CHOICE BASED CREDIT SYSTEM - LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK

B.Sc Mathematics

Those who have joined in the Academic year 2023-24 onwards

Programme Outcomes:

PO1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

PO2: Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO3: Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's earning to real life situations.

PO4: Analytical Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.

PO5: Scientific Reasoning: Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.

PO6: Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.

Programme Specific Outcomes:

PSO1: Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.

PSO2: Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.

PSO3: To prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)can be carried out accordingly, assigning the appropriate level in the grids:

CHOICE BASED CREDIT SYSTEM - LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK

B.Sc Mathematics

Those who have joined in the Academic year 2023-24 onwards

Part	Courses	Subject	Code	Cr.	Hrs
SEMESTER I					
I	Lang. – I	பொதுத்தமிழ் - **I**	230103101	3	6
II	Lang. - II	General English	231003101	3	4
III	CC – 1	Algebra and Trigonometry	232003101	4	4
	CC – 2	Differential Calculus	232003102	3	4
	EC – I (Theory)	Allied Physics - I	232103121	3	4
	EC –I (Practical)	Allied Physics Practicals - I	232103122	1	2
IV	SEC –I (NME)	Mathematics for Competitive Examinations – I	234603120	2	2
IV	FC	Bridge Mathematics	234403120	2	2
	AECC - 1	Soft Skill - I	236003101	2	2
	Total			**23**	**30**
SEMESTER II					
I	Lang. -I	பொதுத்தமிழ் - **II**	230103201	3	6
II	Lang. -II	General English	231003201	3	4
III	CC – 3	Analytical Geometry(Two & Three Dimensions)	232003201	4	4
	CC - 4	Integral Calculus	232003202	3	4
	EC – II(Theory)	Allied Physics – II	232103221	3	4
	EC – II (Practical)	Allied Physics Practicals - II	232103222	1	2
IV	SEC –II (NME)	Mathematics for Competitive Examination - II	234603220	2	2
	SEC - III	Computing skill (Office Automation)	234403220	2	2
	AECC –II	Soft Skill - 2	236003201	2	2
				23	**30**
SEMESTER III					
I	Lang. -I	பொதுத்தமிழ் - **III**	230103301	3	6
II	Lang. -II	General English	231003301	3	4
III	CC – 5	Vector Calculus and Applications	232003301	4	5
	CC - 6	Differential Equations and Applications	232003302	4	5
	EC –3	Numerical Methods with Applications	232003303	3	4
IV	SEC –IV	LATEX	234403320	1	1
	SEC – V	Computational Mathematics	238203320	2	2
	AECC – III	Soft Skill - 3	236003301	2	2
	EVS	Environmental Studies	234103301	1	1
				23	**30**

Part	Courses		Code	Cr.	Hrs
SEMESTER IV					
I	Lang. – I	பொதுத்தமிழ் - **IV**	230103101	3	6
II	Lang. - II	General English	231003101	3	4
III	CC – 7	Industry Module – Industry Statistics	232003401	4	4
	CC - 8	Elements of Mathematical Analysis	232003402	4	5
	EC – IV	Discrete Mathematics	232003403	3	4
IV	SEC –VI	Statistics with Excel	234403420	2	2
IV	SEC –VII	Data Analaysis using Geogebra	238203420	2	2
	AECC – 4	Soft Skill - 4	236003401	2	2
	EVS	Environmental Studies	234103401	1	1
	Total			**24**	**30**
SEMESTER V					
III	CC – 9	Abstract Algebra	232003501	4	5
	CC - 10	Real Analysis	232003502	4	5
	CC - 11	Mechanics	232003503	4	5
	Core 12	Project with Viva Voce	232003504	4	4
	EC – V	Programming in C with Practical	232003505	3	5
	EC – VI	Optimization Techniques	232003506	3	5
IV		Value Education	234303501	1	1
		Internship/Industrial Training(carried out in II year summer vacation)30 hrs	232003507	2	
				25	**30**
SEMESTER VI					
III	CC – 13	Linear Algebra	232003601	4	5
	CC – 14	Complex Analysis	232003602	4	5
	CC – 15	Transform Techniques	232003603	4	5
	EC –7	Programming Language C++ with Practical	232003604	3	5
	EC - 8	Graph Theory and Applications	232003605	3	5
IV	Processional competency skill enhancement course	Mathematics for Competitive Examinations	234403620	2	4
		Value Education	234303601	1	1
V		Extension Activity (outside college hrs)	232003606	1	
				22	**30**

ALLIED – MATHEMATICS FOR PHYSICS and CHEMISTRY					
Sem	**Title of the Paper**	**SUB CODE**	**Hrs.**	**Cr.**	**Generic/Discipline Specifit**
I	Allied Mathematics – I	232003121	6	4	
II	Allied Mathematics - II	232003221	6	4	

ALLIED – MATHEMATICS FOR COMPUTER SCIENCE					
Sem	**Title of the Paper**	**SUB CODE**	**Hrs.**	**Cr.**	**Generic/Discipline Specifi**
I	Numerical methods	232003122	4	3	
II	Graph theory and its applications	232003222	4	3	

Title of the Course		**Algebra and Trigonometry**					
PART		**III**					
Category	CC I	**Year**	I	**Credits**	4	**Course Code**	**232003101**
		Semester	I				

Instructional Hours per week	**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
	4	-	--	4	25	75	100

Learning Objectives

- ✍ Basic ideas on the Theory of Equations, Matrices and Number Theory.
- ✍ Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems.

