisms to solve the given problem. Understand various techniques of allocating memory to processes.
<b>CO4</b>	Understand the strategies of memory management schemes and the usage of virtual memory. Apply suitable page replacement algorithms to avoid thrashing. Understand the structure and organization of the file system
<b>CO5</b>	Understand the principles of protection and security mechanisms

**Mapping of Course Outcomes to Program Outcomes:**

	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PS O1</b>	<b>PS O2</b>	<b>PS O3</b>
<b>CO1</b>	2	2	2			2	2	2	2	2
<b>CO2</b>	2	3	2			1	2	1	2	2
<b>CO3</b>	2	2	1			2	2	2	3	2
<b>CO4</b>	1	2	2			2	3	3	2	3
<b>CO5</b>	3	2	3			2	2	2	2	2

3-Strong Correlation 2- Medium Correlation 1- Low Correlation

S.NO	CONTENTS OF MODULE	Hrs	COs
1.	<b>Unit 1</b> Introduction: Views-Types of system- OS Structure-Operations-Services-Interface- system calls -system structure-system design and implementation process management ;process -process scheduling-inter process communication. CPU scheduling; CPU schedulers-Scheduling criteria-scheduling algorithm	12	CO1
2.	<b>Unit 2</b> Process Synchronization: Critical-Section Problem Synchronization Hardware Semaphores-Classical Problems of Synchronization Monitors. Deadlocks: Characterization- Methods for Handling Deadlocks Deadlock Prevention- Avoidance-Detection-Recovery.	12	CO2
3.	<b>Unit 3</b> Memory Management: Hardware- Address Binding–Address Space Dynamic Loading and Linking– Swapping – Contiguous Allocation-Segmentation - Paging– Structure of the Page Table.	11	CO3
4.	<b>Unit 4</b> Virtual Memory Management: Demand Paging- Page Replacement Algorithms- Thrashing. File System: File Concept Access Methods-Directory and Disk Structure-Protection-File System Structures-Allocation Methods-Free Space Management.	15	CO4
5.	<b>Unit 5</b> I/O Systems: Overview- I/O Hardware- Application I/O Interface-Kernel I/O Subsystem-Transforming I/O Requests to Hardware Operations- Performance. System Protection: Goals-Domain-Access matrix. System Security: The Security Problem- Threats–Encryption- User Authentication.	10	CO5

**TEXT BOOK:**

Abraham Silberschatz, Peter B Galvin, Gerg Gagne, “*Operating System Concepts*”, Wiley India Pvt.Ltd. 2018, 9<sup>th</sup>Edition.

**Reference books:**

1. William Stallings, “*Operating Systems Internals and Design Principles*”, Pearson, 2018, 9<sup>th</sup> Edition.  
Andrew S. Tanenbaum, Herbert Bos, “*Modern Operating Systems*”, Pearson 2014, 4<sup>th</sup> Edition.

**Course Title: Elective Paper V: WEB DESIGN**

<b>Course Code:</b>	<b>Credits</b>	<b>03</b>
	<b>CIAMarks</b>	<b>:50</b>
<b>Exam Hours:03</b>	<b>ESEMarks</b>	<b>:50</b>

CO1	To Demonstrate Internet Basic concepts and Internet Domains To Study about Internet Server Identities To impart the concepts of Establishing Connectivity on the Internet.
CO2	To classify the HTML Tags. To impart Lists, Frames and Table To the Forms and Forms Elements.
CO3	To elaborate DHTML Style Sheets and Element of the Style. To impart Linking a style sheet to a html documents and Web page designing.
CO4	Representation of Java Script Data types, Control and Looping and Functions. To point out the knowledge about the Dialog Boxes.
CO5	Representation of JavaScript Document Object Model and Event Handling. To point out Form object, User Defined Object and Cookies.

**Mapping of Course Outcomes to Program Specific Outcomes:**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	2	3	2	3	3	2	3	2	3	3
<b>CO2</b>	3	3	2	3	2	3	3	3	2	3
<b>CO3</b>	3	3	3	3	3	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3	2	3	3	2	3

**3-Strong Correlation 2-Medium Correlation 1-Low Correlation**

S. NO	Contents of Module	Hrs	COs
1	Internet: Basic Concepts – Communicating on Internet – Internet Domains – Internet Server Identities – Establishing Connectivity on the Internet	10	CO1
2	Introduction to HTML -Anchor Tag – Hyperlink – Head and Body Section – Heading – Horizontal Ruler – Paragraphs–Tags–Images and Picture–Lists–Tables– Frames – Forms and forms elements.	10	CO2
3	DHTML and Style sheets – Defining styles- Elements of style – Linking a style sheet to a html documents-Inline style-External style sheets – Multiple styles – Webpage designing.	15	CO3
4	Introduction to Javascript – Advantage of JavaScript – Data type – Variable– Array -Operator and Expression – Control and looping Constructs – Functions – Dialog Boxes.	15	CO4
5	JavaScript Document Object Model – Event Handling - Form Object – Built in Object – User Defined Object Cookies.	10	CO5

**Text Books:**

1. Ivan Bayross, —Web Enabled Commercial Application Development using HTML, JavaScript, DHTML and PHP, Fourth Edition, BPB Publications, 2010

**References:**

1. Harvey M. Deitel, Paul J. Deitel, Tem R. Nieto, —Internet & World Wide Web – How to Program, Third Edition, Prentice Hall, 2002.

**E-References:**

[http://books.google.co.in/books?id=BrASwbtAGGUC&pg=PA69&source=gbs\\_selected\\_pages&cad=2#v=onepage&q&f=false](http://books.google.co.in/books?id=BrASwbtAGGUC&pg=PA69&source=gbs_selected_pages&cad=2#v=onepage&q&f=false)

## **Practical Paper V Web Design Lab**

**Course Code:**

**Credits - 2**

### **Course Objectives:**

*To apply the Java concepts through various applications and to develop a webpage.*

### Lab Exercises:

1. Program for HTML page to demonstrate the usage of List Tags.
2. Program for HTML page to demonstrate the usage of Table Tags.
3. Program for HTML page to demonstrate the usage of Frames.
4. Program to illustrate hyperlink using Mouse Over event.
5. Program to create a document which opens a new window without a toolbar, address bar or a status bar that unloads itself after one minute
6. Program using CSS.
7. Program using arrays.
8. Program using Operators and expressions.
9. Program using Functions and dialog boxes

**COURSES OFFERED TO OTHER  
DEPARTMENTS**



## FIRSTSEMESTER

### (SYLLABUS)

Course Title: Allied Mathematics-I

(For I year Students of B. Sc (Computer Science) and B. Sc (Physics with CA))

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Course Code : 2036106	Credits : 05
L:T:P:S : 5:0:0:0	CIA Marks : 40
Exam Hours : 03	ESE Marks : 60

#### LEARNING OBJECTIVES:

*On taking this course the student will be able to identify the various operations and properties of matrices, acquire knowledge of circular, hyperbolic, and inverse trigonometric functions. Obtain an insight into Laplace transform, and Inverse Laplace transforms.*

