PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR

SALEM – 636 011

DEGREE OF BACHELOR OF SCIENCE

SYLLABUS FOR B.Sc. MATHEMATICS

CHOICE BASED CREDIT SYSTEM

for

THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2017 – 2018 ONWARDS

OBJECTIVES OF THE COURSE

Mathematics is a key to success in the field of science and engineering. Mathematics plays an important role in the context of globalization of Indian economy, modern technology, and computer science and information technology. Today, students need a thorough knowledge of basic principles, methods, results and a clear perception of the power of mathematical ideas and tools to use them effectively in modeling, interpreting and solving the real world problems. The syllabus of this program is aimed at preparing the students with the latest developments and put them on the right track to fulfill the present requirements.

COMMENCEMENT OF THIS REGULATION

This regulation shall take effect from the academic year 2017 – 2018, i.e, for the students who are admitted to the first year of the course during the academic year 2017 – 2018 and thereafter.

ELIGIBILITY FOR ADMISSION

A Pass in the Higher Secondary Examination of Tamil Nadu Higher Secondary Board or some other Board accepted by the Syndicate as equivalent thereto with Mathematics (other than Business mathematics) as one of the subjects.

DEFINITIONS

Programme : Program means a course of study leading to the award of the degree in a discipline.

Course : Course refers to the subject offered under the degree programme.

SYLLABUS

The syllabus of the UG degree has been divided into the following five categories:

Part I: Tamil / Other Languages.

Part II: English Language.

Part III: Core Courses, Elective Courses and Allied Courses.

Part IV: Skill Based Elective Courses, Non-Major Course, Environmental Studies and Value Education.

Part V: Extension Activity.

- **Elective Course:** There are 3 Elective Courses offered for B.Sc. Mathematics students. One course from each set should be selected for each elective course.
- **Skill Based Elective Course:** This course aims to impart advanced and recent developments in the concerned discipline.
- **Non-Major Course:** Irrespective of the discipline the student can select papers that are offered by other disciplines as non-major course.
- **Extension Activity:** Participation in NSS / NCC / YRC / RRC / Sports or other co-circular activities are considered for Extension activity.

CREDITS

Weightage given to each course of study is termed as credit.

CREDIT SYSTEM

The weightage of credits are spread over to different semester during the period of study and the cumulative credit point average shall be awarded based on the credits earned by the students.A total of 140 credits are prescribed for the under graduate programme.

DURATION OF THE COURSE

The candidates shall complete all the courses of the programme within 5 years from the date of admission. The programme of study shall consist of six semesters and a total period of three years with 140 credits. The programme of study will comprise the course according to the syllabus.

EXAMINATIONS

The course of study shall be based on semester pattern with Internal Assessment under Choice Based Credit System.

The examinations for all the papers consist of both Internal (Continuous Internal Assessment-CIA) and External (end semester) theory examination. The theory examination shall be conducted for three hours duration at the end of each semester. The candidates failing in any subjects(s) will be permitted to appear for the same in the subsequent semester examinations.

SCHEME OF EXAMINATIONS

The scheme of examinations for different semesters shall be as follows:

Sem.	**Part**	**Paper Code**	**Course**	**Hours/Week**			**Credit**	**Exam. Hrs.**	**Marks**		
				Lect.	**Prac.**	**Total**			**CIA**	**Uni. Exam**	**Total**
I	I	17UFTA01	Language/ Tamil – I	6	-	6	3	3	25	75	100
	II	17UEN01	English – I	6	-	6	3	3	25	75	100
	III #	17UMA01/17 UMACA01	Core–I Classical Algebra	5	-	5	4	3	25	75	100
	#	17UMA02/17 UMACA02	Core–II Differential Calculus	4	-	4	4	3	25	75	100
Sem	**Part**	**Paper Code**	**Course**	**Hours/Week**			**Credit**	**Exam. Hrs.**	**Marks**		
				Lect.	**Prac.**	**Total**			**CIA**	**Uni. Exam**	**Total**
			First Allied: Allied Paper -I (Theory)	5	-	5	4	3	25	75	100
			First Allied: Allied Paper -III	-	2	2	-	*	-	-	-

			(Practical)								
	IV	17UES01	EVS	2	-	2	2	3	25	75	100
II	I	17UFTA02	Language/ Tamil -II	6	-	6	3	3	25	75	100
	II	17UEN02	English- II	6	-	6	3	3	25	75	100
	III #	17UMA03/17 UMACA03	Core -III Integral Calculus	5	-	5	4	3	25	75	100
	#	17UMA04/17 UMACA04	Core -IV Vector Analysis	4	-	4	4	3	25	75	100
			First Allied: Allied Paper- II (Theory)	5	-	5	3	3	25	75	100
			First Allied: Allied Paper - III (Practical)	-	2	2	3	3	40	60	100
	IV	17UVE01	Value Education	2	-	2	2	3	25	75	100
III	I	17UFTA03	Language/ Tamil- III	6	-	6	3	3	25	75	100
	II	17UEN03	English-III	6	-	6	3	3	25	75	100
	III	17UMA05	Core -V Statics	4	-	4	3	3	25	75	100
	#	17UMA06/17 UMACA06	Core- VI Differential Equations and	3	-	3	3	3	25	75	100

			Laplace Transforms								
			Second Allied: Allied Paper- I (Theory)	5	-	5	4	3	25	75	100
			Second Allied: Allied Paper- III (Practical)	-	2	2	-	**	-	-	-
	IV	17UMASP01	SBEC-I: Office Automation Practical	-	2	2	2	3	40	60	100
			NMEC-I	2	-	2	2	3	25	75	100
IV	I	17UFTA04	Language/ Tamil-IV	6	-	6	3	3	25	75	100
	II	17UEN04	English-IV	6	-	6	3	3	25	75	100
	III	17UMA07	Core – VII Dynamics	4	-	4	3	3	25	75	100
		17UMA08	Core-VIII Trigonometry and Analytical Geometry of 3D	3	-	3	3	3	25	75	100
			Second Allied: Allied Paper-II (Theory)	5	-	5	3	3	25	75	100
			Second Allied: Allied Paper -III (Practical)	-	2	2	3	3	40	60	100

	IV		NMEC-II	2	-	2	2	3	25	75	100
		17UMAS02	SBEC II- Quantitative Aptitude -I	2	-	2	2	3	25	75	100
V	III \#	17UMA09/17 UMACA09	Core -IX- Modern Algebra-I	5	-	5	5	3	25	75	100
	#	17UMA10/17 UMACA10	Core -X - Real Analysis-I	6	-	6	4	3	25	75	100
	#	17UMA11/17 UMACA11	Core- XI - Complex Analysis-I	5	-	5	4	3	25	75	100
		See Table 1: Group A	Elective - I	5	-	5	5	3	25	75	100
		See Table 1: Group B	Elective -II	5	-	5	5	3	25	75	100
	IV	17UMAS03	SBEC- III C Programming (Theory)	2	-	2	2	3	25	75	100
		17UMASP04	SBEC- IV C Programming (Practical)	-	2	2	2	3	40	60	100
VI	III \# \#	17UMA12/17 UMACA12 17UMA13/17 UMACA13	Core-XII- Modern Algebra- II Core-XIII-Real Analysis -II	5 6	- -	5 6	5 5	3 3	25 25	75 75	100 100

	#	17UMA14/17 UMACA14	Core-XIV- Complex Analysis -II	5	-	5	4	3	25	75	100
	#	17UMA15/17 UMACA15	Core –XV- Graph Theory	5	-	5	5	3	25	75	100
		See Table 1: Group C	Elective-III	5	-	5	5	3	25	75	100
	IV #	17UMAS05/17UMACAS05	SBEP -V -Latex Theory	2	-	2	2	3	25	75	100
	#	17UMASP06/ 17UMACASP06	SBEP –III- Latex Practical	-	2	2	2	3	40	60	100
			Extension Activity	-	-	-	1	***	-	-	***
			Total				140				4200

Syllabus and Question paper are same for Bsc., Maths & Bsc., Maths (CA). The exam to be conducted on the same day * - Examination at the end of Second Semester.

** - Examination at the end of Fourth Semester.

*** - No Examination – Participation in NCC / NSS / RRC / YRC / Others if any.

ALLIED SUBJECTS FOR B.Sc. MATHEMATICS:

Any two of the following subjects (Physics / Chemistry / Statistics / Electronics / Accountancy) can be chosen as Allied Subjects.

NAME OF THE COURSE	PAPER CODE
Allied Physics – I	
Allied Physics – II	
Allied Physics – Practical	
Allied Chemistry – I	
Allied Chemistry – II	
Allied Chemistry – Practical	
Allied Statistics – I	

Allied Statistics – II Allied Statistics – Practical	
Allied Electronics – I	
Allied Electronics – II	
Allied Electronics – Practical	
Allied Accountancy – I	
Allied Accountancy – II	
Allied Accountancy – Practical	

ELECTIVE COURSES:

Select one paper from Group –A for Elective Course-I and one paper from Group –B for Elective Course II and one paper from Group - C for Elective Course III.

Table 1

NAME OF THE COURSE	PAPER CODE
Group A:	
Operations Research	17UMAE01
Astronomy	17UMAE02
Group B: Discrete Mathematics	17UMAE03
Number Theory	17UMAE04
Group C:	
Numerical Analysis	17UMAE05
Java Programming	17UMAE06

SKILL BASED ELECTIVE COURSE:

NAME OF THE COURSE	PAPER CODE
Office Automation	17UMAS01
Quantitative Aptitude Examination	17UMAS02
C Programming Theory	17UMAS03
C Programming Practical	17UMAS04
Latex Theory	17UMAS05
Latex Practical	17UMAS06

NON – MAJOR ELECTIVE COURSES:

Non – Major Elective Course –I (III- SEMESTER)	PAPER CODE
1.Quantitative Aptitude – I	17UMAN01
2.Matrix Algebra	17UMAN02
3.Linear Programming	17UMAN03
Non – Major Elective Course– II **(IV- SEMESTER)**	
1.Quantitative Aptitude – II	17UMAN04
2.Numerical Methods	17UMAN05
3.Operations Research	17UMAN06

ALLIED MATHEMATICS

Note: Select either Group – I or Group - II

ALLIED MATHEMATICS – GROUP I

NAME OF THE COURSE	PAPER CODE
Paper I: Allied Mathematics – I	17UMAA01
Paper II: Allied Mathematics – II	17UMAA02
Paper III: Allied Mathematics – Practical	17UMAAP01

ALLIED MATHEMATICS – GROUP II

NAME OF THE COURSE	PAPER CODE
Paper I – Discrete Mathematics Paper II – Numerical Method	17UMAA03 17UMAA04
Paper III – Graph Theory	17UMAA05

UNIFORMITY IN THE NUMBER OF UNITS IN EACH PAPER:

Each theory paper shall consist of five units. The Question paper shall consist of questions uniformly distributed among all the units.