UNIT	**Details**	**No. of Periods for the Unit**
I	**Reciprocal Equations**: Standard form–Increasing or decreasing the roots of a given equation- Removal of terms, Approximate solutions of roots of polynomials by Horner's method – related problems. **Chapter 6 Sections 16-16.1, 16.2, 17, 19, 30**	**12**
II	**Summation of Series**: Binomial– Exponential –Logarithmic series (Theorems without proof) – Approximations - related problems. **Chapter 3 Section 10** **Chapter 4 Sections 3, 9, 11**	**12**
III	**Matrices:** Characteristic equation – Eigen values and 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. **Chapter 2 Sections 16**	**12**
IV	**Expansions:** of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$, $\cos\theta$ - Expansion 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 $\tan(\theta_1+\theta_2+,\ldots,+\theta_n)$-Expansions of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in terms of θ - related problems. **Chapter 3**	**12**
V	**Hyperbolic functions**: Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series - related problems. **Chapter 4** **Chapter 5 Section 5**	**12**

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

Text Books (Latest Editions)	
1.	Algebra, Volume I by T.K.Manicavachagom Pillai, T.Natarajan, K.S.Ganapathy, Viswanathan Publications, 2014 **Unit 1, Unit 2**
2.	Algebra, Volume II by T.K.Manicavachagom Pillai, T.Natarajan, K.S.Ganapathy, Viswanathan Publication, 2014 **Unit 3**
3.	Trigonometry by S. Narayanan and T.K.Manicavachagom Pillai, Viswanathan Publications, 2008 **Unit 4, Unit 5**

Reference Books	
1.	S. Burnstine and A.W. Panton, Theory of equations
2.	David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007
3.	B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005
4.	V. Durell and A. Robson, Advanced Trigonometry, Courier Corporation, 2003
5.	Stewart, L. Redlin, and S. Watson, Algebra and Trigonometry, Cengage Learning, 2012.
6	Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010.
Web Resources	
1.	https://www.mathwarehouse.com/
2	https://www.mathhelp.com/
3	https://www.mathsisfun.com/
4	https://nptel.ac.in

Mapping with Programme Outcomes:

	POs						**PSOs**	
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**
CO 1	M					S		
CO 2		M						
CO 3		S		L				
CO 4						S		M
CO 5							M	

S-Strong M-Medium L-Low

Title of the Course		**DIFFERENTIAL CALCULUS**						
PART		**III**						
Category	CC II	**Year**	I	**Credits**	3	**Course Code**	**232003102**	
		Semester	I					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		4	-	--	4	25	75	100

Learning Objectives

The basic skills of differentiation, successive differentiation, and their applications.
Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems.

UNIT	**Details**	**No. of Periods for the Unit**
I	**Successive Differentiation**: Introduction (Review of basic concepts) – The n^{th} derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product. **Chapter 3**	**12**
II	**Partial Differentiation**: Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient – A special case – Implicit Functions. **Chapter 8 Sections 1.1 to 1.5**	**12**
III	**Partial Differentiation (Continued)**: Homogeneous functions – Partial derivatives of a function of two variables – Maxima and Minima of functions of two variables - Lagrange's method of undetermined multipliers. **Chapter 8 Sections 1.6, 1.7, Sections 4, 5**	**12**
IV	**Envelope:** Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter. **Chapter 10 Sections 1.1 to 1.4**	**12**
V	**Curvature:** Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involutes – Radius of Curvature in Polar Co-ordinates. **Chapter 10 Sections 2.1, 2.2, 2.5, 2.6**	**12**

Course Outcomes	
Course Outcomes	Students will be able to
CO1	Find the nth derivative, form equations involving derivatives and apply Leibnitz formula
CO2	Find the partial derivative and total derivative coefficient
CO3	Determine maxima and minima of functions of two variables and to use the Lagrange's method of undetermined multipliers

CO4	Find the envelope of a given family of curves
CO5	Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates

Text Books (Latest Editions)	
1.	S. Narayanan and T.K. Manickavachagom Pillai, Calculus Volume I - Viswanathan Publishers. 2014.
Reference Books	
1.	G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2010.
2.	M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.
3.	R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer- Verlag, New York, Inc., 1989.
4.	T. Apostol, Calculus, Volumes I and II.
Web Resources	
1.	https://nptel.ac.in
2	https://www.mathwarehouse.com/
3	https://www.mathhelp.com/

Mapping with Programme Outcomes:

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	-	-	-	3	2	1
CLO3	3	2	3	2	-	-	3	2	1
CLO4	3	2	3	2	1	-	3	2	1
CLO5	3	2	3	2	1	-	3	2	1

S-Strong M-Medium L-Low

Title of the Course		**MATHEMATICS FOR COMPETITIVE EXAMINATIONS - I**						
PART		**IV**						
Category	SEC I - NME	**Year**	I	**Credits**	2	**Course Code**	**234603120**	
		Semester	I					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		2	-	--	2	25	75	100

Learning Objectives

- ✍ To make the students think logically and objectively.
- ✍ To develop skills to attend the competitive exams confidently.
- ✍ To expose the technique of problem solving on quantitative aptitude.
- ✍ To develop the students ability to deal with numerical and quantitative issues in business.

