

**ETHIRAJ COLLEGE FOR WOMEN**

**(AUTONOMOUS)**

**CHENNAI-600 008**

**DEPARTMENT OF MATHEMATICS**

**(Aided & Self Supporting)**

**SYLLABUS**

**(Effective from the academic year 2015-16)**

**ETHIRAJ COLLEGE FOR WOMEN**  
**(AUTONOMOUS)**  
**CHENNAI- 600 008**

**B.Sc., Mathematics**  
**Allied Mathematics**  
**& M.Com., (Statistics)**  
**SYLLABUS**

**CHOICE BASED CREDIT SYSTEM**

**To be offered from the Academic Year**  
**2015-16**

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**Ethiraj College for Women (Autonomous)**

**Department of Mathematics**

**Revised Syllabus with effect from June 2015**

**PREAMBLE**

As per the guidelines given by the University Grants Commission and the Tamil Nadu State Council for Higher Education, the B.Sc. degree programme is designed in such a way to have a foundation in discrete and continuous mathematics; a mathematical attitude towards problem formulation and solving; an analytical skill and desire for correctness; an appreciation of the approaching of mathematical techniques, the programming skill at higher level computer language and research aptitude to mathematics.

Department of Mathematics is revising syllabi with effect from the academic year 2015-2016, as specified by the Government of Tamil Nadu. Part IV and Part V components will seek to build the capacity of the students and provide inputs for her social service and social analysis capabilities.

Every academic year is divided into two semester sessions. Each semester will have a minimum of 90 working days and each day will have 5 working hours. Teaching is organized into a modular pattern of credit courses. Credit is normally related to the number of hours a teacher teaches a particular subject. It is also related to the number of hours a student spends learning a subject or carrying out an activity.

**REGULATIONS**

**1. ELIGIBILITY FOR ADMISSION**

Candidates for admission to the first year of the degree of B. Sc course shall be required to have passed the Higher Secondary Examinations conducted by Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Syndicate of the University of Madras.

## **2. ELIGIBILITY FOR THE AWARD OF DEGREE**

The candidate shall be eligible for the award of degree only if she has undergone the prescribed course of study for a period of not less than three academic years, passed the examinations of all the Six Semesters prescribed earning 140 credits - 12 credits from Part I, 12 credits from Part II, 95 credits from Part III, 20 credits from Part IV and 1 credit from Part V.

## **3. DURATION OF THE PROGRAMME: 3 YEARS**

Each academic year shall be divided into two semesters. The first academic year shall comprise of the first and second semesters, the second academic year, the third and fourth semesters and the third academic year, fifth and sixth semesters respectively. The odd semesters shall consist of period from June to November of each year and the even semesters from December to April of each year. There shall not be less than 90 working days for each semester.

## **COURSE OF STUDY**

The main subject of study for Bachelor Degree shall consist of the following:

- Part – I : Tamil /Other Language
- Part – II : English
- Part – III : Core Subjects, Allied Subjects and Project / Electives with three Courses
- Part – IV : 1. (a) Those who have not studied Tamil up to XII standard and taken a Non- Tamil Language under part I shall take Tamil comprising of two Courses ( Level will be at 6<sup>th</sup> Standard) .
- (b) Those who have studied Tamil upto XII standard and taken a Non-Tamil language under part I shall take Advanced Tamil comprising of two courses.
- (c) Others who do not come under a & b can choose Non- Major elective .
2. Soft skill paper (offered by English Department)
3. Environmental Studies
4. Value Education
- Part V : Extension Activities.

## **PASSING MINIMUM**

A candidate shall be declared to have passed in each paper/ practical of the main subject of study wherever prescribed, if she secured NOT LESS THAN 40% of the marks prescribed for the examination.

1. There shall be no passing minimum for Internal.
2. For External Examination Passing Minimum shall be 40% of the maximum marks prescribed for the paper for each paper / practical and project .
3. In the aggregate (External +Internal) the Passing Minimum shall be of 40%.
4. She shall be declared to have passed the whole examination, if she passes in all the papers and practical where ever prescribed / as per scheme of examinations by earning 140 credits in part I, II, III, IV and V. She shall also fulfill the extension activities prescribed earning a minimum of one credit to qualify for the degree.