1. QUESTION PAPER PATTERN FOR THE THEORY PAPERS

Duration: **Three Hours** Maximum Marks: **75**

Part A: (10 X 2 = 20 marks)

Answer ALL Questions

(Two Questions from Each Unit)

Part B: (5 X 5 = 25 marks)

Answer ALL Questions

(One Question from Each Unit with internal choice)

Part C: (3 X 10 = 30 marks)

Answer Any THREE Questions out of Five Questions

(One Question from Each Unit)

2. MARKS AND QUESTION PAPER PATTERN FOR PRACTICALS

MAXIMUM:**100 Marks** INTERNAL MARK: **40 marks**

EXTERNAL MARK: **60 marks**

(Practical Exam -45 marks + Record - 15 marks)

QUESTION PATTERN FOR THE PRACTICAL EXAM PAPERS

Answer any THREE questions out of 5 questions (3 x 15 = 45 marks)

PASSING MINIMUM

i) The Candidates shall be **declared to have passed the examination if he/she secures not less than 40 marks in total (CIA mark + Theory Exam mark) with minimum of 30 marks in the Theory Exam conducted by the University.**

ii) The Candidates shall be **declared to have passed the examination if he/she secures not less than 40 marks in total (CIA mark + Practical Exam mark) with minimum of 18 marks out of 45 marks in the Practical Exam conducted by the University.**

CONVERSION OF MARKS TO GRADE POINTS AND LETTER GRADE (Performance in a Course/Paper)

RANGE OF MARKS	GRADE POINTS	LETTER GRADE	DESCRIPTION
90-100	9.0-10.	O	Outstanding
80-89	8.0-8.	D+	Excellent
75-79	7.5-7.9	D	Distinction
70-74	7.0-7.4	A+	Very Good
60-69	6.0-6.9	A	Good
50-59	5.0-5.9	B	Average
40-49	4.0-4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

C_i = Credits earned for course i in any semester
G_i = Grade Point obtained for course i in any semester
n = refers to the semester in which such course were credited

Grade point average (for a Semester):

Calculation of grade point average semester-wise and part-wise is as follows:

GRADE POINT AVERAGE [GPA] = $\Sigma_i C_i G_i / \Sigma_i C_i$

$$GPA = \frac{\text{Sum of the multiplication of grade points by the credits of the courses offered under each part}}{\text{Sum of the credits of the courses under each part in a semester}}$$

Calculation of Grade Point Average (CGPA) (for the entire programme):

A candidate who has passed all the examinations under different parts (Part-I to V) is eligible for the following part wise computed final grades based on the range of CGPA.

CUMULATIVE GRADE POINT AVERAGE [CGPA] = $\Sigma_n \Sigma_i C_{ni} G_{ni} / \Sigma_n \Sigma_i C_{ni}$

$$CGPA = \frac{\text{Sum of the multiplication of grade points by the credits of the entire programme under each part}}{\text{Sum of the credits of the courses of the entire programme under each part}}$$

CGPA	GRADE
9.5 – 10.0	**O+**
9.0 and above but below 9.5	**O**
8.5 and above but below 9.0	**D++**
8.0 and above but below 8.5	**D+**
7.5 and above but below 8.0	**D**
7.0 and above but below 7.5	**A++**

6.5 and above but below 7.0	**A+**
6.0 and above but below 6.5	**A**
5.5 and above but below 6.0	**B+**
5.0 and above but below 5.5	**B**
4.5 and above but below 5.0	**C+**
4.0 and above but below 4.5	**C**
0.0 and above but below 4.0	**U**

Classification of Successful candidates

A candidate who passes all the examinations in Part I to Part V securing following CGPA and Grades shall be declared as follows **for Part I or Part II or Part III**:

CGPA	GRADE	CLASSIFICATION OF FINAL RESULT
9.5 – 10.0	O+	First Class – Exemplary *
9.0 and above but below 9.5	O	First Class with Distinction*
8.5 and above but below 9.0	D++	First Class
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
4.5 and above but below 5.0	C+	Third Class
4.0 and above but below 4.5	C	

Conferment of the Degree

No candidate shall be eligible for conferment of the Degree unless he / she

i. has undergone the prescribed course of study for a period of not less than six semesters in an institution
approved by/affiliated to the University or has been exempted from in the manner prescribed and has
passed the examinations as have been prescribed therefor.

ii. Has completed all the components prescribed under Parts I to Part V in the CBCS pattern to earn
140 credits.

iii. Has successfully completed the prescribed Field Work/ Institutional Training as evidenced by certificate
issued by the Principal of the College.

Ranking

A candidate who qualifies for the UG degree course passing all the examinations in the first attempt, within
the minimum period prescribed for the course of study from the date of admission to the course and secures
I or II class shall be eligible for ranking and such ranking shall be confined to 10 % of the total number of
candidates qualified in that particular branch of study, subject to a maximum of 10 ranks.
The improved marks shall not be taken into consideration for ranking.

NOTE:

- All the Papers (including computer papers) specified in this syllabus should be handled and valued by faculty of Mathematics Department only.
- Both Internal and External Examiners for University Practical Examination should be appointed (including computer papers) from faculty of Mathematics only.

*****

SEMESTER – I

CORE PAPER – I CLASSICAL ALGEBRA

Paper Code: 17UMA01 / 17UMACA01 **Max.Mark :75 Marks**

Credit :4

Unit – I

Binomial Series: Binomial theorem for a positive integral index – Binomial theorem for a rational index – Summation of Binomial series. Exponential series – Exponential series for all real Values of x – Standard results for the Exponential series – Logarithmic series – Problems. (Chapter -2, Chapter-3 and Chapter-4)

Unit – II

Matrices: Test for consistency of linear equations – Characteristic equation – Characteristic roots and characteristic vectors of a matrix – Cayley–Hamilton theorem - Similarity of matrices - Diagonalizable matrix – Problems.
(Chapter -6 (Page 6.38 to Page 6.82))

Unit – III

Theory of equations: Fundamental theorem in the theory of equations – Relation between the roots and coefficients of an equation – Imaginary and irrational roots – Symmetric functions of the roots of an equation interms of its coefficients – Problems.
(Chapter -7 (Page 7.1 to Page 7.30))

Unit – IV

Reciprocal equations – Transformation of equations – Multiplication of roots by m – Diminishing the roots of an equation – Removal of a term of an equation – Problems.
(Chapter 7 (page 7.30 to page 7.56)).

Unit – V

Descarte's rule of signs – Descarte's rule of signs for negative roots of an equation – Horner's method for approximation of roots of a polynomial equation – Newton's Method of evaluating a real root correct to given decimal places – Problems.
(Chapter – 7 (Page 7.57 to Page 7.67))

Text Book:

1. Algebra, Analytical Geometry and Trigonometry" by Dr.P.R.Vittal and V.Malini, Margham Publications, Chennai – 17.Third Edition 2000.
   Reprint 2014

Reference Books:

1. Algebra Volume I - T.K.Manicavachagam Pillai & others S.Viswanathan Printers and publishers Pvt. Ltd – 2003 Edition.

SEMESTER - I

CORE PAPER – II DIFFERENTIAL CALCULUS

Paper Code: 17UMA02 / 17UMACA02 **Max.Mark :75 Marks**

Credit : 4

Unit – I

Partial derivatives, Higher derivatives, Homogeneous function, Total differential co efficient, Implicit function – Problems Chapter – 3 (Page 3.1 to Page 3.45).

Unit – II

Jacobians , Maxima and Minima of functions of two variables, Necessary and sufficient conditions (without proof), Method of Lagrange's multipliers (no derivation) – Simple problems Chapter – 3 (Page 3.46 to Page 3.77).

Unit – III

Polar coordinates – Angle between Radius vector and the tangent, Angle of intersection of two curves, Length of perpendicular from the pole to the tangent, Pedal Equation, Asymptotes: Definition - Methods of finding asymptotes to plane algebraic curves – Problems (Chapter 5 and Chapter 7)

Unit – IV

Curvature and radius of curvature - Definitions, Cartesian formula for radius curvature, Parametric formula for radius of curvature - Radius of curvature in polar co- ordinates, Radius of curvature for pedal curves, Radius of Curvature for polar tangential curves – problems. (Chapter 6.)

Unit – V

Envelope of the one parameter family of curves. Definition, necessary and sufficient condition (without proof) Envelope for two parameter family co-ordinates of the center of curvature, Chord of curvature – Evolutes: Definition, Properties for evolute (without proof) – Problems. (Chapter 8 and Chapter 9.)

Text Book:

1.Calculus – By P.R. Vittal and Malini, Margham Publications, Chennai – 17. Third edition- 2000, Reprint 2010.

Reference Books:

1.Calculus: S. Narayanan and others ,S. Viswanathan Publications

2.Calculus: Dr. S. Sudha ,Emerald Publishers.

****

SEMESTER - II

CORE PAPER – III INTEGRAL CALCULUS

Paper Code :17UMA03 / 17UMACA03 **Max.Mark:75 Marks**

Credit :4

Unit – I

Bernoulli's formula for integration by parts, Reduction formulae – Problems. (Chapter 2)

Unit – II

Beta and Gamma functions, Properties, Relation between Beta and Gamma functions, Evaluations of definite integrals using Beta and Gamma functions – Problems. (Chapter 13)

Unit – III

Double Integrals, Double integrals in polar co ordinates, Triple Integrals – Problems (Chapter 17 (page 17.1 to page 17.22)).

Unit – IV

Change of order of Integration, Application of Double and Triple Integrals to Area, Volume and Centroid. (Chapter 17 (Page 17.22 to Page 17.43))

Unit – V

Fourier Series: Fourier expansions of periodic functions with period 2π, Fourier Series for odd and even functions. Half range Fourier series. (Chapter 21.)

Text Book:

1.Calculus – By P.R. Vittal and Malini, Margham Publications, Chennai – 17. (Units I, II, III and IV) Third edition- 2000, Reprint 2010.

2.Allied Mathematics- By P.R.Vittal Margham Publications, Chennai- 17. (Unit-V)

Reference Books:

1. P. Kandasamy and K. Thilagavathy, Allied Mathematics
2. Integral Calculus: Shanti Narayanan (S. Chand and Co.)

SEMESTER : II

CORE PAPER – IV

VECTOR ANALYSIS

Paper Code :17UMA04 / 17UMACA04 **Max.Mark :75 Marks**

Credit :4

Unit – I

Vector differentiation – Limit of a Vector function – Continuity and derivative of Vector function – Geometrical and Physical significance of Vector differentiation – Gradient – Directional derivative of Scalar point functions – Equations of Tangent plane and normal line to a level surface.

Unit - II

Vector point function: Divergence and curl of a vector point function – Solenoidal and irrotational functions – Physical interpretation of divergence and curl of a Vector point function.

Unit – III

Vector identities – Laplacian operator.

Unit – IV

Integration of Vector functions – Line, Surfaces and volume integrals

Unit – V

Gauss–Divergence Theorem – Green's Theorem – Stoke's theorem (Statements only) – Verification of theorems- simple problems.

Text Book

1. Vector Analysis, Dr.P.R. Vittal, Margham Publication, Chennai – 17.

Reference Books

1. T.K. Manickavasagam and others, Vector Analysis, Vijay Nicole Imprints Pvt. Ltd., Chennai – 29, 2004.
2. P. Duraipandian and others, Vector Analysis, S. Viswanathan and Co.,Chennai– 31

*****

SEMESTER - III

CORE PAPER – V

STATICS

Paper Code :17UMA05 **Max.Mark:75 Marks**

Credit :3

Unit – I

Parallelogram law of forces – Triangular law of forces – Perpendicular triangular forces – Converse of the triangular law of forces – The polygon of forces – Lami's theorem – Like and unlike parallel forces – Problems – Moments – Definition – Varignon's theorem – Problems. (Chapter II (sections 1 to 9), Chapter III (sections 1 to 12).)

Unit - II

Couples – Moments of a couple – Theorems on couples – Problems. (Chapter IV (sections 1 to 10)).

Unit – III

Friction : Introduction – Experimental Results – Statical and Dynamical limiting friction – coefficient of friction – angle of friction – Cone of friction – Equilibrium of a particle on a rough inclined plane – Equilibrium of a particle on a rough inclined plane under a force parallel to the plane – Equilibrium of a particle on a rough inclined plane under any force – Problems. (Chapter VII (section 1 to 12)).