**Course Outcomes: At the end of the Course, the Student will be able to:**

CO1	Classify different types of matrices and their properties, using characteristic polynomial to find Eigen values & Eigen vectors, verify the square matrix satisfies its characteristic polynomial, compute inverse of the matrix using Cayley Hamilton theorem.
CO2	Use Demoiivre's theorem to expand $\sin n\theta$ and $\cos n\theta$ , express $\sin^n \theta$ , $\cos^n \theta$ in multiples of $\theta$ and also can express hyperbolic functions in terms of exponential functions and obtain hyperbolic identities, manipulate expressions involving hyperbolic functions.
CO3	Express inverse trigonometric functions in terms of logarithmic functions, Separate the real and imaginary parts of trigonometric functions of complex variables, evaluate integration using Bernoulli's formula and reduction formula and formulate Fourier series of a given periodic function by evaluating the Fourier coefficients.
CO4	Find partial derivatives of given function, classify maxima and minima of the function of two variables, calculate partial derivatives using Jacobian and Evaluate curvature & radius of curvature in Cartesian form.
CO5	Demonstrate about the Laplace transforms and inverse Laplace transforms of standard functions, solve second order differential equations using Laplace transform and inverse Laplace transform.

### Mapping of Course Outcomes to Program Outcomes:

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO 1	3	3	3	3	3	2	2	2	3	3	3	3	3
CO 2	3	3	2	3	3	2	2	2	3	3	3	3	3
CO 3	3	3	2	3	3	2	2	2	3	3	3	3	2
CO 4	3	3	3	3	3	3	2	2	3	3	3	3	2
CO 5	3	3	3	3	3	3	2	2	3	3	3	3	2

3-Strong Correlation    2- Medium Correlation    1- Low Correlation

S. No	CONTENTS OF MODULE	Hrs	COs
1	<b>MATRICES:</b> Symmetric, skew-symmetric, orthogonal and unitary matrices, eigen values and eigen-vectors (Diagonalization excluded), Cayley-Hamilton theorem (statement only)- verification of Cayley-Hamilton theorem- computation of inverse matrix using Cayley- Hamilton theorem.	15	CO 1
2	<b>TRIGONOMETRY:</b> Expansion of $\cos n\theta$ , $\sin n\theta$ (where n is a positive integer) – Expansion of $\cos^n \theta$ , $\sin^n \theta$ in a series of sines and cosines of multiples of $\theta$ , Hyperbolic functions- Relations between hyperbolic functions.	15	CO 2
3	<b>TRIGONOMETRY:</b> Inverse hyperbolic function $\sinh^{-1}x$ , $\cosh^{-1}x$ and $\tanh^{-1}x$ in terms of logarithmic functions separation into real and imaginary parts of $\sin(x+iy)$ , $\cos(x+iy)$ , and $\tan^{-1}(x+iy)$ , -simple problems. <b>INTEGRAL CALCULUS-</b> Bernoulli's formula, reduction formula - $\int_0^{\frac{\pi}{2}} \sin^n x dx$ $\int_0^{\frac{\pi}{2}} \cos^n x dx$ $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x dx$ (m,n being positive integer). <b>FOURIER SERIES</b> – Fourier series for functions in $(0, 2\pi)$	15	CO 3
4	<b>DIFFERENTIAL CALCULUS:</b> Jacobians, curvature and radius of curvature in Cartesian coordinates, maxima and minima of functions of two variables- Simple problems.	15	CO 4
5	<b>LAPLACE TRANSFORMS:</b> Laplace transforms of standard functions. Laplace transform of $e^{-at} f(t)$ , $tf(t)$ , $f(t)/t$ . Inverse Laplace transforms- Application to solution linear differential equations of second order with constant coefficients- simple problems.	15	CO 5

## TEXT BOOKS:

### Recommended Text books:

1. S.Narayanan, R.Hanumantha Rao, T.K.Manickavachagam Pillay, *Ancillary Mathematics Volume I*, S.Viswanathan Pvt., Ltd, Reprint.
2. S.Narayanan, R.Hanumantha Rao, T.K.Manickavachagam Pillay, *Ancillary Mathematics Volume II*, S.Viswanathan Pvt., Ltd, Reprint

<b>Unit I</b>	<b>Vol I</b>	<b>Chapter 3 -Pages 121-124; Pages 128-132; Pages 151-160</b>
<b>Unit II</b>	<b>Vol I</b>	<b>Chapter 5 - §5.1 ,5.2 Pages 220-232; §5.4 Pages 242-247</b>
<b>Unit III</b>	<b>Vol II</b>	<b>Chapter 5 - § 5.4 Pages 247-253</b> <b>Chapter 1 - § 13.3 Pages 75-82; §15 Pages 93-94</b> <b>Chapter 2 - § 1 to §5.5 pages 123-132</b>
<b>Unit IV</b>	<b>Vol I</b>	<b>Chapter 6 - § 6.2,6.4,6.5 Pages 282-285; 298-301; 318-325</b>
<b>Unit V</b>	<b>Vol II</b>	<b>Chapter 7 – Pages 289-311 (Omit solution of simultaneous differential equations)</b>

### Reference books:

1. P.Duraipandian, Dr.S.Udhayabhaskaran, *Allied mathematics Volume I* , Muhil publishers.
2. P.Duraipandian, Dr.S.Udhayabhaskaran, *Allied mathematics Volume II* , Muhil publishers.
3. P.Kandasamy, K.Thilagavathy, *Allied mathematics Volume I*, S.Chand& Company.
4. P.Kandasamy, K.Thilagavathy, *Allied mathematics Volume II*, S.Chand& Company.
5. Dr.S.P.Rajagopalan, Dr.R.Sattanathan, *Allied mathematics*, Tata McGraw hill publishers.

## SECOND SEMESTER

### (SYLLABUS)

**Course Title: Allied Mathematics-II**  
**(For I year Students of B. Sc Physics with CA)**

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<b>Course Code : 2036109</b>	<b>Credits : 05</b>
<b>L:T:P:S : 5:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

#### LEARNING OBJECTIVES:

*On taking this course the student will be able to understand the techniques to find the roots of polynomial equations, estimate the numerical value of a function from a given set of values by using appropriate methods, And also can attain the basic knowledge in partial differentiation vector differentiation, Vector integration and its applications.*

**Course Outcomes: At the end of the Course, the Student will be able to:**

<b>CO1</b>	Summarize the basic ideas about algebraic equations, determine the roots of polynomial equations, Identify the symmetric function and transform the polynomial equations by either increasing or decreasing the roots by a constant.
<b>CO2</b>	Estimate the intermediate value of a function whose table values are known at equal intervals by Newton's forward and backward interpolation method, find the missing term in the table of values using binomial expansion and compute the intermediate value for a function whose table values are unequal intervals.
<b>CO3</b>	Recall the concept of partial differentiation, explain the formation of Partial differential equation, classify the different type of solutions of PDE and enhance the problem-solving skills for any PDE and point out the method to be used for solving PDE.
<b>CO4</b>	Retrieve the idea of multiplication of vectors in two ways (dot and cross product) with its properties, interpret the derivative of a vector, manipulate differential operator to a vector in both dot and cross product and summarize the properties of differential operators when applied to vectors.
<b>CO5</b>	Recall the vector operators, apply critical thinking and problem solving skills to evaluate line, surface and volume integrals and relate the line, surface and volume integrals by Gauss, Stokes and Green's theorem.