UNIT	**Details**	**No. of Periods for the Unit**
I	**Average**: facts and formulae – problems on average – problems on average speed. **Chapter 6**	**6**
II	**Problems on Numbers**: concept of numbers – problems involving set of numbers – solving unknown quantities. **Chapter 7**	**6**
III	**Problems on Ages**: problems on present age – problems on ratio between ages. **Chapter 8**	**6**
IV	**Percentage**: concept of percentage – problems on population – problems on depreciation. **Chapter 11**	**6**
V	Profit and loss. **Chapter 12**	**6**

Course Outcomes	
Course Outcomes	Students will be able to
CO1	provide a comprehensive and clear description of properties concerning averages, study the short cut techniques of solving problems.
CO2	demonstrate procedural fluency with real number arithmetic operations and use those operations to represent real-world scenarios and solve stated problems.
CO3	establish a framework to acquire knowledge and expertise in necessary concepts needed to solve age related problems.
CO4	illustrate the concept of percentage; calculate specified percent of a given number or a quantity; interpret concept of percentages based on population increase – decrease and depreciation.
CO5	explain how to calculate profit and loss, identify the impact of profit or loss can have on a business and describe how a business can obtain a supernormal profit.

Text Books (Latest Editions)	
1.	Aggarwal R.S., Quantitative Aptitude, S.Chand & company Ltd, New Delhi, Revised Edition (Reprint 2020)
Reference Books	
1.	Ranganath G.K, Sampangiram C.S, and Rajaram.Y, & text books of business Mathematics, Himalaya Publishing House, New Delhi, Reprint 2006.
2.	Ponnien Selvi.M, & Sri Devi.N, Business Mathematics, Yoga Publishing House, Virudhunagar, 2007.

3.	Dinesh Khattar, Quantitative Aptitude for Competitive Examinations, Pearson Publications, 2019

Web Resources

01. https://youtu.be/KE7tQf9spPg
02. https://youtu.be/7DJ-lzPnv8I
03. https://youtu.be/vsBpWgNYjtQ
04. https://youtu.be/STaokT5d9Q4
05. https://youtu.be/HbuMwVGtn80
06. http://www.practiceaptitudetests.com/

Mapping with Programme Outcomes:

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	-	-	-	3	2	1
CLO3	3	2	3	2	-	-	3	2	1
CLO4	3	2	3	2	1	-	3	2	1
CLO5	3	2	3	2	1	-	3	2	1

S-Strong M-Medium L-Low

Title of the Course		**BRIDGE MATHEMATICS**						
PART		**IV**						
Category	FC	**Year**	I	**Credits**	2	**Course Code**	**234403120**	
		Semester	I					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		2	-	--	2	25	75	100

Learning Objectives

To bridge the gap and facilitate transition from higher secondary to tertiary education;
To instil confidence among stakeholders and inculcate interest for Mathematics;

UNIT	**Details**	**No. of Periods for the Unit**
I	**Algebra:** Binomial theorem, General term, middle term, problems based on these concepts	**6**
II	**Sequences and series**: (Progressions). Fundamental principle of counting. Factorial n.	**6**
III	**Permutations and combinations**: Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.	**6**
IV	**Trigonometry:** Introduction to trigonometric ratios, proof of sin(A+B), cos(A+B), tan(A+B) formulae, multiple and sub multiple angles, sin(2A), cos(2A), tan(2A) etc., transformations sum into product and product into sum formulae, inverse trigonometric functions, sine rule and cosine rule	**6**
V	**Calculus:** Limits, standard formulae and problems, differentiation, first principle, uv rule, u/v rule, methods of differentiation, application of derivatives, integration - product rule and substitution method.	**6**

Course Outcomes

Course Outcomes	After completion of this course successfully, the students will be able to
CO1	Prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also solve the related problems
CO2	Find the various sequences and series and solve the problems related to them. Explain the principle of counting.
CO3	Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations
CO4	Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and submultiple angles, etc. Also, they can solve the problems using the transformations
CO5	Find the limit and derivative of a function at a point, the definite and indefinite integral of a function.

Text Books (Latest Editions)	
1.	NCERT class XI and XII text books.
2.	Any State Board Mathematics text books of class XI and XII

Web Resources
01. https://www.aicte-india.org/sites/default/files/final%20maths.pdf
02. https://egyankosh.ac.in/bitstream/123456789/13834/1/Unit-1.pdf

Mapping with Programme Outcomes:

	POs						PSOs	
	1	2	3	4	5	6	1	2
CLO1	1	2	3	4	5	6	1	2
CLO2	1	1	1	1	1	1	1	1
CLO3	2	1	1	2	2	1	2	1
CLO4	2	1	1	2	2	1	2	1
CLO5	1	1	1	1	1	1	2	1
	1	1	1	1	1	1	2	1

S-Strong M-Medium L-Low

Title of the Course		**ANALYTICAL GEOMETRY (Two & Three Dimensions)**						
PART		**III**						
Category	CC 3	**Year**	I	**Credits**	4	**Course Code**	**232003201**	
		Semester	II					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		4	-	--	4	25	75	100

Learning Objectives

Necessary skills to analyze characteristics and properties of two- and three-dimensional geometric shapes.
To present mathematical arguments about geometric relationships.
To solve real world problems on geometry and its applications.

UNIT	**Details**	**No. of Periods for the Unit**
I	Pole, Polar - conjugate points and conjugate lines – diameters – conjugate diameters of an ellipse - semi diameters- conjugate diameters of hyperbola. **Chapter 6 Sections 6.9, 6.10 & 6.13 , Chapter 7 - 7.3, 7.4 & 7.10**	**12**
II	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. **Chapter 9**	**12**
III	System of Planes-Length of the perpendicular–Orthogonal projection. **Chapter 2 Sections 2.1 to 2.10**	**12**
IV	Representation of line–angle between a line and a plane – co – planar lines–shortest distance between two skew lines –length of the perpendicular–intersection of three planes. **Chapter 3 Sections 3.1 to 3.8**	**12**
V	Equation of a sphere-general equation-section of a sphere by a plane-equation of the circle- tangent plane- angle of intersection of two spheres- condition for the orthogonality- radical plane. **Chapter 6 Sections 6.1 to 6.8**	**12**