Unit – IV

Centre of gravity : Centre of like parallel forces – Centre of Mass – Centre of gravity – Distinction between centre of gravity and centre of mass – Centre of gravity of a body is unique – Determination of centre of gravity in simple cases – Centre of gravity by symmetry – C.G. of a uniform triangular lamia – Theorem – C.G. of 3 rods forming a triangle – General formula for determination of C.G. of a trapezium – Problems. (Chapter VIII (sections 1 to 13)).

Unit – V

Virtual Work : Work – Theorem – Method of Virtual work – Principle of Virtual work for a system of coplanar forces acting on a body – Forces which may be omitted in forming the equation of Virtual work – Work done by an extensible string – Work done by the weight of the body – Application of the principle of virtual work – Problems.

Text Books

1.Venkatraman.M.K., Statics, (Tenth Edition), Agasthiar Publication, Trichy 2002.

Reference Books

1.Narayanan.s, Statics, Sultan Chand and Co., Chennai 1986.

2.Duraipandian.P and Lakshimi Duraipandian, Mechanics, Emerald Publishers, Chennai, 1987.

CORE PAPER – VI

DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

Paper Code :17UMA06 / 17UMACA06 **Max.Marks:75**

SEMESTER : III **Credit :3**

Unit – I

Ordinary Differential Equations – Second order Differential Equations with constant co–efficients – Particular Integrals of the form $e^{\alpha x}V$, where V is of the form x, x^2, sinax, cosax, xsinax and xcosax.

Unit – II

Second order differential Equations with variable co – efficients – both homogeneous linear equations and homogeneous non - linear equations.

Unit – III

Partial Differential Equations –Definition – Complete solution, Singular solution and general solution – Solution of equations of standard types f(p,q)=0, f(x,p,q)=0, f(y,p,q)=0, f(z,p,q)=0 and $f_1(x,p)= f_2(y,q)$ – Clairaut's form – Lagrange's equation Pp+Qq=R.

Unit – IV

Laplace Transforms – Definition – Laplace transforms of Standard functions – Elementary theorems – Problems.

Unit – V

Inverse Laplace transforms – Standard formulae – Elementary Theorems – Applications to Second order linear differential equation (Problems with only one differential equation).

Text Books

1.T.K. Manickavasagam Pillai and S. Narayanan, Calculus, Vijay Nicole Imprints Pvt. Ltd., C – 7, Nelson Chambers, 115 Nelson Manickam Road, Chennai – 600 029, 2004.

2.Dr.P.R. Vittal, Differential Equations, Fourier Series and Analytical Solid Geometry, Margham Publications, 24, Rameswaram Road, T. Nagar, Chennai – 600 017, 2000.

Reference Books

1. Differential equations and its applications by S.Narayanan & T.K. Manichavasagam Pillay – S.Viswanathan PVT. LTD –2001 Edition

2. Engineering Mathematics by M.K. Venkatraman,National Publishing company, Chennai.

SEMESTER : III

SKILL BASED ELECTIVE COURSE – I
OFFICE AUTOMATION – PRACTICALS

Paper Code :17UMASP01 **Max.Marks :60**

Credit :2

LIST OF PRACTICALS

MS Word

- Preparation of word document (Typing, aligning, Font Style, Font Size, Text editing, colouring, Spacing, Margins)
- Creating and Editing a table (Select no of rows, Select no of columns, row heading, column heading, column width, row width, row height, spacing text editing)
- Formatting a table (insert rows/columns, delete rows/columns, cell merging/ splitting, Cell alignment)
- Preparation of letters using mail merge.
- Demonstration of Find, Replace, Cut, Copy and paste texts in a word document.

MS Excel

- Preparation of a Table using Excel.
- Creation of Charts, Graphs and Diagrams

MS Power Point

- Preparation of slides in power point.
- Creation of Animation Pictures.

MS Access

- Creation of simple reports using MS Access.

General

- Export a given graph from Excel to word.
- Sending an Email.
- Download a document from internet.
- Import a picture from internet to word document.

- Create a Power point presentation when a word document is given.

Text Book

1.Andy Channelle, “Beginning Open Office 3: From Novice to Professional” A Press series, Springer-Verlog, 2009

Reference Books

1.Perry M. Greg, “Sams Teach Yourself Open Office.org All In One”, Sams Publications, 2007.

Note:

- This paper should be handled and valued by the faculty of Mathematics only.
- Both Internal and External Examiners for University Practical Examination should be appointed from faculty of Mathematics Department only.

****

SEMESTER IV
CORE PAPER – VII DYNAMICS

Paper Code :17UMA07 **Max.Marks :75**

Credit :3

Unit – I

Kinematics: Speed – Displacement – Velocity – Composition of Velocities (Parallelogram Law) – Resolution of Velocities – Component of a velocity along two given directions – Triangle of Velocities – Polygon of Velocities – Resultant of several simultaneous coplanar velocities of a particle – Acceleration – Variable acceleration – Units of Straight line under uniform acceleration. (Chapter – III (Sections 3.1 to 3.9, 3.17 – 3.22))

Unit – II

Projectiles: Definitions – Two fundamental principles – The path of a projectile is a parabola – Characteristics of the motion of a projectile – Range on an inclined plane.

(Chapter VI (Sections 6.1 to 6.8, 6.12 to 6.16))

Unit – III

Impulsive Forces: Impulse – Impulsive Force – Impact of two bodies – motion of a shot and Gun – Loss of Kinetic energy – Collision of elastic bodies: Definitions – Fundamental Laws of Impact – Impact of a smooth sphere on a fixed smooth plane – Direct impact of two smooth spheres – Oblique impact of two smooth spheres.

(Chapter – VII (Sections 7.1 to 7.6), Chapter – VIII (Sections 8.1 to 8.9))

Unit – IV

Simple Harmonic Motion: Simple Harmonic motion in a straight line – General solution of the S.H.M. equation – Geometrical representation – Change of origin – S.H.M. on a curve – simple pendulum – period of oscillation of a simple pendulum – equivalence simple pendulum – seconds pendulum – loss or gain in the number of oscillation made by a pendulum.

(Chapter – X (Sections 10.1 to 10.5, 10.11 – 10.16))

Unit – V

Central Forces: Velocity and Acceleration in polar coordinates – Equations of motion in polar coordinates – Motions under a central force – Note on Equiangular Spiral – Differential equation of Central orbits – Perpendicular from the pole on the target formula in polar coordinates – pedal equation of the central orbit – Well known curves – Velocity in a central orbit – Two fold problems in central orbits – Apses and apsidal distances. (Chapter XI (Sections 11.1 to 11.11))

Text Book:

1.Venkatraman. M.K., 2009, Dynamics (Tenth Edition), Agasthiar Publications, Trichy.

Reference Books:

1.Narayanan. S., 1986, Dynamics, Sultan Chand and co., Chennai.

2.Duraipandian. P., 1988, Mechanics, Emerald Publishers, Chennai.

SEMESTER : IV

CORE PAPER – VIII

TRIGONOMETRY AND ANALYTICAL GEOMETRY OF 3D

Paper Code :17UMA08 **Max.Mark :75 Marks**

Credit :3

Unit – I

Expansions of sin nθ , cos nθ and tan nθ – Expansion of $\sin^n\theta$, $\cos^n\theta$ – Hyperbolic functions and its properties. (Chapter III (Sections 1,2,3,4 excluding examples on formation of equations))

Unit – II

Inverse hyperbolic functions – Logarithms of a complex quantities – General Principal Values.(Chapter 4 (Section 2.3), Chapter V (Section 5)).

Unit – III

Analytical Geometry 3D – Straight line – Equation determined by intersection of two planes – symmetrical form – conversion of the equation of the line to symmetrical form – equation of a line passing trough two points – The plane and the straight line – coplanar lines – problems.(Chapter III (Sections 1 to 7)).

Unit – IV

Sphere: Definition – Equation of a sphere - Length, Equation of the tangent – The plane section of a sphere is a circle – Equation of a circle on a sphere – Intersection of 2 Spheres is a circle – problems. (Chapter IV (Section 1 to 8)).

Unit – V

Cone: Cone – Equation of a cone – cone whose vertex is at the origin – Quadric cone whose vertex is at the origin – General quadric cone – Problems. Chapter 6 (Sections 6.1 to 6.5)

Text Books

- Vittal P.R., 2004, Trigonometry, Margham Publications, Chennai.(for unit I)
- Manicavachagam Pillay. T.K., and T. Natarajan, A Text Book of Analytical Geometry Part – II Three Dimensions, Re Print 2000, S.Viswantan Pvt. Ltd.(for unit II, III, IV)
- Duraipandian, P. and Lakshmi Durai Pandian, D Muhilan, Analytical Geometry 3 Dimensional, Emerald Publishers, Chennai, Re Print 2004. (for unit V)

Reference Books:

.

1. Shanthi Narayanan and Mittal P.K:Analytical Solid Geometry 16th Edition (For units I to III) S.Chand & Co, New Delhi.
2. P.Duraipandian& others-Analytical Goemetry 3 Dimensional-Emerald Student Edition.

SEMESTER : IV

SKILL BASED ELECTIVE COURSE – II

QUANTITATIVE APTITUDE

Paper Code :17UMAS02 **Max.Mark:75 Marks**

Credit :2

Unit – I

Chain rule – Time and work.

Unit – II

Time and Distance.

Unit – III

Problems on Trains.

Unit – IV

Boats and Streams.

Unit – V

Calendar and Clocks.

Text Book

1.R.S. Aggarwal, Quantitative Aptitude for Competitative Examinations, S. Chand co. Ltd., 152, Anna Salai, Chennai, 2001.

Reference Books:

1.Quantitative Aptitude “by Abhijit Guha, Tata McGraw Hill Publishing Company Limited, New Delhi (2005).

****

SEMESTER - V

CORE PAPER – IX MODERN ALGEBRA – I

Paper Code :17UMA09/ 17UMACA09 **Max.Mark :75 Marks**

Credit :5

Unit – I

Group Theory: Definition of Group, Examples of Groups, Some preliminary Lemmas and Subgroups – Definition – Lemmas – Theorems (Lagrange's, Euler and Fermat) – Examples. (Sections 2.1 to 2.4)

Unit – II

Group Theory (Continuation): A Counting Principle – Normal Sub Groups and Quotient groups and Homomorphism – Definitions – Lemmas – Theorems – Examples.(Sections 2.5 to 2.7).

Unit – III

Group Theory (Continuation): Automorphism, Cayley's Theorem and permutation groups – definition – Lemmas – Theorems – Examples. (Sections 2.8 to 2.10.)

Unit – IV

Ring Theory: Definition and Examples of Rings, some special classes of Rings, Homomorphisms, Ideals and Quotient Rings and more ideals and Quotient Rings – Definition – Lemmas – theorems – Examples. (Sections 3.1 to 3.5).

Unit – V

Ring theory (Continuation): The field of quotient of an integral Domain, Euclidean Rings, A particular Euclidean ring and polynomial rings – Definition – Lemmas – theorems – Examples.- Polynomials over the rational field- polynomial rings over the commutative rings .(Sections 3.6 to 3.11)

Text Books

1I.N. Herstein, Topics in Algebra, John Wiley, New York, 1975.

Reference Books

1.Mathematics for Degree Students (B.Sc. 3rd Years), Dr.U.S. Rana, S. Chand, 2012.

2.A first course in Modern Algebra, A.R. Vasistha, Krishna Prekasan Mandhir, 9, Shivaji Road, Meerut (UP), 1983.