## **CLASSIFICATION OF SUCCESSFUL CANDIDATES:**

### **Part I, II, III & IV**

Successful candidates passing the examination and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the FIRST and SECOND class respectively. All other successful candidates shall be declared to have passed the examination in the THIRD class.

Candidates who pass all the examination (Part I, II, III & IV) prescribed for the course in the FIRST APPEARANCE ITSELF ALONE are eligible for ranking.

## **QUESTION PAPER PATTERN:**

Unless and otherwise specified in the syllabus for each paper, the pattern of the question paper shall be as follows:

<b>Component</b>	<b>Nature of the Question</b>	<b>Maximum Marks</b>
Part A	Definition / short answers (10x2)	20 Marks
Part B	Understanding Description / Problems (5x8)	40 Marks
Part C	Application/ Analysis/ Synthesis/ Evaluation (2x20)	40 Marks

Part A: Short answers 10 questions, two from each unit each carrying 2 marks.

Part B : 5 questions to be answered out of 8 questions covering all the five units each carrying 8 marks.

Part C : 2 questions to be answered out of 4 questions covering all the five units each carrying 20 marks.

### **OBJECTIVES OF THE COURSE**

- To provide a detailed introduction to the tenets of mathematics and acquaint the learner with the intricate of mathematical models, tools and methods.
- To provide the student a firm grip on all the facets of pure and applied mathematics and inculcate in the student an ardor for mathematical knowledge.
- To propel the student towards higher academic ambitions in Advanced Mathematics, finance, accounting, management, technology, bio-informatics, statistics, econometrics, space science or any other related field.
- To equip the student with mathematical skill necessary to perform well in competitive examinations.



## COURSE PROFILE

COURSE CODE	COURSE TITLE	CREDITS	MARKS		
			CA	SE	TOTAL
<b>SEMESTER I</b>					
Part I	Tamil/Hindi/French/ Sanskrit	3	40	60	100
Part II	English	3	40	60	100
MA15/1C/ TLT	Trigonometry and Laplace Transforms	4	40	60	100
MA15/1C/DCL	Differential Calculus	4	40	60	100
MA15/1A/FD1 (or) PH15/1A/GP1	Calculus of Finite Differences – I (or) Allied General Physics - I	5	40	60	100
Part IV	1ab/NME	2	-	50	50
	Soft Skill (offered by English department)	3	-	50	50
<b>SEMESTER II</b>					
Part I	Tamil/Hindi/French /Sanskrit	3	40	60	100
Part II	English	3	40	60	100
MA15/2C/CLA	Classical Algebra	4	40	60	100
MA15/2C/ICF	Integral Calculus and Fourier Series	4	40	60	100
MA15/2A/FD2 (or) PH15/2A/GP2	Calculus of Finite Differences – II (or) Allied General Physics - II	5	40	60	100
Part IV	1ab/NME	2	-	50	50
	Soft Skill(offered by English Department)	3	-	50	50

COURSE CODE	COURSE TITLE	CREDITS	MARKS		
			CA	SE	TOTAL
<b>SEMESTER III</b>					
Part I	Tamil/Hindi/French/ Sanskrit	3	40	60	100
Part II	English	3	40	60	100
MA15/3C/AS1	Algebraic Structures- I	4	40	60	100
MA15/3C/DEQ	Differential Equations	4	40	60	100
MA15/3A/MS1	Mathematical Statistics -I	5	40	60	100
Part IV	Soft Skill	3	-	50	50
	Environmental Studies	2	-	50	50
<b>SEMESTER IV</b>					
Part I	Tamil/Hindi/French/ Sanskrit	3	40	60	100
Part II	English	3	40	60	100
MA15/4C/AS2	Algebraic Structures- II	4	40	60	100
MA15/4C/VCG	Vector calculus &Geometry	4	40	60	100
MA15/4A/ MS2	Mathematical Statistics -II	5	40	60	100
Part IV	Soft Skill	3	-	50	50
	Value Education	2	-	50	50