Course Outcomes	Students will be able to
CO1	Find pole, polar for conics, diameters, conjugate diameters for ellipse and hyperbola
CO2	Find the polar equations of straight line and circle, equations of chord, tangent and normal and to find the asymptotes of hyperbola
CO3	Explain in detail the system of Planes
CO4	Explain in detail the system of Straight lines
CO5	Explain in detail the system of Spheres

Text Books (Latest Editions)	
1.	Analytical Geometry of 2-Dimentional by P.Duraipandian, Emerald publishers for Unit 1, 2
2.	Analytical Solid Geometry of 3D by S. Narayanan and T.K. Manickavachagom Pillai, S.V. Publications, 2006 for Units 3, 4, 5.
Reference Books	
1.	S. L. Loney, Co-ordinate Geometry
2.	Robert J. T. Bell, Co-ordinate Geometry of Three Dimensions.
3.	Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010.
4.	William H. McCrea, Analytical Geometry of Three Dimensions, Dover Publications, Inc, New York, 2006.
5.	John F. Randelph, Calculus and Analytic Geometry, Wadsworth Publishing Company, CA, USA, 1969.
6.	Ralph Palmer Agnew, Analytic Geometry and Calculus with Vectors, McGraw-Hill Book Company, Inc. New York, 1962.
Web Resources	
01. https://nptel.ac.in 02. https://www.mathwarehouse.com/ 03. https://www.mathhelp.com/ 04. https://www.mathsisfun.com/	

Mapping with Programme Outcomes:

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	2	2	1	-	-	3	2	1
CLO2	2	2	2	1	-	-	3	2	1
CLO3	3	2	2	1	-	-	3	2	1
CLO4	3	2	3	1	-	-	3	2	1
CLO5	3	2	3	1	-	-	3	2	1

S-Strong M-Medium L-Low

Title of the Course		**INTEGRAL CALCULUS**						
PART		**III**						
Category	CC 4	**Year**	I	**Credits**	3	**Course Code**	**232003202**	
		Semester	II					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		4	-	--	4	25	75	100

Learning Objectives

- ✍ Knowledge on integration and its geometrical applications, double, triple integrals and improper integrals.
- ✍ Knowledge about Beta and Gamma functions and their applications.
- ✍ Skills to Determine Fourier series expansions.

UNIT	Details	No. of Periods for the Unit
I	**Integration:** Reduction formulae -Types, integration of product of powers of algebraic and trigonometric functions, integration of product of powers of algebraic and logarithmic functions - Bernoulli's formula, **Chapter 1 Sections 13, 14, 15.1**	**12**
II	**Multiple Integrals:** definition of double integrals - evaluation of double integrals – double integrals in polar coordinates **Chapter 5 Sections 1, 2, 3**	**12**
III	**Triple integrals:** applications of multiple integrals - volumes of solids of revolution - areas of curved surfaces **Chapter 5 Sections 4, 5, 6, 7**	**12**
IV	**Beta and Gamma functions:** infinite integral - definitions–recurrence formula of Gamma functions – properties of Beta and Gamma functions- relation between Beta and Gamma functions - Applications. **Chapter 7 Sections 1, 2, 3, 4, 5, 6**	**12**
V	**Geometrical applications of integration:** area under plane curves (Cartesian and polar co-ordinates) - Physical Applications of Integration – centre of mass of an arc and a plane area. **Chapter 2 Sections 1.1, 1.4** **Chapter 3 Sections 1.2, 1.3**	**12**

Course Outcomes	Students will be able to
CO1	Determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae
CO2	Evaluate double and triple integrals and problems using change of order of integration
CO3	Solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution
CO4	Explain beta and gamma functions and to use them in solving problems of integration
CO5	Explain Geometric and Physical applications of integral calculus

Text Books (Latest Editions)	
1.	Calculus, Volume II, by S.Narayanan and T.K ManicavachagomPillay. – S. Viswanathan, Publishers, 2007.
Reference Books	
1.	H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002
2.	G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.
3.	D. Chatterjee, Integral Calculus and Differential Equations, Tata-McGraw Hill Publishing Company Ltd.
4.	P. Dyke, An Introduction to Laplace Transforms and Fourier Series, Springer Undergraduate Mathematics Series, 2001 (second edition).
Web Resources	
01. https://www.mathwarehouse.com/ 02. https://www.mathhelp.com/ 03. https://www.mathsisfun.com/ 04. 04. https://nptel.ac.in	

Mapping with Programme Outcomes:

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	3	1	3	-	-	-	3	2	1
CLO3	3	1	3	-	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	2	1	3	2	1

S-Strong M-Medium L-Low

Title of the Course		**MATHEMATICS FOR COMPETITIVE EXAMINATIONS - II**						
PART		**IV**						
Category	SEC 2 NME	**Year**	I	**Credits**	2	**Course Code**	**234603220**	
		Semester	II					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		2	-	--	2	25	75	100

Learning Objectives

To make the students think logically and objectively.
To prepare students for further study in order to equip themselves to attend competitive examination.
To sensitize students with the gamut of skills which facilitate them to enhance their employability quotient.