3.Modern Algebra, M.L. Santiago, Tata McGraw Hill, New Delhi, 1994.

4.Modern Algebra, K. Viswanatha Naik, Emerald Publishers, 135, Anna Salai, Chennai, 1988.

SEMESTER - V

CORE PAPER – X REAL ANALYSIS – I

Paper Code :17UMA10/ 17UMACA10 **Max.Mark: 75 Marks**

Credit :4

<u>Unit – I</u>

Functions – Real Valued functions – Equivalence countability – Real numbers – Least upper bound (Sections 1.3 to 1.7) Sequence of real numbers – definition of sequence and subsequence – Limit of a sequence - Convergent sequences – divergent sequences. (Sections2.1 to 2.4)

<u>Unit – II</u>

Bounded sequences – Monotone sequences – operations on convergent sequences – operations on divergent sequences – Limit superior and limit inferior – Cauchy sequences (Sections 2.5 to 2.10).

<u>Unit – III</u>

Convergent and divergent series of real numbers – series with non–negative terms – Alternating series – conditional convergence and absolute convergence – Rearrangements of series – Test for absolute convergence – series whose terms form a non increasing sequence (Sections 3.1 to 3.7)

<u>Unit – IV</u>

The Class l^2 – Limit of a function on the real line – metric spaces – Limit in metric spaces. (Sections 3.10, 4.1 to 4.3).

<u>Unit – V</u>

Functions continuous at a point on the real line – Reformulation – Functions continuous on a metric space – open sets – closed sets – Discontinuous functions on R^1. (Sections 5.1 to 5.6)

<u>Text Book</u>

1.Richard R. Goldberg, Methods of Real Analysis – Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

<u>Reference Books</u>

1.D. Somasundaram and B.Choudhary, A First Course in Mathematical Analysis, Narosa Publishing House, New Delhi, Third Reprint, 2007.

2.Tom. M. Apostel, Mathematical Analysis, Narosa Publications, New Delhi, 2002.

SEMESTER - V

CORE PAPER – XI COMPLEX ANALYSIS – I

Paper Code :17UMA11/17UMACA11 **Max.Mark :75 Marks**

Credit :4

Unit – I

Regions in the Complex Plane – Functions of a complex variable – Limits – Theorems on Limits – Limits Involving the Point at Infinity – Continuity – Derivative – Differentiation Formulas – Cauchy – Riemann Equations – Sufficient Conditions for differentiability – polar coordinates – Analytic Functions – Examples – Harmonic Functions. Chapter I (Section 11 Only). (Chapter II (Sections 12, 15, 16 to 26)).

Unit – II

Derivative of Functions W(t) – Definite integrals of Functions W(t) – Contours – Contour Integrals – Some Examples – Examples with Branch cuts – Upper bounds for Moduli of contour Integrals – Anti-derivatives – Proof of the theorem – Cauchy–Goursat Theorem – Proof of the theorem - Simply connected Domains – Multiply connected Domains. (Chapter 4 (Sections 37 to 49)).

Unit – III

Cauchy Integral Formula – An Extension of the Cauchy integral formula – Some consequences of the extension – Liouville's Theorem and the Fundamental Theorem of Algebra – Maximum modules Principle..(Chapter 4 (Section 50 to 54)).

Unit – IV

Mappings – Mappings by the Exponential Function – Linear Transformations – the transformation w = 1/Z - Linear Fractional Transformations – An Implicit form. (Chapter 2 (Sections 13, 14) & Chapter 8 (Sections 90 to 94))

Unit – V

The Transformation w = sinz, w = cosz, w = sinhz, w=coshz – Mappings by z^2 and branches of $Z^{1/2}$ - Conformal mappings – preservation of Angles – Scale factors – Local Inverses. (Chapter 8 (Section 96, 97) and Chapter 9 (Sections 101 to 103)).

Text Book

1. James Ward Brown and Ruel V. Churchil,l Complex Variables and Applications, McGraw Hill, Inc, Eighth Edition.

Reference Books

1. P.P Gupta – Kedarnath & Ramnath, Complex Variables, Meerut -Delhi

2. J.N. Sharma, Functions of a Complex variable, Krishna Prakasan Media(P) Ltd, 13th Edition, 1996-97.

3. T.K.Manickavachaagam Pillai, Complex Analysis, S.Viswanathan Publishers Pvt Ltd.

SEMESTER - V

ELECTIVE PAPER – I OPERATIONS RESEARCH

Paper Code :17UMAE01/17UMACAEO1 Max.Mark :75 Mark

Credit :5

Unit - I

Introduction - Definition of O.R. - Scope, phases and Limitations of O.R. - Linear Programming Problem - Graphical Method - Definitions of bounded, unbounded and optimal solutions - procedure of solving LPP by graphical method - problems - Simplex technique - Definitions of Basic, non-basic variables - basic solutions - slack variables, surplus variables and optimal solution, simplex procedure of solving LPP - Problems.

Unit – II

Introduction- Balanced and unbalanced T.P, Feasible solution- Basic feasible solution - Optimum solution - degeneracy in a T.P. - Mathematical formulation - North West Corner rule - Vogell's approximation method (unit penalty method) Method of Matrix minima (Least cost Method) - problems-algorithm of Optimality test (Modi Method) -Problems. Introduction - Definition of Assignment problem, balanced and unbalanced assignment problem -restrictions on assignment problem - Mathematical formulation -formulation and solution of an assignment problem (Hungarian method) - degeneracy in an assignment problem – Problems.

Unit – III

Introduction - Definition - Basic assumptions - n jobs to be operated on two machines - problems - n-jobs to be operated on three machines - problems - n-jobs to be operated on m machines - problems . Definition of Inventory models-Type of inventory models: (i) Uniform rate of demand, infinite rate of production with no shortage (ii) Uniform rate of demand, finite rate of replacement with no shortage - Book Works - Problems.

Unit – IV

Definitions -Newspaper boy problem - Inventory model with one and more price break problems. Introduction- definition of steady state, transient state and queue discipline, characteristics of a queuing model - Applications of queuing model - Little's formula - Classification of queues - Poisson process -properties of Poisson process. Models(i) (M/M/1): (∞ /FCFS),(ii) (M/M/1) : (N/FCFS),(iii) (M/M/S) : (∞ /FCFS) - formulae and problems only.

Unit - V

Introduction - definition of network, event, activity, three time estimates (optimistic, pessimistic & most likely), critical path, total float and free float - difference between CPM and PERT – Problems.

Text Book

1.P.K. Gupta, Manmohan and Kanti Swarup, Operations Research, 9th edition, 2001, Sultan Chand &Sons, Chennai.

Reference Books

1.CK Mustafi, Operations Research, Fourth Edition, New Age International Publishers

2.P.K.Gupta and D.S. Hira, Operations Research, 2th edition, 1986, S Chand & Co, New Delhi.

3.S. Kalavathy, Operations Research, 2nd edition -2002, Publishing House Pvt. Limited,New Delhi.

SEMESTER - V

ELECTIVE PAPER – I

ASTRONOMY

Paper Code :17UMAE02 **Max.Mark :75 Marks**

Credit :5

Unit – I

Standard formulae in spherical Trigonometry – Statements only – celestial sphere – celestial co-ordinates and their conversions – Diurnal Motion - Problems Connected with Diurnal Motion – Zones of Earth – DIP – Twilight – Problems.

Unit – II

Astronomical refraction – Tangent and Cassini's formulae – Geocentric Parallax Heliocentric Parallax – Problems.

Unit – III

Kepler's laws of planetary motion – Newton's deductions from kepler's Laws – Equation of Time – Seasons – Calender conversion of time – problems.

Unit – IV

Fixing the Ecliptic – Fixing the position of the first point of Aries (Flamsteed's Method) – The moon – Different phases – Metonic cycle – Tides – Problems.

Unit – V

Eclipses – Solar eclipses – Lunar eclipses – General description of Solar system and stellar universe – Problems.

Text Book:

1.Kumaravelu and Susila Kumaravelu, 1984, Astronomy, K.Kumaravelu, Muruga Bhavanam, Chidambara Nagar, Nagarkoil – 2.

Reference Books

1. V. Thiruvenkatacharya, A Text Book of Astronomy, S. Chand and Co., Pvt Ltd., 1972.

SEMESTER - V

ELECTIVE PAPER – II

DISCRETE MATHEMATICS

Paper Code :17UMAE03/17UMACAE03 **Max.Mark :75 Marks**

Credit :5

Unit – I

Mathematical logic – Statements and Notations – Connectives – Negation – Conjunction – Disjunction – Statement formulas and Truth table – Conditional and Bi- conditional – well formed formulas. Tautologies. (Sections 1.1, 1.2.1 to 1.2.4, 1.2.6 to 1.2.8)

Unit – II

Normal forms – Disjunctive Normal forms – Conjunctive Normal forms – Principal Disjunctive Normal forms – Principal conjunctive normal forms – ordering and uniqueness of normal forms – the theory of inference for the statement calculus – validity using truth tables – Rules of inference. (Sections 1.3.1 to 1.3.5., 1.4.1 to 1.4.2)

Unit – III

The predicate calculus – Predicates – The Statements function, Variables and quantifiers – Predicate formulas – Free and bound variables – The universe of discourse – inference theory of the predicate calculus – Valid formulas and Equivalence – some valid formulas over finite Universes – Special valid formulas involving quantifiers – Theory of inference for the predicate calculus. (Sections 1.6.1 to 1.6.4).

Unit – IV

Relations and ordering – Relations – Properties of binary relation in a set – Partial ordering – Partially ordered set: Representation and Associated terminology – Functions – Definition and introduction – Composition of functions – inverse functions – Natural numbers – Peano axioms – Mathematical Induction. (Sections 2.3.1, 2.3.2, 2.3.8, 2.3.9, 2.4.1., 2.4.3., 2.5.1)

Unit – V

Lattices a partially ordered sets : Definition and Examples – Some properties of Lattices. Boolean Algebra: Definition and example – Sub algebra, Direct Product and homomorphism – Boolean Functions – Boolean forms and free Boolean algebra – values of Boolean expression and Boolean functions. (Sections 4.1.1., 4.1.2., 4.2.1, 4.2.2, 4.3.1., 4.3.2.,)

Text Book

1.J.P. Trembly, R. Manohar, Discrete Mathematical Structure with Applications to Computer Science, Tata McGraw Hill, 2001.

Reference Book

1.Dr. M.K.Sen and Dr. B.C.Charraborthy, Introduction to Discrete Mathematics, Arunabha Sen Books & Allied Pvt. Ltd., 8/1 Chintamoni Das Lane, Kolkata – 700009, Reprinted in 2016.

SEMESTER - V

ELECTIVE PAPER – II

NUMBER THEORY

Paper Code :17UMAE04 **Max.Mark :75 Marks**

Credit :5

Unit – I

The Division Algorithm – The g.c.d. – The Eucliden Algorithm – The Diophantine $ax + by = c$.

Unit – II

The Fundamental Theorem of arithmetic, the sieve of Eratesthenes – The Goldbach conjecture – basic properties of congruence.

Unit – III

Special Divisibility tests – Linear congruences – The little Fermat's theorem – Wilson's Theorem.

Unit – IV

The Functions μ and σ the Mobius inversion Formula – The Greatest integer function.

Unit – V

Euler's Phi–Function – Euler's Theorem – Some Properties of the Phi – Function.

Text Book

1.David M. Burton, 2001, Elementary Number Theory, Universal Book Stall.