### Mapping of Course Outcomes to Program Outcomes:

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO 1	3	3	3	3	3	3	3	2	3	3	3	3	3
CO 2	2	2	2	3	3	3	3	2	3	3	3	3	3
CO 3	3	3	2	3	3	3	2	2	3	3	2	2	2
CO 4	3	3	2	3	3	3	2	2	3	3	2	2	2
CO 5	3	3	3	3	3	3	2	2	3	3	3	3	2

3-Strong Correlation    2- Medium Correlation    1- Low Correlation

S.No	CONTENTS OF MODULE	Hrs	COs
1	<b>Theory of Equations:</b> Solving Polynomial equations with imaginary and irrational roots in A.P and G.P, Diminishing of roots, Reciprocal equations – simple problems.	12	CO 1
2	<b>Interpolation:</b> Newton’s forward and backward interpolation formula for equal intervals, Binomial method for missing terms with equal intervals, Lagrange’s interpolation formula.	12	CO 2
3	<b>Partial Differential Equations :</b> Formation , Complete integrals and general integrals , four standard types $f(p,q) = 0$ , $f(x,p,q) = 0$ , $f(y,p,q)=0$ , $f(z,p,q)=0, f(x,p) = f(y,q)$ ; Clairaut’s form and Lagrange’s equation $Pp + Qq = R$ .	12	CO 3
4	<b>Vector Differentiation:</b> Level Surfaces – the vector differential operator, gradient, divergence, curl, solenoidal and irrotational vectors.	12	CO 4
5	<b>Vector Integration:</b> Line, surface and volume integrals; Gauss, Stokes’s theorem (statement only)– Simple problems.	12	CO5

## TEXT BOOKS:

### Recommended Text Book:

- 1.S.Narayanan, R.Hanumantha Rao, T.K.ManicavachagamPiilai, *Ancillary Mathematics Volume I*, S.Viswanathan Pvt. Ltd, Reprint.
2. S.Narayanan, R.Hanumantha Rao, T.K.ManicavachagamPiilai, *Ancillary Mathematics Volume II*, S.Viswanathan Pvt. Ltd, Reprint

<b>Unit I</b>	<b>VolI Chapter 2 – Sections 2.1 to 2.4; pages 59 -83.</b>
<b>Unit II</b>	<b>VolI Chapter 4 - Sections 4.1 to 4.3; pages 183 – 214.</b>
<b>Unit III</b>	<b>Vol II Chapter 6 - Sections 1 to 3 pages 262 – 273</b>
<b>Unit IV</b>	<b>Vol II Chapter 8 -Sections 15 to 20 pages335 – 351</b>
<b>Unit V</b>	<b>Vol II Chapter 8 -Sections 1 to 2 pages 363 – 414</b>

**[\*Derivations are not included and only applications are to be expected from the students]**

### Reference Books:

1. P. Duraipandian, S.Udaybakaran, *Allied Mathematics Volumes I*, Muhil publishers.
2. P. Duraipandian, S.Udaybakaran, *Allied Mathematics Volumes II*, Muhil publishers.
3. P.Kandasamy, K.Thilagavathy, *Allied Mathematics Volumes I*, S.Chand& company.
4. P.Kandasamy, K.Thilagavathy, *Allied Mathematics Volumes II*, S.Chand& company.
5. Dr.S.P.Rajagopalan and Dr.R.Sattanathan, *Allied Mathematics*, Tata McGraw hill publishers.

## SECOND SEMESTER

### (SYLLABUS)

**Course Title: Allied Mathematics-II**  
**(For I year Students of B. Sc Computer Science)**

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<b>Course Code : 2036218</b>	<b>Credits : 05</b>
<b>L:T:P:S : 5:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

#### LEARNING OBJECTIVES:

*On taking this course the student will be able to know about various methods to find the roots of the polynomial equations and understand the numerical methods of solving non-linear equations, interpolation, Numerical differentiation and integration.*

**Course Outcomes: At the end of the Course, the Student will be able to:**

<b>CO1</b>	Explain the relation between roots and coefficients, solve the polynomial equations using imaginary and irrational roots, generate equation using reciprocal roots and use diminishing of roots to transform an equation.
<b>CO2</b>	Define least square method, examine the best fit for a line or curve and explain about interpolating the data. Calculate the dependent variable $f(x)$ at any point of $x$ and solve problems using the interpolation methods for equal intervals.
<b>CO3</b>	Discuss about the concept of divided difference, solve the problems with unequal intervals and interpolate the value, and use inverse interpolation to find the independent variable $x$ for given values of $f(x)$ .
<b>CO4</b>	Use numerical differentiation to find the value of derivative of a function, discuss the various methods of numerical integration and estimate the given function in an interval.
<b>CO5</b>	Define algebraic and transcendental equations, explain about iteration method and use various methods of solving algebraic and transcendental equations.

### Mapping of Course Outcomes to Program Outcomes:

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO 1	3	3	3	3	3	2	2	2	3	3	2	3	2
CO 2	3	3	2	3	3	2	2	2	3	3	2	3	2
CO 3	2	3	2	3	3	2	2	2	3	3	3	3	3
CO 4	2	3	3	3	3	2	2	2	3	3	3	3	3
CO 5	3	2	3	3	3	2	2	2	3	3	3	3	3

3-Strong Correlation    2- Medium Correlation    1- Low Correlation

S.No	CONTENTS OF MODULE	Hrs	COs
1	<b>Theory of equations:</b> Relation between the roots and the coefficients of $f(x)=0$ , Solving polynomial equations with imaginary and irrational roots – To form equations whose roots are reciprocals-Reciprocal equations, Diminishing of roots – simple problems	12	CO1
2	<b>Curve Fitting:</b> By least squares method only – Fitting of straight line and parabolic curve <b>Interpolation:</b> Newton's forward and backward interpolation formula, Stirling's central difference formula	12	CO2
3	<b>Interpolation with unequal intervals:</b> Divided differences, Newton's divided difference formula for interpolation and Lagrange's formula for interpolation, Inverse interpolation using Lagrange's method	12	CO3
4	<b>Numerical differentiation:</b> Derivatives using Newton's forward and backward difference formulae, Stirling's formula and Divided difference formula (Maxima and minima not included) <b>Numerical integration:</b> Trapezoidal formula, Simpson's one-third rule and three eighth rule (Romberg's method and applications are not included)	12	CO4
5	<b>Solutions of Algebraic and Transcendental Equations:</b> Bisection method, Iteration method, Regular falsi method, Newton Raphson method (Convergence and rate of convergence not included) and Horner's method	12	CO5



**TEXT BOOKS:****Recommended Text book:**

M.K.Venkatraman, *Numerical methods in Science and Engineering*. The National publishing company, Fifth edition, 1999.