UNIT	**Details**	**No. of Periods for the Unit**
I	**Ratio and proportion**: concepts of ratio and proportion - problems on ratio – problems on proportion. **Chapter 13**	**6**
II	**Time and Work**: facts and formulae – problems on time and work. **Chapter 17**	**6**
III	**Time and Distance:** facts and formulae – problems on time and distance – problems on relative speed. **Chapter 18**	**6**
IV	**Simple interest:** facts and formulae – problems on finding simple interest and amount - problems on finding principal - problems on finding rate of interest and number of years. **Chapter 22**	**6**
V	**Permutations and combinations:** facts and formulae – problems on permutations – problems on combinations. **Chapter 30**	**6**

Course Outcomes	Students will be able to
CO1	distinguish between absolute comparison and relative comparison and recognize and apply ratio and proportion to solve real-life problems
CO2	solve the tricky questions based on time and work; lay foundation to various other concepts including data interpretation, and data sufficiency.
CO3	understand the types of formula used to measure time and distance; able to calculate time and distance while an object that moves in uniform motion which involve objects moving in same direction, opposite directions, or round trips.
CO4	know and use simple interest terminology, understand how to algebraically manipulate the interest formulae to solve for different variables and find the total cost of various types of loans or credits
CO5	distinguish between permutation and combination and apply the concept of principle of choice to problem solving

Text Books (Latest Editions)	
1.	Aggarwal R.S., Quantitative Aptitude, S.Chand & company Ltd, New Delhi, Revised Edition (Reprint 2020)
Reference Books	
1.	Ranganath G.K, Sampangiram C.S, and Rajaram.Y, & text books of business Mathematics, Himalaya Publishing House, New Delhi, Reprint 2006.
2.	Ponnien Selvi.M, & Sri Devi.N, Business Mathematics, Yoga Publishing House, Virudhunagar, 2007.
3.	Quantitative Aptitude for Competitive Examinations, Pearson Publications, 2019.
Web Resources	
01. https://youtu.be/KE7tQf9spPg 02. https://youtu.be/7DJ-lzPnv8I 03. https://youtu.be/vsBpWgNYjtQ 04. https://www.javatpoint.com/aptitude/quantitative 05. https://testbook.com/learn/maths-time-and-work/ 06. http://www.practiceaptitudetests.com/	

Mapping with Programme Outcomes:

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	-	-	-	3	2	1
CLO3	3	2	3	2	-	-	3	2	1
CLO4	3	2	3	2	1	-	3	2	1
CLO5	1	2	3	4	5	6	1	2	3

S-Strong M-Medium L-Low

Title of the Course		**Computing Skills (Office Automation)**						
Part		**IV**						
Category	SEC III	**Year**	I	**Credits**	2	**Course Code**	**234403220**	
		Semester	II					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		1	-	1	2	25	75	100

Learning Objectives

- ✍ Understand the fundamentals of MS-OFFICE
- ✍ Learn how to create documents and editing using MS-word
- ✍ Learn how to create mail merge and tables using MS-word
- ✍ Learn how to work with worksheets and charts using Excel
- ✍ Understand the usage of MS-power point

UNIT	Details	No. of Periods for the Unit
I	**Introduction to MS-word:** File menu : New documents- Open - Close - Save - Print - Exit. Edit menu: Editing text- Selecting text - Undo typing- Redo typing - Cut - Deleting text- Copy - Paste - Moving text - Copying text - Paste - Clear - Select all - Find and Replace - Goto. View menu : Normal view - Web layout- Print layout - Outline view - Tools bar - Ruler - Headers and Footers. Insert menu :Break - Page number - Date & Time - Symbol - Index & Tables - Picture - Text box. **Chapter 2,3,4 (Pages 7 to 45)**	**6**
II	**Introduction to MS-word(continued):** Format menu : Font - Paragraph - Bullets & Numbering - Borders & Shading - Columns - Text direction - Background - Theme. Tools menu : Spelling & Grammar - Language - Auto summarize - Merge documents - Mail merge. Table menu : Draw table - Insert table - Delete - Select - Merge cells - Spilt cells -Auto fit -Table properties. **Chapter 5,6,7 (Pages 50 to 67, 70 to 86, 91 to 99)**	**6**
III	**Introduction to MS-Excel**: Starting Excel - Navigating worksheets - Opening a new work book - Entering date, text, numbers, dates & times, formulas, labels & data - Excel functions -Selecting cell ranges - Creating text, numbers & data series - Undo & redo - saving workbooks - Editing worksheet - Inserting rows, columns & cell ranges - Deleting rows, columns & cell ranges - Headers & Footers - Find & Replace. **Chapter 1 (Pages 107 to 132)**	**6**
IV	**Introduction to MS-Excel(Continued)**: Formatting worksheets : Numeric formatting - Custom formatting - Date & time formats - Alignment - Wrap text - Merge cells - Font - Borders - Changing row height - Changing column width - Auto formatting. Charts: Creating charts - Save & print a chart - Save & printing worksheets. **Chapter 2,3 (Pages 135 to 162)**	**6**
V	**Introduction to MS-Power Point**: Starting power point - Creating a presentation using Auto content wizard - Creating a Design template - Creating a Blank presentations - Opening an existing presentations - Saving a presentations - closing a presentations - Existing power point. **Chapter 1 (Pages 177 to 185)**	**6**

Course Outcomes	
Course Outcomes	On completion of this course, students will be able;
CO1	Students will be able to create a documents using MS
CO2	Students will be able to create a tables and pictures using MS
CO3	Students will be able to create worksheet using MS
CO4	Students will be able to design and implement charts using MS
CO5	Students will be able to create a presentation using MS

Text Books (Latest Editions)	
1	MS-OFFICE - C.Nellai Kannan, Nels Publications,2012.
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1. PC Software for Windows 98 - R.K.Taxali, Tata Mc-Graw Hill Publishing,2006. 2. Mastering MS Office - Bittu Kumar, V&S Publishers,2018. 3. Comdex - Computer Course Kit, Vikas Gupta, Dreamtech Press, 2006.	
Web Resources	
1.https://www.helpwithpcs.com/software/microsoft-word-menus.php 2. https://www.w3schools.com/EXCEL/index.php 3. https://www.tutorialspoint.com/powerpoint/index.htm	