Reference Book

1. Elementary Theory of Numbers, cy. Hsiung, Allied Publishers, 1995.
2. Elmentary Number Theory, Allyn and Bacon lnc.,Boston, 1980.
3. Introduction to Analytic Number Theory, Tom.M.Apostal, Narosa Publishing House, New Delhi, 1989.

SEMESTER : V

SKILL BASED ELECTIVE COURSE - III

C PROGRAMMING

Paper Code :17UMAS03 **Max.Mark :75 Marks**

Credit :2

Unit – I

Constants and variables: Introduction – Character set – Constants – Keywords and Identifiers – Variables – Data Types – Declaration of Variables – Assigning values to variables – Defining symbolic constants.(Sections:2.1 to 2.8, 2.10, 2.11)

Unit – II

Arithmetic operators – Relational operators – Logical operators – Assignment operators – Increment and Decrement operators – conditional operators – Special operators. Arithmetic expressions – Evaluation of Expressions (Sections 3.2 to 3.7, 3.9, 3.10, 3.11)

Unit – III

Managing Input and output operations: Reading a character – Writing a character – Formatted input and output Decision making and Branching: Decision making with IF Statement – Simple IF Statement – IF ELSE Statements – Nesting of IF …ELSE Statement – ELSE IF Laader (Sections 4.1 to 4.5)

Unit – IV

Switch Statement – ? Operator – GOTO Statement – Decision Making and Looping: WHILE Statement – Do Statement – FOR Statement – Jumps in Loops – Simple Programs. (Sections 5.2 to 5.9, 6.2 to 6.5)

Unit – V

Arrays: Introduction – One Dimensional array – Declaration of one and two dimensional arrays – Initiating of one and two dimensional arrays - Declaring and initializing string variables – Reading strings from terminal – writing sting on the screen–Arithmetic operations on characters – simple problems. (Sections 7.1 to 7.6,8.1 to 8.5)

Text Book:

1.E. Balagurusamy, Reprint 2006, Programming in ANSI C, Tata McGraw Hill Publishing Company Ltd., New Delhi, 3rd Edition.

Reference Books

1.Peter Aitken and Bradley L Jones, Teach Yourself C in 21 Days, Tech Media, New Delhi, 4th Edition.

2.Tony Zhang, Teach Yourself C in 24 Hours, Sams Publications, 1st Edition, 1997.

3.Ram Kumar and Rakash Agrawal, Programming in ANSI C, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1993.

Note: This paper should be handled and valued by the faculty of Mathematics only.

SEMESTER V

SKILL BASED ELECTIVE COURSE - IV

C PROGRAMMING PRACTICAL

Paper Code :17UMASP04 **Max.Mark :60 Marks**

Credit :2

Write C program for the following

1. To Find the sum of N numbers
2. To Find the Largest of given 3 numbers
3. To solve a quadratic equations
4. To find the simple and compound interest
5. That reads an integer N and determine whether N is prime or not.
6. To arrange the number in ascending and descending order
7. To generate the Fibonacci sequence
8. To Find mean and standard deviation
9. To find addition and subtraction of two matrices.
10. To find the multiplication of two matrices.

Note

- This paper should be handled and valued by the faculty of Mathematics only.
- Both internal and external examiners for University Practical examination should be appointed from the faculty of Mathematics only.

*****

SEMESTER - VI

CORE PAPER – XII

MODERN ALGEBRA – II

Paper Code:17UMA12 /17UMACA12 **Max.Mark :75 Marks**

Credit :5

Unit I: Vector Spaces and Modules

Elementary Basic concepts and Linear Independence & Bases - definition - lemmas -theorems - examples.- Dual spaces- Inner Product Spaces - definition - lemmas -theorems - examples.- Modules (Sections 4.1 to 4.5)

Unit II : Fields

Extension fields – The Trancedence of e – roots of polynomials – constructions with straightedge and compass – more about roots – the elements of Galois theory. (Sections 5.1 to 5.6)

Unit III : Linear Transformations.

The Algebra of linear transformations, Characteristic roots and Matrices - definition - lemmas-theorems - examples. (Sections 6.1 to 6.3)

Unit IV : Linear Transformations

Canonical forms: Triangular form and Nilpotent Transformations - definition - lemmas –theorems examples. (Sections 6.4 & 6.5)

Unit V : Linear Transformations(continuation)

Trace and Transpose and Determinants - Definitions - Properties - Theorems - Cramer's Rule -Problems. (Sections 6.8 & 6.9)

Text Book

1.I.N. Herstein, Topics in Algebra-2nd Edition, John Wiely, New York, 1975.

Reference Books

1. Dr. U S Rana, Mathematics for Degree Students (B.Sc 3rd Years), S.Chand, 2012.

2. A.R.Vasistha, A first course in modern algebra, Krishna Prekasan Mandhir, 9, Shivaji Road, Meerut (UP), 1983.

3. K.Viswanatha Naik, Modern Algebra, Emerald Publishers, 135, Anna Salai, Chennai -2, 2001.

4. K.Viswanatha Naik, Modern Algebra, Emerald Publishers, 135, Anna Salai, Chennai -2, 1988.

SEMESTER - VI

CORE PAPER – XIII

REAL ANALYSIS – II

Paper Code :17UMA13/17UMACA13 **Max.Mark :75 Marks**

Credit :5

Unit – I

More about open sets – connected sets – bounded sets and totally bounded sets – complete metric spaces. (Sections 6.1 to 6.4)

Unit – II

Compact metric spaces – continuous functions on compact metric spaces – continuity of the inverse function – uniform continuity. (Sections 6.5 to 6.8)

Unit – III

Sets of measure zero – definition of the Riemann integral – Existence of the Riemann integral – Properties of the Riemann integral (Sections 7.1 to 7.4)

Unit – IV

Derivatives – Rolle's theorem – The law of the mean – Fundamental theorem of calculus. (Sections :7.5 to 7.8)

Unit – V

Pointwise convergence of sequences of functions – uniforms convergence of sequences of functions – consequences of uniform convergence – convergence and uniform convergence of series of functions (Sections :9.1 to 9.4)

Text Book

1.Richard R. Goldberg, Methods of Real Analysis – Oxford and IBH Publishing co, Pvt. Ltd., New Delhi.

Reference Books

1.D. Somasundaram and B.Choudhary, A First Course in Mathematical Analysis, Narosa Publishing House, Third Reprint, 2007.

2.Tom. M. Apostel, Mathematical Analysis, Narosa Publications, New Delhi, 2002.

SEMESTER : VI

CORE PAPER – XIV

COMPLEX ANALYSIS – II

Paper Code :17UMA14/17UMACA14 **Max.Mark :75 Marks**

Credit :4

Unit – I

Convergences of Sequences - Convergences of Series – Taylor series – Proof of Taylor's Theorem – Examples – Laurent series – Proof of Laurent's theorem – Examples. (Chapter 5 :Section 55 to 62).

Unit – II

Absolute and Uniform convergence of power series – continuity of sums of power series – Integration and differentiation of power series – Uniqueness of series representations – Multiplication and Division of power series. (Chapter 5 Sections 63 to 67).

Unit – III

Isolated Singular points – Residues – Cauchy's Residue Theorem – Residue at Infinity – the Three Types of Isolated Singular points – Residues at poles – Examples – Zeros of Analytic Functions – Zeros and Poles – Behaviour of Functions Near Isolated Singular Points. (Chapter 6 : Section 68 to 77)

Unit – IV

Evaluation of Improper Integrals – Examples – Improper Integrals from Fourier Analysis – Jordan's Lemma. (Chapter 7 :Sections 78 to 81).

Unit – V

Indented Paths – An Indentation, around a branch point – Integration Along a Branch cut – Definite Integrals Involving sines and cosines – Argument Principle – Rouche's Theorem. (Chapter 7 :Section 82 to 87).

Text Book

1.James Ward Brown and Ruel V. Churchill ,Complex Variables and Applications, Eighth Edition by McGraw Hill, Inc.

Reference Books

1. Theory and Problems of Complex Variables-Murray.R.Spiegel,Schaum outline series.

2. Complex Analysis-P. Duraipandian.

3. Introduction To Complex Analysis.S. Ponnuswamy, Narosa publishers 1993.

SEMESTER - VI

CORE PAPER – XV

GRAPH THEORY

Paper Code :17UMA15/17UMACA15 **Max.Mark :75 Marks**

Credit :5

Unit – I

Introduction – Definition – Examples – Degrees – Definition – Theorem 1, 2 – Problems – Subgraphs – Definition – Theorems – Operations on graphs – Definition theorem–1 – Problems.

Unit – II

Introduction – Walks, Trails and Paths – Definitions Theorem–1,2,3 – Connectedness and Components – Definitions – Theorems – Definition – Distance – Theorems – Cut point – Bridge – Blocks – Connectivity.

Unit – III

Introduction – Eulerian Graphs – Definition – Lemmas – Theorem – Konigsberg Bridge problem – Fleury's Algorithms – Hamiltonian graphs – Definitions - Theorems – Lemma – Closure – Theorems.

Unit – IV

Introduction – Characterization of Trees – Theorems – Centre of a tree – Definition – Theorem.

Unit – V

Introduction – Definition – Basic properties definitions – Theorems – Paths and connections – Theorems – Definition – Diagraphs and matrices – Definitions – Theorems.

Text Book

1. S.Arumugam, S.Ramachandran, Invitation to Graph theory, Scitech Publications, Chennai, 2001**.**

Reference Books

1. John clark and Derek Allan Holton ,A first book at graph theory,Allied publishes.

2. S.Kumaravelu and Susheela Kumaravelu ,Graph theory,Publishers Authors C/o.182, Chidambara Nagar, Nagarkoil - 629 002.

SEMESTER -VI

ELECTIVE PAPER– III

NUMERICAL ANALYSIS

Paper Code :17UMAE05 **Max.Mark :75 Marks**

Credit :5

Unit I

Method of successive approximation - The Bisection method - The method of false position – Newton Raphson Method - Generalized Newton's Method - Muller's Method.

Unit II

Finite Differences - Forward Differences - Backward Differences - Symbolic relations and separation of symbols - Detection of Errors using difference tables - Differences of a polynomial - Newton's formulae for Interpolation - Central Difference Interpolation formulae - Gauss's central difference formulae -Stirling's formulae - Bessel's formulae - Everett's formulae.

Unit III

Numerical Differentiation: Newton's forward and backward difference formulas - Errors in Numerical Differentiation. Numerical Integration : Trapezoidal rule - Simpson's 1/3 rule - Simpson's 3/8 rule - Boole's and Weddle's rule.

Unit IV

Solution of Linear systems : Direct Methods - Gaussian elimination method - Gauss Jordan method, LU decomposition method . Iterative methods - Jacobian's method - Gauss Seidal Method.

Unit V

Solution of Ordinary Differential Equations(First Order Differential Equations only): Taylor's series - Picard's method of successive approximations - Euler's method - Runge-Kutta Methods - II and IV order.

Text Books:-

1. Introductory Methods of Numerical analysis by S.S.Sastry,, Prentice Hall of India Pvt Ltd, New Delhi 2000

Reference Books:-

1. Numerical Methods by.Balagurusamy, Tata Me Graw Hill Publishing Company Ltd, NewDelhi, 2002

2. Numerical Analysis by G.Shanker Rao,New Age International Publishers Fourth Edition

3. Engineering Numerical Methods by T.K.Manickavasagam and Narayanan S.Viswanathan & Co, Chennai 1998

SEMESTER - VI

ELECTIVE PAPER – III JAVA PROGRAMMING

Paper Code :17UMAE06/17UMACAE06 **Max.Mark :75 Marks**

Credit :5

Unit – I

Basic concepts of object – oriented programming – objects and classes – Data Abstraction and Encapsulation – Inheritance – polymorphism – Dynamic Binding – Message communication – Java features – Java Environment – Java Program structure – Java Virtual Machine.