COURSE CODE	COURSE TITLE	CREDITS	MARKS		
			CA	SE	TOTAL
<b>SEMESTER V</b>					
MA15/5C/RAN	Real Analysis	4	40	60	100
MA15/5C/STT	Statics	4	40	60	100
MA15/5C/DIM	Discrete Mathematics	4	40	60	100
MA15/5C/OPT	Optimization Techniques	4	40	60	100
MA15/5E/PLC	Programming Language 'C'	3	40	60	100
MA15/5E/PR1	Programming Language 'C' (Practicals)	2	-	100	100
<b>SEMESTER VI</b>					
MA15/6C/CAN	Complex Analysis	4	40	60	100
MA15/6C/DYN	Dynamics	4	40	60	100
MA15/6C/ENT	Elementary Number Theory	4	40	60	100
MA15/6E/OPR	Operations Research	5	40	60	100
MA15/6E/PCO	Programming Language 'C' & Introduction to OOP	3	40	60	100
MA15/6E/PR2	Programming Language 'C' & Introduction to OOP (Practicals)	2	-	100	100

### CORE COURSE PROFILE

Sem	Course Code	Course Title	HRS/ Cycle	Credits	L	T	P
I	MA15/1C/TLT	Trigonometry and Laplace Transforms	5	4	3	2	0
I	MA15/1C/DCL	Differential Calculus	5	4	3	2	0
II	MA15/2C/CLA	Classical Algebra	5	4	3	2	0
II	MA15/2C/ICF	Integral Calculus and Fourier Series	5	4	3	2	0
III	MA15/3C/AS1	Algebraic Structures- I	5	4	3	2	0
III	MA15/3C/DEQ	Differential Equations	5	4	3	2	0
IV	MA15/4C/AS2	Algebraic Structures- II	5	4	3	2	0
IV	MA15/4C/VCG	Vector calculus & Geometry	5	4	3	2	0
V	MA15/5C/RAN	Real Analysis	5	4	3	2	0
V	MA15/5C/STT	Statics	6	4	3	3	0
V	MA15/5C/DIM	Discrete Mathematics	5	4	3	2	0
V	MA15/5C/OPT	Optimization Techniques	5	4	3	2	0
V	MA15/5E/PLC	Programming Language 'C'	6	3	2	4	0
V	MA15/5E/PR1	Programming Language 'C' (Practicals)	3	2	0	0	3
VI	MA15/6C/CAN	Complex Analysis	5	4	3	2	0
VI	MA15/6C/DYN	Dynamics	6	4	3	3	0
VI	MA15/6C/ENT	Elementary Number Theory	5	4	3	2	0
VI	MA15/6E/OPR	Operations Research	5	5	4	1	0
VI	MA15/6E/PCO	Programming Language 'C' & Introduction to OOP	6	3	2	4	0
VI	MA15/6E/PR2	Programming Language 'C' & Introduction to OOP (Practicals)	3	2	0	0	3

### ALLIED COURSE PROFILE

Sem	Course Code	Course Title	HRS/ Cycle	Credits	L	T	P
I	MA15/1A/FD1	Calculus of Finite	6	5	3	3	0
	(or) PH15/1A/ GP1	Differences – I (or) Allied General Physics - I	6	5	-	4	2
II	MA15/2A/FD2	Calculus of Finite	6	5	3	3	0
	(or) PH15/2A/GP2	Differences – II (or) Allied General Physics - II	6	5	-	4	2
III	MA15/3A/MS1	Mathematical Statistics - I	6	5	4	1	1
IV	MA15/4A/ MS2	Mathematical Statistics -II	6	5	4	1	1
I	MA15/1A/AM1	Allied Mathematics- I	6	5	3	3	0
II	MA15/2A/AM2	Allied Mathematics- II	6	5	3	3	0
I	MA15/1A/BM1	Business Mathematics - I	6	5	3	3	0
II	MA15/2A/BM2	Business Mathematics- II	6	5	3	3	0

### M.COM COURSE PROFILE

Sem	Course Code	Course Title	HRS/ Cycle	Credits	L	T	P
I	7P15/1C/ST1	Statistical tools for Business Management- I	6	5	3	3	0
II	7P15/2C/ST2	Statistical tools for Business Management- II	5	5	4	1	0

### NON MAJOR ELECTIVE COURSE PROFILE

SEM	Course Code	Course Title	HRS/ cycle	Credits	Max Marks
I / II	MA15/1N/SUE// MC15/1N/SUE & MA15/2N/SUE// MC15/2N/SUE	Statistics using Excel	2	2	50