Mapping with Programme Outcomes:

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	-	-	-	3	2	1
CLO3	3	2	3	2	-	-	3	2	1
CLO4	3	2	3	2	1	-	3	2	1
CLO5	3	2	3	2	1	-	3	2	1

3 – Strong, 2 – Medium , 1 - Low

Title of the Course		**Allied Mathematics – I** **(for Physics and Chemistry Major Students)**						
Part		**III**						
Category	EC I	**Year**	I	**Credits**	4	**Course Code**	**232003121**	
		Semester	I					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		5	1	--	6	25	75	100

Learning Objectives		
	To provide basic knowledge of fundamental concepts in Mathematics	
	To motivate the students on Mathematics there by to lay foundation for future studies.	
UNIT	**Details**	**No. of Periods for the Unit**
I	**Curvature:** Radius of curvature – Centre of curvature (Cartesian equation only) – Involute - Evolute. **Chapter 10 Sections 2.1 to 2.6**	**18**
II	**Reduction formula:** Reduction formula for $\sin^n x$, $\cos^n x$, $\tan^n x$, $\sec^n x$, $\text{cosec}^n x$, $\cot^n x$ and $\sin^m x \cos^n x$- Problems**.** **Chapter 1 Section 13**	**18**
III	**Trigonometry:** Expression for $\sin n\theta$, $\cos n\theta$ and $\tan n\theta$ – Expression for $\sin^n\theta$ and $\cos^n\theta$ – Expression of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in powers of θ **Chapter 3**	**18**
IV	**Matrices:** Inverse of a Matrix- Rank of a matrix – Consistency of system of equations - Cayley – Hamilton Theorem without proof - eigen values and eigen vectors of a matrix **Chapter 7 Sections 7.3 to 7.8**	**18**
V	**Statistics:** Curve fitting (Straight line, second degree parabola only) – correlation – rank correlation – regression lines. **Chapter 5** **Chapter 6 Sections 6.1 to 6.3**	**18**

Course Outcomes	
Course Outcomes	On completion of this course, students will be able;
CO1	apply the basic concepts of differentiation, curvature.
CO2	find the reduction formulae for various functions
CO3	solve the problems of series involving trigonometric functions of multiple angles.
CO4	develop the basic concept of matrix and find the rank, inverse, eigen values and eigen vectors of a matrix.
CO5	fit straight line and parabola and compute correlation, rank correlation, regression lines.

Text Books (Latest Editions)
01. Manickavasagam Pillai T.K., and Narayanan S.,Calculus Volume I, S. V. Publications, 2014,
02. Manickavasagam Pillai T.K., and Narayanan S.,Calculus Volume II, S. V. Publications, 2014,
03. S. Narayanan and T.K.Manicavachagom Pillai, Trigonometry S.Viswanathan Publications, 2008.
04. Arumugam S. and Thangapandi Isaac, Modern Algebra, Scitech Publication (India) Private Limited, 2016.
05. Arumugam S., Statistics, New Gamma Publications, 2015.

References Books **(Latest editions, and the style as given below must be strictly adhered to)**
01. Manickavasagam Pillai T.K., and Narayanan S., Ancillary Mathematics, S.V. Publications, Chennai, 2006. 02. Arumugam S. and Thangapandi Isaac A.,Algebra, Theory of Equations, Theory of Numbers and Trigonometry, New Gamma Publishing House, Palayamkottai, July 2011. 03. Manickavasagam Pillai T.K., Natarajan, Ganapathy.K.S., Algebra Vol. – I, S.Viswanathan Publishers, 2015. 04. S.C. Gupta, V. K. Kapoor, Fundamendals of Mathematical Statistics, Sultan Chand & sons, 2014.
Web Resources
1. https://www.khanacademy.org/math/calculus-1 2. http://www-math.mit.edu/~djk/calculus_beginners/ 3. https://www.jagranjosh.com/articles/theory- of-equations-iit-jee-important-questions-and-preparation-tips-1460030334-1 4. http://www.real-statistics.com/correlation/multiple-correlation/

Mapping with Programme Outcomes: Mapping with Programme Specific Outcomes:

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	-	-	-	3	2	1
CLO3	3	2	3	2	-	-	3	2	1
CLO4	3	2	3	2	1	-	3	2	1
CLO5	3	2	3	2	1	-	3	2	1

3 – Strong, 2 – Medium , 1 - Low

Title of the Course		**Allied Mathematics – II (for Physics and Chemistry Major Students)**						
Part		**III**						
Category	EC -II	**Year**	I	**Credits**	3	**Course Code**	**232003221**	
		Semester	II					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		5	1	--	6	25	75	100

Learning Objectives

- ✍ To enable students to solve different types of linear differential equations.
- ✍ To get equip with the knowledge of vector differentiation and integration.