Unit – II

Introduction – Constants – Variables – Data types – Declaration of variables – scope of variables – type casting – operators and expressions – Decision making and branching – Decision making and looping.

Unit – III

Classes – objects and methods – Arrays – Strings – Interfaces – Multiple inheritance.

Unit – IV

Packages – Multithreaded programming – Managing Errors and Exceptions.

Unit – V

Applet Programming – Introduction – Building Applet code – applet life cycle – Creating an executable applet – Designing a web page – Applet tag – adding applet to HTML file – Running the Applet – Managing I/O files in Java.

Text Book

1.E. Balagurusamy, Programming with Java a Printer, Tata McGraw Hill Publications Co., Ltd., New Delhi, 1998.

Reference Books

1.Pootrick Naughton and Hebert Schedelt, The Complete Reference Java – 2, Tata McGraw Hill Publications Co., Ltd., New Delhi, 3rd Edition, 2006.

2.Hebert Schedelt, Java – 4th Edition.

Note:

- This paper should be handled and valued by the faculty of Mathematics only.
- Both Internal and External Examiners for University Practical Examination should be appointed from faculty of Mathematics only.

SEMESTER - VI

SKILL BASED ELECTIVE PAPER – V: LATEX – THEORY

Paper Code :17UMAS05 / 17UMACAS05 **Max.Mark :75 Marks**

Credit :2

Unit – I

Basic LaTex – Sample document and Key Concepts – type style – environments – Lists – Contering – tables – verbatim – vertical and horizontal spacing.(Chapter 2 Sections 2.1. to 2.4.)

Unit – II

Typesetting Mathematics – Examples – Equation environments – Fonts, hats and underlining – braces – arrays and matrices – Customized commands – theorems like environments. (Chapter 3 Sections3.1. to 3.7.)

Unit – III

Math miscellaxy – Math Styles – Bold Math – Symbols for number sets – binomial coefficient. (Chapter 3 Sections 3.8. to 2.4.)

Unit – IV

Further essential LaTex – Document classes and the overall structure – titles for documents – Sectioning commands. (Chapter 4 Sections 4.1. to 4.3.)

Unit – V

Miscellaneous extras – Spacing – Accented characters – Dashes and hyphens – quotation marks – trouble shooting – Pinpointing the error – common errors – warning messages. (Chapter 4 Sections42.4. to 4.5.)

Text Books

1.David F Griffiths and Desmond J. Higham, Learning LaTex, SIAM (Society for Industrial and Applied Mathematics) Publishers, Phidel Phia, 1996.

Reference Books

1.Martin J. Erickson and Donald Bindner, A Student's Guide to the Study, Practice, and Tools of Modern Mathematics, CRC Press, Boca Raton, FL, 2011.

2. L. Lamport. LATEX: A Document Preparation System, User’s Guide and ReferenceManual. Addison-Wesley, New York, second edition**,** 1994

Note: This paper should be handled and valued by the faculty of Mathematics only.

- Both Internal and External Examiners for University Practical Examination should be appointed from faculty of Mathematics only.

SEMESTER : VI

SKILL BASED ELECTIVE PAPER – VI: LATEX PRACTICALS

Paper Code :17UMASP06 / 17UMACASP06 **Max.Mark :60 Marks**
Credit :2

LIST OF PRACTICALS

Write Latex program for the following

1.Type a Document in different alignments (Left, Right, Center, Justify).

2.Type a Letter for applying a job.

3.Type your own Bio – Data.

4.Draw a Table structure.

5.Type a given Mathematical expression using Differentiation, Integration and Trigonometry.

6.Type a given Mathematical expression using all expression.

7.Type a given expression using all inequalities.

8.Type of given Article.

9.Draw any picture and insert in LateX file.

10.Type a given Question paper

11.Convert one LateX file into power point presentation.

Text Books

1.David F Griffiths and Desmond J. Higham, Learning LaTex, SIAM (Society for Industrial and Applied Mathematics) Publishers, Phidel Phia, 1996.

Reference Books

1.Martin J. Erickson and Donald Bindner, A Student's Guide to the Study, Practice, and Tools of Modern Mathematics, CRC Press, Boca Raton, FL, 2011.

2. L. Lamport. LATEX: A Document Preparation System, User's Guide and ReferenceManual. Addison-Wesley, New York, second edition, 1994

Note: This paper should be handled and valued by the faculty of Mathematics only.

- Both Internal and External Examiners for University Practical Examination should be appointed from faculty of Mathematics only.

ALLIED MATHEMATICS

SEMESTER - I / III

ALLIED MATHEMATICS – I (GROUP - A)

Paper Code :17UMAA01 **Max.Mark :75 Marks**

Credit : 4

Unit -1: Theory of Equations:

Imaginary roots - Irrational roots -Formation of equations -Solution of equations-Diminishing the roots of an equation & solutions-Removal of the second term of an equation & solutions –Descarte's rule of sign -Problems only.

Unit - II: Matrices:

Definition of Characteristic equation of a matrix- Characteristic roots of a matrix - Eigen values and the corresponding Eigen vectors of matrix – Cayley Hamilton theorem (Statement only) – Verifications of Cayley Hamilton Theorem – Problems only.

Unit- III :Radius of Curvature:

Formula of Radius of Curvature in Cartesian coordinates, Parametric coordinates and Polar coordinates (no proof for formulae)-Problems only.

Unit - IV : Partial Differential Equations:

Formation of Partial Differential Equations by eliminating the arbitrary constant and arbitrary functions - Lagrange's Linear Partial Differential Equations - Problems only.

Unit - V : Integration:

Definite Integral :Simple properties of definite Integrals-Bernoulli's Formula - Integration by parts- simple problems; Reduction formula for $\int_0^{\frac{\pi}{2}} \sin^n x \, dx$, $\int_0^{\frac{\pi}{2}} \cos^n x \, dx$, $\int_0^{\infty} e^{-x} x^n \, dx$, $\int x^n e^{ax}$dx - simple problems.

Text Book :

1. Dr.P.R .Vittal ,Allied Mathematics, Margham publication, Chennai-17, Reprint 2012

Reference Book:

1.S.G.Venkatachalapathi, Allied Mathematics, Margham publication, Chennai-17,Reprint 2011.

SEMESTER - II/ IV

ALLIED MATHEMATICS – II (GROUP -A)

Paper Code :17UMAA02 **Max.Mark :75 Marks**

Credit : 3

Unit - I: Jacobian and Maxima & Minima:

Jacobian of two variables and three variables - Maxima and Minima of functions of two variables -Problems only.

Unit - II : Finite Differences:

First difference- Higher differences - Construction of difference table - Interpolation of missing value-Newton's Forward and Newton's Backward difference formula (no proof)-Lagrange's Interpolation formula (no proof)- simple problems only.

Unit - III : Second Order Differential Equations:

Second Order Differential Equations with constant coefficients- Complementary function-particular Integral and Solution of the type: e^{ax} , x^n , cos ax (or) sin ax, $e^{ax}x^{bx}$, e^{ax}sin bx , e^{ax}cos bx - only

Unit - IV : Laplace Transforms:

Definition of Laplace Transforms - standard formula -Linearity property - Shifting property - Change of scale property - Laplace Transforms of derivatives-Problems.

Unit - V : Inverse Laplace Transforms:

Standard formula - Elementary theorems(no proof) - Applications to solutions of second order differential equations with constant coefficients -Simple problems.

Text Book :

1. Dr.P.R .Vittal ,Allied Mathematics, Margham publication, Chennai-17, Reprint 2012

Reference Book:

1. S.G.Venkatachalapathi, Allied Mathematics, Margham publication, Chennai-17,Reprint 2011.

SEMESTER - II / IV

ALLIED MATHEMATICS-III – PRACTICALS (GROUP - A)

Paper Code :17UMAAP01 **Max.Mark :60 Marks**

Credit : 3

Unit-1: Matrices:

Rank of Matrix – Problems upto (3x3) Matrix - Characteristic equation of a Matrix - Cayley Hamilton Theorem (statement only)-Problems to verify Cayley Hamilton Theorem.

Unit - II: Leibnitz formula for n^{th} derivative:

Leibnitz formula (without proof) for n^{th} derivative- Problems (Page no. 8.23 to 8.39 of the Text Book).

Unit - III: Partial Differentiation:

Euler's theorem on homogeneous function (without proof)- Problems to verify Euler's theorem-Partial derivative - problems (Page no. 9.1 to 9.13 and 9.18 to 9.27 of the Text Book).

Unit - IV: Scalar and Vector point functions:

Scalar point functions -Gradient of scalar point functions - Vector point functions -Problems only.

Unit - V : Divergence and Curl of Vector point functions:

Divergence of vector point functions - Curl of vector point functions -Solinoidal of vector - Irrotational of vector - Problems only.

Text Book :

1. Dr.P.R .Vittal ,Allied Mathematics, Margham publication, Chennai-17, Reprint 2012

Reference Book:

1.S.G.Venkatachalapathi, Allied Mathematics, Margham publication, Chennai-17,Reprint 2011.

Note:

1) University Examination will be conducted at the end of Second Semester/Fourth Semester,
2) **Two Teaching Hours** for Unit – I, II and III in the First Semester/Third Semester and **two Hours** for Unit – IV and V in the Second Semester/Fourth Semester.

SEMESTER - I / III

ALLIED MATHEMATICS -I- (GROUP- B)

DISCRETE MATHEMATICS

Paper Code :17UMAA03 **Max.Mark :75 Marks**

Credit : 4

Unit I

Mathematical Logic : Logical Statements - Propositional Calculus - The Negation -Conjunction - Disjunction - Tautologies - Logical Equivalence- The algebra of propositions- Problems.. Relation and Functions: Relation - Equivalence relation - Functions - Problems.

Unit II

Ordered sets and Lattices : Coset-Product Set and Order- Hasse Diagram of Partially Ordered Sets - Lattices-Lattices as Partially Ordered Sets - Lattices as Algebraic System - Sub Lattices - Product of two Lattices - Complete, Complemented , Distributive, and Modular Lattices - Problems. only.

Unit III

Boolean Algebra and Switching Circuits : Introduction – Boolean Functions - Normal Form -Fundamental form of Boolean Functions -Applications to Switching Networks - Problems.

Unit IV

Matrices and Linear Equations – Rank - Cramer's rule-problems. Characteristic Roots and Vectors of a Matrix : Characteristic equation and roots- Cayley Hamilton Theorem – Characteristic - Vectors of a Matrix - Problems.

Unit V

Combinatorics : Introduction - Sum, Product rules Factorial - Permutations - Circular Permutations - Combinatorics - Value of nCr - Pigeonhole Principle - Problems.

Text Book :

1.B.S.Vatsa . Suchi Vastsa, Discrete Mathematics, New Age International Publishers, Fourth Revised edition

Reference Book:

1.Prof.V.Sundaresan, K.S. Ganapathy Subramaniyam, K.Ganesan., Discrete Mathematics, Tata Me Graw Hill, New Delhi., 2000.

2.L.Lovarz, J.Pelikan, K.Vexztergombi.., Discrete Mathematics, Springer International Edition,2002.

SEMESTER - I / III

ALLIED MATHEMATICS – II (GROUP- B)

NUMERICAL METHODS

For Unit I, Unit II, and Unit III - First Semester / Third Semester - 2 Hours per Week For Unit IV and Unit V - Second Semester / Fourth Semester - 2 Hours per Week.