<b>Unit I</b>	<b>Chapter II - § 1 to §4; § 7 to §10 Pages 53-63,69-80</b>
<b>Unit II</b>	<b>Chapter I - § 1.7 and §1.8</b> <b>Chapter VI - § 1 to § 5</b> <b>Chapter VII - § 5 Pages 26-30,34-39,193-208,225-226</b>
<b>Unit III</b>	<b>Chapter VIII - § 1 to § 5 Pages 244-263</b>
<b>Unit IV</b>	<b>Chapter IX - § 1 to § 4 (Omit maxima and minima) § 8 to § 11 Pages 265-278, 281-293</b>
<b>Unit V</b>	<b>Chapter III - § 1 to § 6 Pages 81-112</b>

**Reference books:**

1. P.Kandasamy, K.Thilagavathy&K.Gunavathy, *Numerical methods*, S.Chand& Company.
2. S.Arumugam, A.Thangapandi Isaac &A.Somasundaram, *Numerical methods*, Scitech publications.
3. T.Veerarajan and T.Ramachandran, *Numerical methods with programming in C*, Tata McGraw hill publishers.

**FIRST SEMESTER  
(SYLLABUS)**

**Course Title: Mathematical Foundations  
(For I year students of BCA)**

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<b>Course Code : 2036107</b>	<b>Credits : 05</b>
<b>L:T:P:S :5:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

**LEARNING OBJECTIVES:**

*On taking this course the student will be able to obtain problem solving skills in matrices and its application, gain logical thinking and use of appropriate methods to solve the problems, To think analytically and have better reasoning abilities, To apply the logic theory to practical situation To analyze the statement using truth table. To apply the concept of derivatives and integrals.*

**Course Outcomes: At the end of the Course, the Student will be able to**

<b>CO1</b>	Retrieve the concept of matrix and perceive the idea of finding inverse by using Cayley - Hamilton theorem. Solving linear equations by using matrix method and determinant method.(Cramer's Rule)
<b>CO2</b>	Define Proposition Summarize the concept of types of proposition, negation, disjunction, Conjunction, conditional, by conditional. Prepare tautologies and contradictions. Explain logical equivalence Summarize converse, inverse and contra positive propositions, arguments and validity of arguments.
<b>CO3</b>	Attaining the knowledge of finding operations on sets and Cartesian product of sets. Prepare a Venn-diagram Identify number of elements of sets Summarize the concepts of domain, range, Equivalence relations, partially and totally ordered sets List types of functions and Composition of function.
<b>CO4</b>	Recall the concept of derivatives of simple function using sum, product, quotient rules, function of function rule, logarithmic differentiation, Implicit of functions, Parametric differentiation. Solve problems on successive differentiation.
<b>CO5</b>	Identify the rules of integration. Discover integration by substitution method, integration by parts, and Bernoulli's formula.

### Mapping of Course Outcomes to Program Outcomes:

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO 1	3	3	2	2	3	2	2	2	3	3	3	3	2
CO 2	3	3	3	3	3	2	2	2	3	3	3	3	2
CO 3	3	2	3	3	3	2	3	2	3	3	3	3	2
CO 4	2	3	3	3	3	2	2	3	3	3	3	3	2
CO 5	3	3	3	3	3	2	2	2	3	3	3	3	2

3-Strong Correlation    2- Medium Correlation    1- Low Correlation

S. No.	CONTENTS OF MODULE	Hrs	COs
1	<b>Matrices:</b> Introduction – Basic properties – Symmetric, Skew Symmetric-Hermitian, Skew Hermitian – Orthogonal – Unitary Matrices, Inverse of a Matrix- Rank of Matrix – Solving system of linear equations by Matrix method – Determinants – Properties- Cramer rule.	12	CO1
2	<b>Mathematical logic:</b> Proposition- Definition – Types of propositions – Negation – Disjunction – Conjunction – Conditional – Bi-condition – Tautologies and contradictions – Logical equivalence – algebra of propositions – converse, inverse and contra positive proposition – arguments and validity of arguments.	12	CO2
3	<b>Sets:</b> Operation on sets, Venn diagram, number of elements in a set, Cartesian product. <b>Relations:</b> Domain and range of a relation, Equivalence relation, partially and totally ordered sets – simple problems. <b>Functions</b> – Types of functions, composition of functions – simple problems.(Theorems excluded).	12	CO3
4	<b>Differentiation</b> – derivatives of simple functions using sum, product, quotient rules – Functions of function rule – logarithmic differentiation – Differentiation of implicit function – parametric differentiation – successive differentiation (upto third derivative) – simple problems	12	CO4
5	<b>Integration</b> – Rules of Integration – Integration by substitution (using algebraic functions) – Integration by parts – Bernoulli's formula.	12	CO5

#### TEXT BOOKS:

##### Recommended Text Book:

1. P. R. Vittal: *Mathematical foundations.*, Margham publication–

##### Reference Books:

1. M. K. Venkataramanan: *Discrete Mathematics*, National Publishing company.
2. M. K. Venkataramanan: *Engineering Mathematics*, National Publishing company.

**SECOND SEMESTER  
(SYLLABUS)**

**Course Title: STATISTICAL METHODS  
(For I year students of BCA)**

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<b>Course Code : 2036216</b>	<b>Credits : 05</b>
<b>L:T:P:S :5:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

**LEARNING OBJECTIVES:**

*On taking this course the student will be able to obtain problem solving skills in Measures of central tendency, gain logical thinking and use of appropriate methods to solve the problems, To demonstrate knowledge on applications of statistics in business operations. Experience the use of statistical tools to make scientific decisions in uncertain business environment. To develop computational skills needed in competitive examinations.*

**Course Outcomes: At the end of the Course, the Student will be able to**

<b>CO1</b>	Retrieve the concept of Arithmetic mean, median, mode geometric mean and harmonic mean combined mean, weighted mean-Simple problems.
<b>CO2</b>	Determine the Range, Quartile deviation, mean deviation, standard deviation, combined standard deviation, coefficient variation. Measures of skewness :Karl Pearson's, Bowley's coefficient of skewness. Simple problems.
<b>CO3</b>	Attaining the knowledge of finding Karl Pearson, Spearman's rank correlation method and Lines of regression.
<b>CO4</b>	Recall the concept of ProbabilitySample space-Events-probability-Addition and multiplication theorem and Conditional probability. Application of Baye's theorem. Solving problems using Baye's Theorem
<b>CO5</b>	Identify the Time series and Meaning of time series , definitions and uses Components of time series and Methods of measuring trends.