UNIT	**Details**	**No. of Periods for the Unit**
I	**Differential Equations:** Exact Differential equations – Integrating factors (Problems only). Partial differential equations: Formation of partial differential equations – By elimination of arbitrary constants in a relation between x, y and z – By elimination of arbitrary functions of variables x, y and z – Methods of solving first order partial differential equations - Lagrange's method (Problems only). **Chapter 2 Sections 6.1 to 6.4** **Chapter 12 Sections 3, 4**	**18**
II	**Laplace transforms:** Laplace transform - Inverse Laplace Transform – Solution of differential equation using Laplace transform (second order linear differential equations with constant co–efficient only). [Exclude – solving the differential equation with variable coefficient and solving the simultaneous equation]. **Chapter 9 Sections 1 to 8**	**18**
III	**Fourier series:** The cosine and sine series - Problems. **Chapter 5**	**18**
IV	**Vector differentiation:** Differentiation of Vectors – Gradient – Geometrical Interpretation - Divergence and curl – Solenoidal – irrotational. **Chapter 5**	**18**
V	**Vector integration:** Line integral – surface and volume integrals – Theorems on Green's, Stoke's and Gauss divergence theorems (Problems only). **Chapter 7**	**18**

Course Outcomes	
Course Outcomes	On completion of this course, students will be able;
CO1	recognize and solve exact equations, determine the solution of exact differential equation using Integrating factor, form the partial differential equations and solve Lagrange's equation.
CO2	Investigate the Laplace and inverse Laplace Transform techniques to solve second order differential equations with constant coefficients,
CO3	Construct Fourier series of a given periodic function by evaluating Fourier coefficients
CO4	determine and apply the important quantities associated with vector fields such as scalar potential, divergence, curl, solenoidal and irrotational.
CO5	solve problems in double, triple integrals and verify Green's, Stoke's and Gauss Divergence theorems.

Text Books (Latest Editions)
01. Narayanan. S and Manicavachagom Pillai. T.K.,Differential Equations and its applications, S. V. Publications, 2015 for Units 1, 2. 02. Dr. S.Arumugam and Issac., Calculus, New Gamma Publications, 2014 for Unit 3 03. Dr. S.Arumugam and Issac., Analytical 3D and Vector Calculus, New Gamma Publications, 2014 for Unit 4, 5
References Books **(Latest editions, and the style as given below must be strictly adhered to)**
01. Narayanan. S and Manicavachagom Pillay. T.K., 2015, Calculus, Volume II, S. Viswanathan printers and publishers private limited, Chennai. 02. Narayanan. S and Manicavachagom Pillay. T. K., Ancillary Mathematics Book I (2000), II (2002), and III (1998), S.Viswanathan printers and publishers private limited, Chennai. 03. Kandasamy and Thilagavathy K., Allied Mathematics Paper – II, S.Chand & company Pvt Ltd, New Delhi -55, Reprint 2013.
Web Resources
01. http://www.mathforum.org 02. https://tutorial.math.lamar.edu/classes/de/intropde.aspx 03. https://tutorial.math.lamar.edu/classes/de/LaplaceIntro.aspx 04. http://www.learningwave.com 05. https://www.khanacademy.org/math/integral-calculus 06. https://www.sakshieducation.com/Engg/EnggAcademia/CommonSubjects/MathMethods-Fourier_Series.pdf

Mapping with Programme Outcomes:. Mapping with Programme Specific Outcomes:

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	-	-	-	3	2	1
CLO3	3	2	3	2	-	-	3	2	1
CLO4	3	2	3	2	1	-	3	2	1
CLO5	3	2	3	2	1	-	3	2	1

3 – Strong, 2 – Medium , 1 – Low

Title of the Course		**NUMERICAL METHODS** **(For Computer Science Major Students)**						
Part		**III**						
Category	EC I	**Year**	I	**Credits**	3	**Course Code**	**232003122**	
		Semester	I					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		3	1	--	4	25	75	100

Learning Objectives	
	To introduce the various topics in Numerical methods.
	To make understand the fundamentals of algebraic equations.
	To apply interpolation and approximation on examples.
	To solve problems using numerical differentiation and integration.
	To solve linear systems, numerical solution of ordinary differential equations

UNIT	**Details**	**No. of Periods for the Unit**
I	**Algebraic and Transcendental Equations:** Solution of algebraic and transcendental equations-Bisection method – iteration method – Newton Raphson method –simultaneous equations: Gauss elimination method – Gauss Jordan method . **Chapter 3 Sections 3.2, 3.3, 3.5** **Chapter 4 Sections 4.3, 4.4**	**12**
II	**Iterative Methods, Interpolations And Approximation:** Iterative methods - Gauss Jacobi and Gauss Seidel - Interpolation with unequal intervals – Lagrange's interpolation – Newton's divided difference interpolation. **Chapter 4 Sections 4.7, 4.8** **Chapter 7 Sections 7.3 to 7.5**	**12**
III	**Interpolations with equal intervals:** Difference operators and relations - Interpolation with equal intervals – Newton's forward and backward difference formulae. **Chapter 6 Sections 6.1, 6.2** **Chapter 7 Sections 7.0 to 7.2**	**12**
IV	**Numerical Differentiation and Integration:** Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal, Simpson's rule. **Chapter 8 Sections 8.0, 8.1, 8.2. 8.5**	**12**
V	**Initial value problems for ordinary differential equations:** Taylor's series method – Euler's method – Modified Euler's method - Runge Kutta method for solving (first, second , third and 4th) order equations **Chapter 10 Sections 10.1, 10.3, 10.4**	**12**

Course Outcomes	
Course Outcomes	On completion of this course, students will be able;
CO1	solve equations using various methods.
CO2	apply direct and indirect methods to solve system of equations
CO3	estimate the missing data using forward, backward and central difference interpolation formulae .
CO4	study some methods for numerical differentiation and integration.
CO5	study some methods for numerical differentiation and integration.

Text Books (Latest Editions)	
1	Arumugam S., Thangapandi Issac A., Somasundaram A., Numerical Methods, 2nd Edition, Scitech publications pvt ltd, Chennai, 2017

References Books
(Latest editions, and the style as given below must be strictly adhered to)

01. Kandasamy P., Thilagavathi K., and Gunavathy K., Numerical Methods, S. Chand and Company Ltd, New Delhi, 12th Edition, 2012.
02. Jain M.K., Iyengar SRK., Jain K., Numerical Methods for scientific and engineering computation, New age international publishers Ltd,6thEdition, New Delhi, 2016.
03. Veerarajan T.,Ramachandran T., Numerical Methods, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2019.