Paper Code :17UMAA04 **Max.Mark :75 Marks**

Credit : 3

Unit I

Solution of Algebraic and Transcendental Equations - Introduction - Regula Falsi Method - Bisection Method - Iteration Method - Newton - Raphson Method - Problems.

Unit II

Calculus of Finite Differences - Introduction - Forward Differences - Backward Differences - Central Differences - Operators - Forward Differences - Backward Differences - Fundamental Theorem of Difference Calculus - Difference Operator Δ and E - Problems.

Unit III

Interpolation with equal intervals - Newton's Forward and Backward Interpolation Formula - Central Difference Interpolation Formula - Gauss's Forward and Backward Interpolation formula - Bessel's Formula - Stiring 's Formula .-Problems.

Unit IV

Numerical Differentiation and Numerical Integration - Derivatives using Newton's Forward - Newton's Backward - Striling 's Formula - Numerical Integration -General Quadrature Formula - Trapezoidal Rule - Simpson's 1/3 Rule - Simpson's 3/8 Rule -Problems .

Unit V

Numerical solutions of Ordinary Differential First and Second Order Equations -Introduction - Taylor's Series Method - Euler's Method - Modified Euler's Method –Runge Kutta Methods – Problems.

Note : The University Examination will be conducted at the end of even semester.

Text Book :

1. M.K.Jain, S.R-K.Iyenger & R.K.Jain, Numerical Methods For Science And Engineering Computation,, New Age International Pvt .Ltd.
2, E.Balagurusamy, Numerical Methods, Tata McGraw Hill Publishing company Ltd, New Delhi, 2002

Reference Book:

1. S.S. Sastry, Introductory Methods of Numerical Analysis, Ptentice Hall of India Private Ltd ,New Delhi,2000.
2. T.K.Manickavasagam and Narayanan, Engineering Numerical Methods, S.Viswanathan & Co, Chennai,2000.

SEMESTER - II / IV

ALLIED MATHEMATICS - III(GROUP- B)

Graph Theory (Group-B)

Paper Code :17UMAA05 **Max.Mark :75 Marks**

Credit : 3

Unit I

Graph - Definition 1.2 - Applications of Graph - 1.3 Finite and Infinite Graphs - 1.4. Incidence and Degree - 1.5. Isolated Vertex - Pendant Vertex - Null Graph.

Unit II

Isomorphism - 2.2 Sub graphs – 2.3 A Puzzle with multicoloured - 2.4 Walks, paths and circuits - 2.5 Connected Graphs - Disconnected Graphs and components.

Unit III

2.6 Euler Graphs - 2.7 operations on Graphs ~ 2.8 More on Euler Graphs - 2.9 Hamiltonian and circuit - 2.10 The Travelling salesman problem.

Unit IV

Trees 3.2 Properties of Trees - 3,3 Pendent Vertices in a Tree - 3.4. Distance and centers in a Tree - 3.5 Rooted and Binary Trees.

Unit V

On Counting Trees - 3.7 Spanning Trees - 3.8 - Fundamental circuits - 3.9 finding all spanning Trees

Text Book :

1 Narasingh Deo, Graph Theory with applications to Engineering and computer science, Ptentice Hall of India Private Ltd ,New Delhi.

Reference Book:

1. Harary, Graph Theory, Narosa publications, New Delhi.
2. John Clark, A First look at Graph Theory, Allied Publications Ltd, Madras.

NON MAJOR ELECTIVE COURSE

SEMESTER III

NON MAJOR ELECTIVE COURSE – I

1. QUANTITATIVE APTITUDE – I

Paper Code :17UMAN01 **Max.Mark :75 Marks**

Credit :2

Hours : 2 Hrs/Week

Unit – I

Operations on numbers.

Unit – II

HCF and LCM

Unit – III

Decimal Fractions

Unit – IV

Square roots and cube roots

Unit – V

Averages.

Tex Book

1.Dr. R.S. Aggarwal, Quantitative Aptitude, S. Chand and Company Ltd., New Delhi, Re Print 2013.

Reference Book:

1.Abhijit Guha, Quantitative Aptitude Tata McGraw Hill Publishing Company Limited, New Delhi (2005).

SEMESTER - III

NON- MAJOR ELECTIVE COURSE – I

2. MATRIX ALGEBRA

Paper Code :17UMAN02 **Max.Mark :75 Marks**

Credit :2

Hours : 2 Hrs/Week

Unit – I

Definition of matrices- Addition, Subtraction and Multiplication of matrices-problems only.

Unit – II

Transpose of a matrix- Adjoint of a matrix - Inverse of a matrix - problems only.

Unit – III

Definitions of Symmetric, Skew symmetric, Hermitian and Skew Hermitian matrices - problems only,

Unit – IV

Rank of a matrix: Definition- Finding the rank of a matrix- problem upto 3x 3 matrix only,

Unit – V

Characteristic equation of matrix- Cayley Hamilton Theorem (statement only) -Verification of Cayley Hamilton Theorem - simple problems only.

Text Book :

1. Dr.P.R .Vittal ,Allied Mathematics, Margham publication, Chennai-17, Reprint 2012

Reference Book:

1.S.G.Venkatachalapathi, Allied Mathematics, Margham publication, Chennai-17,Reprint 2011.

SEMESTER - III

NON - MAJOR ELECTIVE COURSE – I

3. LINEAR PROGRAMMING

Paper Code :17UMAN03 **Max.Mark :75 Marks**

Credit :2

Hours : 2 Hrs/Week

Unit I

Definition of O.R. - Graphical Method .

Unit II

Simplex Method using Slack and Surplus Variables.

Unit III

Transportation Problem - Definition - Finding initial basic feasible solution only by using North -West corner Rule - Vogel's Approximation Method - Lowest cost entry Method. (Minimization with balanced problems only).

Unit IV

Assignment Problem - Definition -Finding optimal solution by using Hungarian Method

Unit V

Sequencing Problem - Definition - N jobs to be operated on Two Machines-Problems.

<u>Text Book :</u>

1. G.V Shenoy, Linear Programming Methods and Applications, New Age International Publishers,Second Edition.

<u>Reference Book:</u>

1. Gauss S.l., Linear Programming, McGraw-Hill Book Company.
2. Gupta P.K. and Hira D.S., Problems in Operation Research , S.Chand & Co.,
3. Kanti Swaroop, Gupta P.K. and Manmohan, Problems in Operation Research, Sultan Chand & Sons.

SEMESTER - IV

NON MAJOR ELECTIVE COURSE – II

1.QUANTITATIVE APTITUDE – II

Paper Code :17UMAN04 **Max.Mark :75 Marks**

Credit :2

Hours : 2 Hrs/Week

Unit – I

Surds and Indices

Unit – II

Logarithms

Unit – III

Permutations and Combinations

Unit – IV

Probability

Unit – V

Tabulation

Tex Book

1.Dr. R.S. Aggarwal, Quantitative Aptitude, S. Chand and Company Ltd., New Delhi, Re Print 2013.

Reference Book:

1.Abhijit Guha, Quantitative Aptitude Tata McGraw Hill Publishing Company Limited, New Delhi (2005).

SEMESTER- IV

NON MAJOR ELECTIVE COURSE - II

2. NUMERICAL METHODS

Paper Code :17UMAN05 **Max.Mark :75 Marks**

Credit :2

Hours : 2 Hrs/Week

Unit – I

Solutions to Algebraic equations only: By (i) Bisection Method (no proof) and (ii) Newton Raphson's Method (no proof) - Simple Problems only.

Unit – II

Finite Differences: Definition- First difference -Higher differences- Construction of difference Table- Operator Δ, and E only- Interpolation of missing value-Expression of any value of y in terms of the initial value y_0 -Simple problems.

Unit – III

Newton's Forward difference Formula (without proof) - Construction of difference Table - Simple problems only.

Unit – IV

Newton's Backward difference Formula (without proof) - Construction of difference Table—Simple problems only.

Unit – V

Central difference Formula: Gauss's Forward and Gauss's Backward difference formula (without proof)- Stirling formula (without proof) - Simple problems only.

Tex Book

1P.Kandasamy K.Thilagavathi, Calculus of Finite Differences and Numerical Analysis, S.Chand &. Company PVT.LTD, New Delhi-55,2003.

Reference Book:

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Private Limited, 1999.
2. C.E. Froberg, Introduction to Numerical Analysis, II Edn., Addison Wesley, 1979.

SEMESTER-IV

NON MAJOR ELECTIVE COURSE – II

3.OPERATIONS RESEARCH

Paper Code :17UMAN06 **Max.Mark :75 Marks**

Credit :2

Hours : 2 Hrs/Week

Unit – I

Inventory Models - Introduction - Definition of Inventory Models - EOQ with Uniform demand, infinite rate of production with no shortages-problems only

Unit – II

Inventory Models - Probabilistic Type - News paper Boy Problem -Discrete case Problems only.

Unit – III

Queuing Theory - Definition - Model (M/M/1): (∞/FCFS) - Problems.

Unit – IV

Network - Definition of Network, Event, Activity, Critical Path – Critical Path Method. - Problems.

Unit – V

Network -Definition PERT , Three time estimates - PERT Algorithm -Problems.

<u>Tex Book</u>

1. P.K,Gupta, Man Mohan and Kanti Swarup, Operations Research, Sultan Chand and sons, NewDelhi,2001, -9th Edition

<u>Reference Book:</u>

1. Prem Kumar Gupta and D.S. Hira, Operations Research : An Introduction, S. Chand and Co., Ltd. New Delhi.
2. Hamdy A. Taha, Operations Research (7th Edn.), McMillan Publishing Company, New Delhi, 1982.

Model question paper

<u>MODERN ALGEBRA – I</u>

Paper code:

Time: 3 hrs   Maximum Marks: 75

SECTION-A   (10 X 2 = 20 marks)

Answer all the questions

1.Define Abelian group?

2. Define Sub group.

3. Define Question group

4.Define Normal sub group

5. What is commutative ring?

6. Define Isomorphism?

7. Define Kernal of ø

8. Define Integral domain.

9. Define Euclidean Ring.

10. Define gcd (a,b).

Section – B   (5 X 5 = 25marks)

Answer all the question

11. a) State and prove Fermat theorem.

b) If G is a finite group and a ϵ G prove that $a^{0(G)} = e$

12.a)Prove that the sub group N of G is a normal sub group of G ⇔ every left to set of N in G is a right coset of N in G.

b) If G is a finite group and N is a normal subgroup of G, Prove that O(G/N)=O(G)/O(N).

13.a) Let ø be a homomorphism of G onto G with kernel R, prove that G / R G.

b) If G is a group prove that (the set of automorphisms of G), A(G) is also a group.

14.a) Show that a finite integral domain is a field.

b) Let R be a Commutative Ring with unit element whose only ideals are (0) and R itself.prove that R is a field.

15.a) Let R be a Euclidean Ring, for a,b,c € R, and a/bc but (a,b)=1,prove that a/c.

b) Prove that every integral domain can be imbedded in a field.