### Mapping of Course Outcomes to Program Outcomes:

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO 1	3	2	3	3	3	2	2	2	3	3	3	3	2
CO 2	3	3	3	2	3	2	2	2	3	3	3	3	2
CO 3	2	3	3	3	3	2	2	2	3	3	3	3	2
CO 4	3	3	3	3	3	2	2	2	3	3	3	3	2
CO 5	3	3	2	3	3	2	2	2	3	3	3	3	2

3-Strong Correlation    2- Medium Correlation    1- Low Correlation

S. No.	CONTENTS OF MODULE	Hrs	COs
1	<b>Measures of central tendency:</b> Arithmetic mean, median, mode geometric mean and harmonic mean combined mean, weighted mean-Simple problems.	12	CO1
2	<b>Measures of dispersion:</b> Range, Quartile deviation, mean deviation, standard deviation, combined standard deviation, coefficient variation. Measures of skewness :Karl Pearson's, Bowley's coefficient of skewness.Simple problems.	12	CO2
3	<b>Correlation:</b> Karl Pearson,spearman's rank correlation method. <b>Regression:</b> Lines of regression.	12	CO3
4	<b>Probability:</b> Sample space-Events-probability-Addition and multiplication theorem-Conditional probability-Baye'stheorem(statement only)-Simple problems.	12	CO4
5	<b>Time series</b> -Meaning –definitions-uses-Components of time series – Methods of measuring trends.	12	CO5

#### TEXT BOOKS:

##### Recommended Text Book:

Dr.S.P.Rajagopalan, R.Sattanathan,*Business statistics and Operations Research*TATAMcgraw Hill

##### Reference Books:

Dr.P.R.Vittal, *Business Statistics*, Margham Publishers.

**FIRST SEMESTER  
(SYLLABUS)**

**Course Title: Business Mathematics - I  
(For I year students of B.Com. (A&F))**

<b>Course Code : 2036106</b>	<b>Credits : 05</b>
<b>L: T:P:S : 5:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

**LEARNING OBJECTIVES:**

*On taking this course the student will be able to attain solid foundation for preparing to Competitive exams, Acquire skills in calculating specific business mathematics applications such as checking accounts, payroll, taxes, invoices, cash discounts, trade discounts, inventories, simple and compound interest, annuities, depreciations, and financial statements.*

**Course Outcomes: At the end of the Course, the Student will be able to:**

<b>CO1</b>	Restate the definition of sets. Differentiate the elements and sets. Demonstrate relation and functions of sets.
<b>CO2</b>	Define the term ratio. Demonstrate the importance of proportions. Solve the problems on ratios, proportion and variance.
<b>CO3</b>	Distinguish between permutation and combination. Solve the problems on binomial theorem. Summarize the concepts of exponential and logarithmic series.
<b>CO4</b>	Define the term interest. Explain the difference between Simple interest and Compound interest. Calculate the future and present values of Annuities. Point out the important term of banker's discount.
<b>CO5</b>	Distinguish between H.C.F & L.C.M of numbers. Demonstrate the importance of Average and Percentage. Solve real-life problems based on time & work.

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
<b>CO 1</b>	2	1	1	1	3	3	3	3	3	3	2	3	2
<b>CO 2</b>	2	2	1	1	2	3	3	3	1	3	3	3	3
<b>CO 3</b>	2	2	1	1	2	3	3	3	1	1	2	2	2
<b>CO 4</b>	2	2	2	2	3	3	3	3	1	1	2	3	3
<b>CO 5</b>	3	3	3	3	3	3	3	3	3	3	3	3	3

3-Strong Correlation    2- Medium Correlation    1- Low Correlation

S.No	CONTENTS OF MODULE	Hrs	COs
1	<b>Set theory:</b> Definition, Elements and types of sets, Operations on sets, Relations and functions of sets.	12	CO1
2	<b>Algebra:</b> Ratio, proportion and variance	12	CO2
3	<b>Permutation and combination:</b> permutation and combination, binomial theorem, exponential and logarithmic series.	12	CO3
4	<b>Interest and annuity:</b> Simple interest, Compound interest and Annuities-Discount on bills-Payroll-Wages-commission.	12	CO4
5	<b>Quantitative Aptitude:</b> Operations on Numbers-H.C.F. & L.C.M. of Numbers- Average-Percentage - Time & Work - Time & Distance-Odd Man Out & Series.	12	CO5

### TEXT BOOKS:

#### Recommended Text Book:

- Dr. P. R. Vittal,(2017), *Business Mathematics*, Margham Publications

Module	CHAPTERS
I	Chapter 1
II	Chapters 2,3
III	Chapters 8,9,10
IV	Chapters 17,18,19,21

- Dr. R. S. Aggarwal (2017), *Quantitative aptitude*, S. Chand & Company limited. Revised Edition

Module	CHAPTERS
V	Section 1 1,2,6,10,15,17,35

### Reference Books:

- Dr. S. P. Rajagopalan, Dr. R. Sattanathan (2014), *Business Mathematics*, Vijay Nicole Imprints private limited.
- D. C. Sancheti, V. K. Kapoor (2014), *Business Mathematics*, Sulthan Chand & Sons.

## SECOND SEMESTER

### (SYLLABUS)

**Course Title: Business Mathematics II**  
**(For I year students of B.Com. (A & F))**

<b>Course Code : 2036215</b>	<b>Credits : 05</b>
<b>L:T:P:S : 5:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

#### Course objectives:

*On taking this Course, the student will be able to develop the Analytical reasoning skills and attain proficiency in problem solving and quantitative aptitude. To understand the plane analytical geometry concepts, to demonstrate the applications of co-ordinate system, to prepare business mathematics model for any given real life situation through survey.*

#### Course Outcomes: At the end of the Course, the Student will be able to

<b>CO1</b>	Restate the definition of plane analytical geometry. Demonstrate the Cartesian co-ordinate system. Demonstrate gradient of straight line.
<b>CO2</b>	Distinguish between arithmetic mean and geometric mean. Solve the problem on arithmetic mean and harmonic mean.
<b>CO3</b>	Define the term interpolation. Explain the concept of binomial method. Judge and classify the concepts of Newton and Lagrange interpolation method).
<b>CO4</b>	Define the term matrix. Point out the important term of matrix inversion, solution to linear equation.
<b>CO5</b>	Understand the difference between rational and irrational numbers and perform operations with Surds and Indices. Calculate the profit and loss of a real-life problem. Find the ratio between two or more ingredients at their respective prices

#### Mapping of Course Outcomes to Program Outcomes:

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
<b>CO 1</b>	3	3	3	3	2	3	3	3	3	3	3	3	2
<b>CO 2</b>	3	3	3	3	3	3	2	3	3	3	3	2	2
<b>CO 3</b>	3	3	3	2	3	3	3	3	3	3	3	3	3
<b>CO 4</b>	3	3	3	3	3	2	3	3	3	3	3	3	2
<b>CO 5</b>	3	3	3	2	3	3	2	3	3	3	3	3	3



S. No.	CONTENTS OF MODULE	Hrs	COs
1	<b>Set theory :Plane analytical geometry</b> –Cartesian co-ordinate system, length of a line segment, section formula(ratio)-gradient of a straight line, equation of a straight line.	12	CO1
2	<b>Algebra</b> :Arithmetic, geometric and harmonic progressions.	12	CO2
3	<b>Interpolation:</b> Binomial, Newton and Lagrange’s method .	12	CO3
4	<b>Matrices:</b> Matrices- Meaning and operations, matrix inversion, solution to linear equation-payroll wages and commission.	12	CO4
5	<b>Quantitate Aptitude:</b> Surds & Indices-Profit&Loss-Pipes & Cistern-Alligation or Mixture-Calendar-Clocks.	12	CO5

### TEXT BOOKS:

#### Recommended Text Book:

1. Dr.P.R. Vittal,*Business Mathematics*, Margham Publications.

Module	CHAPTERS
I	Chapter 12
II	Chapters 7
III	Chapters 22
IV	Chapters 14

2. Dr. R. S. Aggarwal, (2017) *Quantitative Aptitude*, S. Chand & Company Ltd., (Revised edition)

Module	CHAPTERS
V	Section 1 9,11,16,20,27 and28

#### Reference Books:

1. Dr.S. P. Rajagopalan, Dr. R. Sattanathan, *Business Mathematics*, Vijay Nichole Imprints private limited.
2. D. .C. Sanchetti, V.K. Kapoor(2014), *Business Mathematics*, Sultan Chand & Sons.