Web Resources

01. http://sites.iiserpune.ac.in/~bhasbapat/phy221_files/curvefitting.pdf
02. https://www.math.hkust.edu.hk/~machas/numerical-methods.pdf
03. https://perhuaman.files.wordpress.com/2014/07/metodos-numericos.pdf
04. https://www.academia.edu/34595604/Numerical_Methods_for_Computational_Science_and_Engi _Always_under_construction
05. https://fmipa.umri.ac.id/wp-content/uploads/2016/03/Dahlquist_G._Bjoerck_A._Vol.1._Numerical_methodBookZZ.org_.pdf
06. https://www.cs.tau.ac.il/~dcor/Graphics/adv-slides/Solving.pdf

Mapping with Programme Outcomes / Mapping with Programme Specific Outcomes:

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	-	-	-	3	2	1
CLO3	3	2	3	2	-	-	3	2	1
CLO4	3	2	3	2	1	-	3	2	1
CLO5	3	2	3	2	1	-	3	2	1

3 – Strong, 2 – Medium , 1 - Low

Title of the Course		**GRAPH THEORY AND ITS APPLICATIONS (For Computer Science Major Students)**					
Category	EC II	**Year**	I	**Credits**	3	**Course Code**	**232003222**
		Semester	II				

Instructional Hours per week	**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
	3	1	--	4	25	75	100

Learning Objectives

- Definition of Graph, sub graph their representations, degree and algebraic operations.
- Connected graphs, weighted graphs and shortest paths
- Trees: Characterizations, spanning tree, minimum spanning trees
- Eulerian and Hamiltonian graphs: Characterization, Necessary and sufficient conditions
- Special classes of graphs: Bipartite graphs, line graphs, chordal graphs.

UNIT	**Details**	**No. of Periods for the Unit**
I	**Introduction**: Graph-mathematical definition- Introduction – sub graphs –Walks, paths, Circuits connectedness- Components- Euler Graphs- Hamiltonian paths and circuits **Chapter 1 Sections 1.0 to 1.5** **Chapter 2 Sections 2.2, 2.4. 2.5. 2.6, 2.9**	**12**
II	**Trees:** properties of trees – distance and centers in tree – rooted and binary trees. **Chapter 3 Sections 3.1 to 3.5**	**12**
III	**Connectivity and Coloring:** Introduction to circuits – cut set – properties of cut sets – all cut sets – connectivity and separability – network flows – 1- isomorphism – 2-isomorphism. - Chromatic number **Chapter 4** **Chapter 8 Section 8. 1**	**12**
IV	**Matrix Representations in Graph:** Matrix representation of graphs – Adjacency matrix, incidence matrix (only) – Spanning trees: Prim's Algorithm to construct Spanning Trees, Weighted Graphs, Minimal Spanning Trees by Prim's Algorithm & Kruskal's Algorithm. **Chapter 11 Section 2.4**	**12**
V	**Applications of Graph:** Traveling Sales man Problem with undirected Graph - Shortest Paths with undirected Graphs – Depth-First Search – Breadth-First Search – Coloring a graph using backtracking – n queen problem using backtracking. **Chapter 2 Section 2.10 (Text Book 1)** **Chapter 11 Section 5 (Text Book 2)** **Chapter 11 Section 11.4 (Text Book 3)**	**12**

Course Outcomes

Course Outcomes	On completion of this course, students will be able;
CO1	To Introduce the fundamental concepts in graph theory Graphs, subgraphs, walks, Euler graphs, Hamiltonian Paths
CO2	Understanding the concepts of Trees, Circuits, Cut set and its Properties, Network Flows, Isomorphism Matching
CO3	Applying the concept of Colouring with Chromatic Number, Directed Graphs,

CO4	Analysing the Various Concepts of Representation of Graphs, Euler Paths Circuit, Kruskals and Prims Algorithms, Connected Components.
CO5	Implementation of an application using All Types of Graphs and evaluate the Applications with travelling sales person Problem, K colour Problem with n vertices in a Graph and Shortest Path finding Problem using Directed and Undirected Graphs

Text Books (Latest Editions)

01. Narsingh Deo , "Graph Theory with Application to Engineering and Computer Science" Prentice Hall of India 2010. Units 1, 2, 3
02. M.K.Venkatraman, Dr. N.Sridharan, Dr.N. Chandrasekaran, Discrete Mathematics, The National Publishing Company, 2007 Unit 4
03. Rosen H., "Discrete Mathematics and its applications" , Mc Graw Hill, 2012.

References Books
(Latest editions, and the style as given below must be strictly adhered to)

01. Discrete Maths for Computer Scientists & Mathematicians by Mott, Kandel, Baker
02. Clark J and Holton DA " First look at Graph Theory" Allied Publishers 1995
03. Discrete Maths for Computer Scientists & Mathematicians by Mott, Kandel, Baker

Web Resources

Web resources from NDL Library, E-content from open source libraries

01. https://d3gt.com/
02. https://www.coursera.org/courses?query=graph%20theory

Mapping with Programme Outcomes / Mapping with Programme Specific Outcomes:

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	-	-	-	3	2	1
CLO3	3	2	3	2	-	-	3	2	1
CLO4	3	2	3	2	1	-	3	2	1
CLO5	3	2	3	2	1	-	3	2	1

3 – Strong, 2 – Medium , 1 - Low