Section – C   (5X5=25 marks)

Answer any three questions

16. State and prove Lagrange's theorem

17. Prove that HR is a sub group of G ⇔ HR = RH.

18. State and prove Cayley theorem.

19. If is a prime number prove that J_p ‘ the ring of integers mod p, is a field.

20. Let R be a Euclidean ring and a,b,€ R , if $b \neq 0$ is not a unit in R prove that d(a) <d(ab).

Model Question Paper
Allied Paper-I : Allied Mathematics- I

Paper Code: 17UMAA01

Time: 3 Hours

Maximum: 75 Marks

SECTION-A (10×2=20 Marks)

Answer **ALL** Questions

1. Solve the equation $2x^3-7x^2 + 4x + 3= 0$ given that $1+\sqrt{2}$ is root
2. Diminish by 2 the roots of the equation $x^4 + x^3 - 3x^2 + 2x - 4 = 0$
3. Find the characteristic roots of a matrix A= $\begin{pmatrix} 3 & 2 \\ 2 & 3 \end{pmatrix}$
4. Find sum and product of the eigen values of the matrix A= $\begin{pmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{pmatrix}$
5. Write the formula for radius of curvature in cartesian coordinates.
6. Find the radius of curvature at (1,1) of the curve $x^4 + y^4 = 2$
7. Form the partial differential equation by eliminating the arbitrary contant from $z = ax + by + ab$
8. Form the partial differential equation by eliminating the arbitrary function from $z = f(\frac{y}{x})$
9. Find the value of $\int_0^{\frac{\pi}{2}} sin^8 \theta \, d\theta$
10. Evaluate : $\int x \, e^{-x} dx$.

SECTION-B (5×5=25 Marks)

Answer **ALL** Questions

11. (a) Show that the equation $3x^5 - 2x^3 - 4x + 2 = 0$ has at least two imaginary roots

(OR)

(b) Solve the equation $x^4 + 2x^3 - 5x^2 + 6x + 2 = 0$ given that $1+ i$ is a root

12. (a) Find the characteristic roots of the matrix A = $\begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}$

(OR)

(b) Find the eigen values and eigen vectors for the matrix A= $\begin{pmatrix} 4 & 1 \\ 3 & 2 \end{pmatrix}$

13.(a)Find the radius of curvature at any point θ on the curve x = a(θ + sinθ) and y = a(1 – cosθ)

(OR)

(b) Find ρ for the curve r = a(1 + cosθ)

14. (a) Form the partial differential equation by eliminating the arbitrary constant from z = $(x\quad a)^2 + (y\quad b)^2 + z^2 = 1$

(OR)

(b) Form the partial differential equation by eliminating the arbitrary function from f(x+y+z , xyz) =0

15. (a) Evaluate $\int_0^{\frac{\pi}{2}} \log tanx$ dx.

(OR)

(b) If $I_n = \int_0^{\frac{\pi}{2}} cos^n$ x dx then prove that $I_n = \frac{n-1}{n} I_{n-2}$

SECTION-C (3×10=30 Marks)

Answer any **THREE** Questions

16. Remove the second term of the equation x^4 - 12x^3 + 48x^2-72x + 35 = 0 and Hence solve it.

17. Verify Cayley Hamilton Theorem for the matrix A= $\begin{pmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{pmatrix}$

18. Find the radius of curvature at the point ($\frac{a}{4}, \frac{a}{4}$) of the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$

19. Prove that $\int_0^{\frac{\pi}{2}} \log sin\theta \, d\theta - - \frac{\pi}{2}$ log 2 .

20. Solve (mz – ny)p – (nx – lz)q = ly – mx

Model Question Paper
Allied Paper-II: Allied Mathematics-II

Paper Code: 17UMAA 02 Time: 3hrs

Max.: 75 Marks

SECTION-A (10×2=20 Marks)

Answer **ALL** Questions

1) If $u = x^2$, $v = y^2$ then find $\frac{\partial(u,v)}{\partial(x,y)}$

2) Write the condition for a function to attain maximum

3) Write the Newton's Forward difference formula

4) Prove that $\Delta^2 y_1 = y_3 - 2 y_2 + y_1$

5) Solve $(D^2 - 4D + 4) y = 0$

6) Find the Particular Integral of $(D^2 + 4) y = \text{Sin}2x$

7) Find $L[te^{-2t}]$

8) Find $L[t^n]$

9) Find $L^{-1}\left[\frac{1}{s^2-a^2}\right]$

10) Find $L^{-1}\left[\frac{10}{(S+2)^6}\right]$

SECTION-B (5×5=25)

Answer ALL Questions

11(a) If $x + y = u$, $y = uv$ then find $J(x,y)$

(OR)

(b) Find the maximum value of $f(x,y) = x^2 + 5y^2 - 6x + 10y + 12$

12 (a) Estimate f(5) from the following data:

X:	3	4	5	6
f(x):	4	13	-	43

(OR)

(b) Use Newton's Forward difference formula find y when x=4 ,Given

X:	3	5	7	9
Y:	180	150	120	90

13 (a) Solve: $(D^2 - 8D + 9)y = 8 \sin 5x$

(OR)

(b) Solve: (D^2- 3D + 2) y = e^{5x}+ 2

14 (a) Find L [$sin^3 2t$]

(OR)

(b) Find L [$e^{3t}cos6t - t^3 + e^t$]

15 (a) Find $L^{-1}\left[\frac{S-3}{S^2+4S+13}\right]$

(OR)

(b) Find the Inverse Laplace Transform of $\left[\frac{7s-1}{(s+1)(S+2)(s+3)}\right]$

SECTION-C (3×10=30 Marks)

Answer any **THREE** Questions

16) Find the maximum and minimum values of
$f(x,y) = 2(x^2 - y^2) - x^4 + y^4$

17) By using Lagrage' formula find y when x=2 from the following:

X:	6	3	5	6	8
Y:	276	460	414	343	110

18) Solve : (D^2– 5D + 6) y = e^xcos2x

19) Find L $\left[\frac{cos3t-cos2t}{t}\right]$

20) **Solve:** $\frac{d^2y}{dx^2} - \frac{dy}{dx}$ **- 2y = 0 given y(0)=-2 ,**
$y'(0)$=5 by using Laplace Transform

Model Question Paper

Allied Paper-III: Allied Mathematics Practical -III

Paper Code: 17UMAAP01

Time : 3 hrs

Maximum : **60** Marks

Prac. = 45 Marks

Rec. = 15 Marks

Answer ANY THREE **Questions (3×15=45 Marks)**

1) Find the characteristic equation and Verify Cayley Hamilton Theorem for the matrix $A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$.

2) (a) If y = a cos(log x) +bsin(log x) then Prove that $x^2y_2 + xy_1 + y = 0$

(b) If Y= $e^{a\sin^{-1}x}$, prove that

$(1-x^2)y_{n+2}$ - (2n+1) xy_{n+1}- $(n^2 + a^2)y_n$=0

3) (a) Verify Euler's theorem for $u = x^3 + y^3 + z^3 - 3xyz$

(b) If u = $\tan^{-1} \dfrac{x^2+y^2}{x+y}$ then

Show that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = \dfrac{1}{2}\sin 2u$

4) (a) If $\vec{r} = \vec{x} + \vec{y} + \vec{z}$ then Prove that $\nabla r = \frac{1}{r}\vec{r}$

(b) Find the directional derivative of $\phi = x^2 + y^2 + z^2$ at the point (1 , 1 , 1) in the direction $\vec{i} + \vec{j} + \vec{k}$

5) (a) If $\vec{F} = x^2z\,\vec{i} - 2y^3z^2\,\vec{j} + xy^2z\,\vec{k}$ then find div $\vec{F}$ and Curl $\vec{F}$ at the point (1, -1 , 1) .

(b)Prove that the vector $\vec{F} = 3x^2y\,\vec{i} - 4xy^2\,\vec{j} + 2xyz\,\vec{k}$

MODEL QUESTION PAPER

OPERATIONS RESEARCH

Time: 3 hrs Maximum Marks: 75

SECTION-A (10X2=20 MARKS)

Answer all the question

1. What are the limitation of operations research?
2. What is the difference between slack and surplus variable?
3. Define: degeneracy in a transportation problem?
4. Define: an assignment problem?
5. Define: Elapsed time?
6. Write the formula for the minimum total annual inventory cost TC^o in the EOQ problem with no shortages?
7. Write the optimum order quantity Q^o for the EOQ problems with shortages?
8. How do you calculate E(n) in (M/M/1;∞/FIFO) model?
9. Define total float of an activity in a critical path?
10. What is the value of expected time in PERT?

SECTION-B (5X5=25)

Answer all the question

11. (a) Use Graphical method, solve:

Minimum: $z = 2x - y$

Subject to: $x + y \leq 5$

$x + 2x \leq 8$

$x , y \geq 0$

(or)

(b) Use Simplex method, solve:

Maximation : $z = 5x_1 + 7x_2$

Subject to: $x_1 + x_2 \leq 4$

$3x+8x \leq 24$

$10x_1+7x_2 \leq 35$

$x_1 , x_2 \geq 0$

12. (a) Use North West Corner Rule, find Initial Basic Feasible Solution (IBFS) to the following transportation problem.

Destionations | Supply

Origin	8	9	6	3	18
	6	11	5	10	20
	3	8	7	9	18
Demand	15	16	12	13	

(or)

(b) Solve the following Assingment problem.

Job

	I	II	III	IV	V	
A	6	5	8	11	16	
B	1	13	16	1	10	
C	16	11	8	8	8	
D	9	14	12	10	10	Worker
E	10	13	11	8	16	

13. (a) there are Nine jobs each of which has to go through the machines M_1 and M_2 in the order M_1, M_2. The processing time (in time) are given as follows:

Jobs:	A	B	C	D	E	F	G	H	I
Machine M_1:	2	5	4	9	6	8	7	5	4
Machine M_2:	6	8	7	4	3	9	3	8	11

(or)

Determine the sequence of these jobs that will minimize the total elapsed time T.

(b) Derive the fundamental EOQ problem?

14.(a) Find the optimum order quantity for a product for which the price breaks are as follows:

Quantity	Unit cast
$0 \leq Q_1 < 800$	Re.1.00
$800 \leq Q_2$	Re.0.98

(b) Find the average queue length and the average waiting time of an arrival in (M/M/1;N/FIFO) system.

15.(a) Write down the difference between CPM and PERT?

(b) Draw the network for the activites A, B, ….< K such that A<C;B<D;C<E,F;C,D<G;F,G<H;E<I;I<J;H<K. The notation X < Y means that the activity X must be finished before Y can begin.

SECTION-B (5X5=25)

16.Use Simplex method, solve:

Maximize: $z = 500x_1 + 20x_2 + 30x_3$

Subject to: $5x_1 + x_2 + 7x_2 \leq 5$

$5x_1 + x_2 + 6x_3 \leq 6$

$3x_1 - x_2 - 9x_3 \leq 3$

` $x_1, x_2, x_3 \geq 0$

17. Solve the following Assignment problem.

		Job				
		H_1	H_2	H_3	H_4	H_5
	A	6	5	8	11	16
	B	1	13	16	1	10
	C	16	11	8	8	8
Worker	D	9	14	12	10	10
	E	10	13	11	8	16

18. a) Use graphical method to determine the minimum time needed to process two jobs on five machines A , B , C , D, and E. the technological order for the these jobs on machines is as follows:

Processing time (in hours) are given as follows:

Job 1:	3	4	2	6	2
Job 2:	5	4	3	2	6

Processing time (in hours) are given as follows:

Job 1:	3	4	2	6	2
Job 2:	5	4	3	2	6

b) Find the optimal order quality for a product for which the price breaks are as follows:

Quantity	Unit cast(Rs)
$0 \leq Q_1 < 500$	Rs.1000
$500 \leq Q_2 \leq 4000$	Rs. 925
$4000 \leq Q_3$	Rs. 875

19. At a railway station only one train is handled at a time. The yard can accommodate only two trains to wait. Arrival rate is 6 per hour and the service r ate is 12/hr. find the steady state probabilities for the various number of trains in the system. Also find the average waiting time of the train coming into the yard.

20. Find the critical path for the network given below, and find the probability of completing the project 14 days?