## THIRD SEMESTER

### (SYLLABUS)

**Course Title: Business Statistics and Operations Research – I**  
**For II year Students of B.Com, (General) & B.Com, (A/F)**

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<b>Course Code : 2036327</b>	<b>Credits : 05</b>
<b>L:T:P:S : 5:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

#### LEARNING OBJECTIVES:

*On taking this course the student will be able to demonstrate knowledge of the statistical distributions. Demonstrate knowledge on applications of statistics in business operations. Compute and interpret correlation and regression analysis. Demonstrate the knowledge of applying linear programming to solve real life applications. Represent a real time problem using Network Diagram and find its critical path*

**Course Outcomes: At the end of the Course, the Student will be able to:**

<b>CO1</b>	Explain about classification and tabulation of statistical data. Plot the diagrammatic and graphical representation of data
<b>CO2</b>	Explain about central tendency and calculate various measures. Explain how mean, median, mode are related in symmetric and skew symmetric distributions. Explain about dispersion and calculate various measures. Estimate the coefficient of variation using standard deviation. Investigate the uniformity or consistency of a data using coefficient of variation. Interpret the concept of skewness and methods to calculate its coefficient
<b>CO3</b>	Define correlation and its types. Calculate and interpret correlation between two variables. Apply regression equations to estimate the values of unknown variable using the given data. Rank the given data and examine the rank correlation
<b>CO4</b>	Define the nature and features of operations research. Explain the term various terms in LPP. Formulate and model a linear programming problem. Solve an LPP using graphical and simplex method. Identify a feasible solution and optimal solution using simplex method
<b>CO5</b>	Explain basic components of network analysis and critical path. Define CPM and PERT. Construct the network using CPM and PERT techniques to plan, schedule and control project activities

### Mapping of Course Outcomes to Program Outcomes:

CO/PO/PSO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO 1	2	3	3	3	3	3	2	3	3	3	3	2
CO 2	2	3	3	3	3	3	2	3	3	3	3	2
CO 3	2	3	3	3	3	3	2	3	3	3	3	2
CO 4	2	3	3	3	3	3	2	3	3	3	3	2
CO 5	2	3	3	3	3	3	2	3	3	3	3	2

3-Strong Correlation    2- Medium Correlation    1- Low Correlation

S.No	CONTENTS OF MODULE	Hrs	COs
1	Introduction – Classification and Tabulation of statistical data – Diagrammatic and graphical representation of data	12	CO1
2	Measures of central tendency : Arithmetic mean ,median, mode Measures of dispersion : Range , Quartile deviation, Mean deviation, Standard deviation , Measures of Skewness – simple problems	12	CO2
3	Correlation: Karl Pearson's coefficient of correlation, Spearman's rank correlation, Regression Lines and Coefficients.	12	CO3
4	Introduction to OR – Linear Programming Formulation _ Graphical and Simplex method to solve LPP with all constraints less than or equal to type only (simple problems)	12	CO4
5	Network Analysis – PERT and CPM(no crashing)	12	CO5

#### TEXT BOOKS:

##### Recommended Text Book:

1. Dr. P.R.Vittal, *Business Statistics and Operations Research*, Margham publications
2. Dr. S.P. Rajagopalan & Dr. R. Sattanathan. *Business Statistics and Operations Research* Tata McGraw Hill Publications
3. S.P. Gupta: *Statistical Methods*, Sultan 2000.

##### Reference Books:

1. Dr.S.P.Gupta, *Statistical Methods*, S.Chand
2. Gupta and Hira, *Operations Research*, S.Chand.
3. Handy and A.Taha, *Operations Research*, Macmillan Publishers

## FOURTH SEMESTER

### (SYLLABUS)

**Course Title: Business Statistics and Operations Research – II**  
**For II year Students of B.Com, (General) & B.Com, (A/F)**

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<b>Course Code : 2036435</b>	<b>Credits : 05</b>
<b>L:T:P:S : 5:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

### LEARNING OBJECTIVES:

*On taking this course the student will be able to demonstrate knowledge on applications of statistics in business operations. Experience the use of statistical tools to make scientific decisions in*

S. No	CONTENTS OF MODULE	Hrs.	COS
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*uncertain business environment. To solve the real time industrial problems using transportation model and Assignment model. Find the optimum allocation of number of jobs to equal number of facilities.*

**Course Outcomes: At the end of the Course, the Student will be able to**

<b>CO1</b>	Explain the term time series Classify the various components of time series Analyze the seasonal and cyclical pattern in series of time.
<b>CO2</b>	Interpret indices to identify trends in a data set. Construct simple and weighted price, quantity and value indices. Use the consumer price index to determine the purchasing power
<b>CO3</b>	Explain basic probability axioms and rules. Calculate probabilities by using addition and multiplication law, with the terms independent and mutually exclusive events. Apply Baye's Theorem to solve real world events
<b>CO4</b>	Explain the Transportation problem and formulate it as LPP and solve the problem Determine that an assignment problem is a special case of LPP and evaluate using Hungarian Method
<b>CO5</b>	Define various terms and rules used in the Theory of Games. Identify strategic situations and represent them as games. Compute general solution of $m \times n$ rectangular games. Demonstrate graphical solution for $m \times 2$ and $2 \times n$ games

1	Time series analysis – Trend – Seasonal Variation – Cyclical Variation	12	CO1
2	Index numbers – Aggregate and Relative index – Chain and Fixed index - Wholesale index- Cost of living index	12	CO2
3	Probability – Addition and Multiplication theorem – Conditional probability – Baye’s Theorem (without proof) – Simple problems	12	CO3
4	Assignment and Transportation problem	12	CO4
5	Game theory – Games with saddle – Dominance – Graphical Method	12	CO5

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO/PSO	PO								PSO			
	1	2	3	4	5	6	7	8	1	2	3	4
CO 1	2	3	3	3	3	3	2	3	3	3	3	2
CO 2	2	3	3	3	3	3	2	3	3	3	3	2
CO 3	2	3	3	3	3	3	2	3	3	3	3	2
CO 4	2	3	3	3	3	3	2	3	3	3	3	2
CO 5	2	3	3	3	3	3	2	3	3	3	3	2

3-Strong Correlation    2- Medium Correlation    1- Low Correlation

**TEXT BOOKS:**

**Recommended Text Book:**

1. Dr. P.R.Vittal, *Business Statistics and Operations Research*, Margham publications
2. Dr.S.P.Rajagopalan ,R.Sattanathan, *Business Statistics & Operations Research*, Margham Publications.

**Reference Books**

1. Dr.S.P.Gupta, *Statistical Methods*, S.Chand
2. Gupta and Hira, *Operations Research*, S.Chand.
3. Handy and A.Taha, *Operations Research*, Macmillan Publishers

## THIRD SEMESTER

### (SYLLABUS)

**Course Title: Business Mathematics**  
**(For II year students of BBA)**

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<b>Course Code : 2036326</b>	<b>Credits : 05</b>
<b>L:T:P:S : 5:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

#### LEARNING OBJECTIVES:

*On taking this Course, the student will be able to develop the Analytical reasoning skills and attain proficiency in problem solving. To understand the plane analytical geometry concepts, to demonstrate the applications of co-ordinate system, To summarize the arithmetic progression, Geometric progression and Harmonic progression with illustrations. To discuss the applications of differential calculus, matrices and interest calculation on real time situations through secondary data*

**Course Outcomes: At the end of the Course, the Student will be able to:**

<b>CO1</b>	Summarize the concept of Arithmetic progression- nth term of an AP, sum to n terms of an AP, Geometric progression- nth term of a GP, sum to n terms of GP
<b>CO2</b>	Summarize the concept of straight line-length of line segment, section formula, gradient of slope of line, various forms of equation of straight line-simple problems
<b>CO3</b>	Summarize the concept of Differentiation- product rule, quotient rule, applications- Average cost, Marginal cost, Marginal revenue, elasticity, maxima and minima, point of inflection
<b>CO4</b>	Summarize the concept of matrices, addition, subtraction, multiplication of matrices, transpose, matrix inversion and solution to system of linear equation
<b>CO5</b>	Summarize the concept of simple interest and compound interest, Annuities-amount of annuity, freehold estate and leasehold estate, sinking fund, Amortization, Discount.

### Mapping of Course Outcomes to Program Outcomes:

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO 1	3	3	3	3	3	2	2	2	3	3	3	3	2
CO 2	3	3	3	3	3	2	2	2	3	3	3	2	2
CO 3	3	3	3	3	3	2	2	2	3	3	3	3	2
CO 4	3	3	3	3	3	2	2	2	3	3	3	2	2
CO 5	3	3	3	3	3	2	2	2	3	3	3	3	2

3-Strong Correlation    2- Medium Correlation    1- Low Correlation

S.No	CONTENTS OF MODULE	Hrs	COS
1	<b>Progression</b> –.Arithmetic progression- nth term of an AP, sum to n terms of an AP, Geometric progression- nth term of a GP, sum to n terms of GP	12	CO1
2	<b>Plane analytical geometry:</b> straight line-length of line segment, section formula, gradient of slope of line, various forms of equation of straight line-simple problems	12	CO2
3	<b>Differential calculus:</b> Differentiation- product rule, quotient rule, applications- Average cost, Marginal cost, Marginal revenue, elasticity, maxima and minima, point of inflection	12	CO3
4	<b>Matrices:</b> addition, subtraction, multiplication of matrices, transpose, matrix inversion and solution to system of linear equation	12	CO4
5	<b>Mathematics of finance</b> simple interest and compound interest, Annuities- amount of annuity, freehold estate and leasehold estate, sinking fund, Amortization, Discount	12	CO5

#### Recommended Text Book:

P.R.Vittal, *Business Mathematics*, Margham Publications, Chennai.

Chapter 1	Chapter 7 (Pages 118-172)
Chapter 2	Chapter 12(upto equations of straight lines)
Chapter 3	Chapter 13 (Pages 434 - 534)
Chapter 4	Chapter 14
Chapter 5	Chapter 17, Chapter 18, Chapter 19, Chapter 11

#### Reference Book:

Dr.S.P.Rajagopalan, *Business Mathematics*, Tata Mcgrawhill, Chennai.

## FOURTH SEMESTER

### (SYLLABUS)

**Course Title: Operations Research  
(For II year students of BBA)**

<b>Course Code : 2036434</b>	<b>Credits : 05</b>
<b>L:T:P:S : 5:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

#### LEARNING OBJECTIVES:

*On taking this course the student will be able to apply quantitative methods and techniques for effective decision making. Demonstrate the knowledge of applying linear programming to solve real life applications. To prepare a network for a given project and identify the critical path of the project*

**Course Outcomes: At the end of the Course, the Student will be able to**

<b>CO1</b>	List the concepts and scope of Operations Research, Formulate general mathematical model of Linear Programming problem. Solve the LPP of graphical method
<b>CO2</b>	Summarize the transportation model. Compute initial basic feasible solution under the methods of northwest corner rule, row minima, column minima, least cost method and Vogel's approximation method. Solve the transportation model using Vogel's approximation method.
<b>CO3</b>	Distinguish the assignment problem of types balanced and unbalanced problem and also minimization and maximization problems. Solve assignment problem under Hungarian method Summarize the sequencing problem of processing of n jobs through m machines.
<b>CO4</b>	Judge the network problems. Produce the optimal solution by Critical Path Method and PERT computations
<b>CO5</b>	Define the game theory problems. Solve the problems based on pure and mixed strategies, dominance method and graphical method.

#### Mapping of Course Outcomes to Program Outcomes:

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
<b>CO 1</b>	3	3	3	3	3	3	3	2	3	3	3	3	3
<b>CO 2</b>	3	3	3	3	3	3	3	2	3	3	3	3	3
<b>CO 3</b>	3	3	3	3	3	3	3	2	3	3	3	3	3
<b>CO 4</b>	3	3	3	3	3	3	3	2	3	3	3	3	3
<b>CO 5</b>	3	3	3	3	3	3	3	2	3	3	3	3	3

3-Strong Correlation    2- Medium Correlation    1- Low Correlation



S.No	CONTENTS OF MODULE	Hrs	COS
1	<b>Linear Programming problem-</b> Concept and scope of OR, general mathematical model of LPP, steps of LP model formulation, graphical method of the solution of LPP-Simple problems	12	CO1
2	<b>Transportation Problem-</b> Basic definitions, formulation of transportation problem as LPP, Finding initial basic feasible solution-North west corner rule, the row minima, column minima, least cost method and Vogel's approximation methods-optimum solution	12	CO2
3	<b>Assignment problem-</b> Hungarian method – Minimization and maximization-unbalanced assignment problem <b>Sequencing problem:</b> Processing of n jobs through 2 machines-Processing of n jobs through 3 machines-Processing each of n jobs through m machines	12	CO3
4	PERT and CPM-difference between PERT and CPM- constructing Network-Critical Path, various floats-PERT computations.	12	CO4
5	Game theory- Maximin-minmax criterion, saddle point, dominance property, graphical method for solving 2xn and mx2 game	12	CO5

**Recommended Text Book:**

P.R.Vittal& Malini, *Operations Research*, Margham Publications.2007

<b>Chapter 1</b>	<b>Chapter 2 &amp; Chapter 3</b>
<b>Chapter 2</b>	<b>Chapter 10</b>
<b>Chapter 3</b>	<b>Chapter 11 &amp; Chapter12</b>
<b>Chapter 4</b>	<b>Chapter 14</b>
<b>Chapter 5</b>	<b>Chapter 15</b>

**REFERENCE BOOKS:**

1. Sundaresan, Ganapathy Subramanian, Ganesan, *Resource Management Technique*, A.R. Publications.
2. P. K. Gupta and Manmohan, *Operations Research*, S. Chand & Company

## FIRST SEMESTER

### (SYLLABUS)

**Course Title: Business Statistics**  
**(For I year students of BBM)**

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<b>Course Code : 2036108</b>	<b>Credits : 05</b>
<b>L:T:P:S : 5:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

#### LEARNING OBJECTIVES:

*On taking this Course, the student will be able to develop comprehensive understanding of statistical distributions. the ability to perform data analysis. Demonstrate knowledge on applications of statistics in business operations. Compute and interpret correlation and regression analysis.*

**Course Outcomes: At the end of the Course, the Student will be able to:**

<b>CO1</b>	Summarize the concept of mean, median and mode and able to solve problems in mean. median and mode .
<b>CO2</b>	Summarize the concept of mean deviation, standard deviation, quartile deviation and range and able to solve problem in mean deviation, standard deviation, quartile deviation and range
<b>CO3</b>	Summarize the concept of karlpearsons coefficient of skewness- Bowleys coefficient of skewness and kurtosis and able to solve simple problem in karlpearsons coefficient of skewness- Bowleyscoefficient of skewness and kurtosis
<b>CO4</b>	Summarize the concept of karlpearsons coefficient of correlation, spearman's rank, correlation coefficient, regression analysis and regression equations and able to solve the problem in Karlpearsons coefficient of correlation, Spearman's rank, correlation coefficient, regression analysis and regression equations
<b>CO5</b>	Summarize the concept of index numbers- methods of constructing index numbers -Laspeyres method, paasches method, fishers method, bowleys method, Marshalledge-worth method, unit test-time reversal test and factor reversal test and able to solve problem in Laspeyres method, Paasches method, fishers method, bowleys method, marshalledgeworth method, unit test-time reversal test and factor revarsal test

### Mapping of Course Outcomes to Program Outcomes:

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO 1	3	3	3	3	3	2	2	2	3	3	3	3	2
CO 2	3	3	3	3	3	2	2	2	3	3	3	3	2
CO 3	3	3	3	3	3	2	2	2	3	3	3	3	2
CO 4	3	3	3	3	3	2	2	2	3	3	3	3	2
CO 5	3	3	3	3	3	2	2	2	3	3	3	3	2

3-Strong Correlation    2- Medium Correlation    1- Low Correlation

S.No	CONTENTS OF MODULE	Hrs	COs
1	<b>Measures of averages.</b> –Arithmetic mean-Weighted mean-Combined mean-Median -.Mode- Geometric mean- Harmonic mean- Simple problems.	12	CO1
2	<b>Mesures of dispersions.</b> -Range –quartile deviation- mean deviation- standard deviation combined standard deviation-coefficient of variation-simple problems.	12	CO2
3	<b>Skewness</b> karlpearsons coefficient of skewness- Bowleys coefficient of skewness and kurtosis-simple problems	12	CO3
4	karlpearsons coefficient of correlation, spearman's rank, correlation coefficient, regression analysis and regression equations-simple problems.	12	CO4
5	<b>Index numbers</b> - methods of constructing index numbers -Laspeyres method, paasches method, fishers method, bowleys method, marshalledgeworth method, unit test-time reversal test and factor reversal test	12	CO5

### TEXT BOOKS:

#### Recommended Text Book:

1. Dr. P.R.Vittal, *Business Statistics and Operations Research*, Margham publications
2. Dr. S.P. Rajagopalan & Dr. R. Sattanathan. *Business Statistics and Operations Research* Tata McGraw Hill Publications
3. S.P. Gupta: *Statistical Methods*, Sultan 2000.

#### Reference Books:

4. Dr.S.P.Gupta, *Statistical Methods*, S.Chand

## SECOND SEMESTER

### (SYLLABUS)

**Course Title: Operations Research**  
**(For I year students of BBM)**

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<b>Course Code : 2036217</b>	<b>Credits : 05</b>
<b>L:T:P:S : 5:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

#### LEARNING OBJECTIVES:

*On taking this course the student will be able to apply quantitative methods and techniques for effective decision making. Demonstrate the knowledge of applying linear programming to solve real life applications. To prepare a network for a given project and identify the critical path of the project*

**Course Outcomes: At the end of the Course, the Student will be able to**

<b>CO1</b>	Deal with history of operations research and introduce linear programming problem. Determine the optimality of the objective function of a linear programming problems
<b>CO2</b>	Determine the schedule for transporting goods from source to destination in a way which will minimize the shipping cost while satisfying supply and demand constraints
<b>CO3</b>	Assign a number of jobs to an equal number of machine so as to minimize the total time required for successful execution of all the jobs
<b>CO4</b>	Demonstrate pure and mixed strategy and saddle point of a game. Explain the concept of fair game. Complete the job in maximum possible time, keeping the minimal idle time of the machine
<b>CO5</b>	Schedule, organize and coordinate tasks within a particular project by using the activities of the project (PERT) Determine the project completion time and the critical path of the project

### Mapping of Course Outcomes to Program Outcomes:

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO 1	3	3	3	3	3	3	3	2	3	3	3	3	3
CO 2	3	3	3	3	3	3	3	2	3	3	3	3	3
CO 3	3	3	3	3	3	3	3	2	3	3	3	3	3
CO 4	3	3	3	3	3	3	3	2	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	2	3	3	3	3	3

3-Strong Correlation    2- Medium Correlation    1- Low Correlation

S.No	CONTENTS OF MODULE	Hrs.	COS
1	Operations Research Definition- Scope limitations Linear Programming Problem(LPP)- Formation of LPP-Graphical method-simple problems.	12	CO1
2	Transportation model-Balanced and Unbalanced Transportation problems – Initial basic feasible solution- North west corner rule, the row minima ,column minima,least cost method and Vogel's approximation methods - Optimum solution-MODI method.	12	CO2
3	Assignment Problem- Balanced and Unbalanced Maximization restricted assignment problem. (Excluding travelling salesman Minimization and problem).	12	CO3
4	<b>Game Theory-</b> Pure & Mixed Strategies- Dominance-Graphical method. <b>Sequencing problem:</b> Processing of n jobs through 2 machines- Processing of n jobs through 3 machines- Processing each of n jobs through m machines.(Excluding Processing 2 jobs through m machines)	12	CO4
5	PERT- Project Network diagram- PERT computations.	12	CO5

### TEXT BOOKS:

#### Recommended Text Book:

1. Dr. P.R.Vittal, *Business Statistics and Operations Research*, Margham publications
2. Dr. S.P. Rajagopalan & Dr. R. Sattanathan. *Business Statistics and Operations Research* Tata McGraw Hill Publications

#### Reference Books:

1. Gupta and Hira, *Operations Research*, S.Chand.
2. Handy and A.Taha, *Operations Research*, Macmillan Publishers