**CORE - INTERNAL EVALUATION PATTERN**

Sem	Course Code	Course Title	Continuous Assessment				
			Test		Quiz / Assignm ent / seminar / field visit	Participatory Learning	Total
			I	II			
I	MA15/1C/TLT	Trigonometry and Laplace Transforms	10	10	10	10	40
I	MA15/1C/DCL	Differential Calculus	10	10	10	10	40
II	MA15/2C/CLA	Classical Algebra	10	10	10	10	40
II	MA15/2C/ICF	Integral Calculus and Fourier Series	10	10	10	10	40
III	MA15/3C/AS1	Algebraic Structures - I	10	10	10	10	40
III	MA15/3C/DEQ	Differential Equations	10	10	10	10	40
IV	MA15/4C/AS2	Algebraic Structures -II	10	10	10	10	40
IV	MA15/4C/VCG	Vector Calculus And Geometry	10	10	10	10	40
V	MA15/5C/RAN	Real Analysis	10	10	10	10	40
V	MA15/5C/STT	Statics	10	10	10	10	40
V	MA15/5C/DIM	Discrete Mathematics	10	10	10	10	40
V	MA15/5C/OPT	Optimization Techniques	10	10	10	10	40
V	MA15/5E/PLC	Programming Language 'C'	10	10	10	10	40
V	MA15 /5E /PR1	Programming Language 'C' – Practicals	NO CONTINUOUS ASSESSMENT END SEMESTER EXAM ONLY				
VI	MA15/6C/CAN	Complex Analysis	10	10	10	10	40

Sem	Course Code	Course Title	Continuous Assessment				
			Test		Quiz / Assignment / seminar / field visit	Participatory Learning	Total
			I	II			
VI	MA15/6C/DYN	Dynamics	10	10	10	10	40
VI	MA15/6C/ENT	Elementary Number Theory	10	10	10	10	40
VÌ	MA15/6E / OPR	Operations Research	10	10	10	10	40
VI	MA15 /6E/PCP	Programming Language 'C' & Introduction To OOP	10	10	10	10	40
VI	MA15 /6E/PR2	Programming Language 'C' & Introduction To OOP Practicals	NO CONTINUOUS ASSESSMENT END SEMESTER EXAM ONLY				

**PRACTICAL EVALUATION PATTERN:**

Duration - 3 hrs

Maximum marks 100 (Aggregate of examination and record);

Practical examination – 90 (3 x 30) Marks

Record -10 Marks.

**ALLIED - INTERNAL EVALUATION PATTERN**

Sem	Course Code	Course Title		Continuous Assessment				
				Test		Quiz / Assignment / seminar / field visit	Participatory Learning	Total
				I	II			
I	MA15/1A/FD1	Calculus of Finite Differences – I		10	10	10	10	40
	PH15/1A/GP1	Allied General Physics - I						
II	MA15/2A/FD2	Calculus of Finite Differences – II or		10	10	10	10	40
	PH15/2A/GP2	Allied General Physics - II						
III	MA15 /3A/MS1	Mathematical Statistics –I	Theory	10	10	-	-	40
			Practical	-	-	10	10	
IV	MA15/4A/MS2	Mathematical Statistics –II	Theory	10	10	-	-	40
			Practical	-	-	10	10	
I	MA15/1A/AM1	Allied Mathematics -I		10	10	10	10	40
II	MA15/2A/AM2	Allied Mathematics- II		10	10	10	10	40
I	MA15/1A/BM1	Business Mathematics- I		10	10	10	10	40
II	MA15/2A/BM2	Business Mathematics -II		10	10	10	10	40



### M.COM - INTERNAL EVALUATION PATTERN

SEM	Course Code	Course Title	Continuous Assessment				
			Test		Quiz / Assignment / seminar / field visit	Participat ory Learning	Total
			I	II			
I	7P15/1C/ST1	Statistical tools for Business Management- I	10	10	10	10	40
II	7P15/2C/ST2	Statistical tools for Business Management -II	10	10	10	10	40

#### **PATTERN FOR CONTINUOUS ASSESSMENT:**

CA			
Test I	2hrs	50 marks	10 marks
Test II	2hrs	50 marks	10 marks
Quiz/Assignment/Seminar/Field Visit			10 marks
Participatory Learning			10 marks
Total			40 marks

#### **Rubrics for Continuous assessment evaluation**

Assignment : Appearance/Contents/Originality/Presentation/ Schematic Representation and diagram/Bibliography

Seminar : Organization/ Subject knowledge/ Visual aids/confidence level/ Presentation.

Participatory learning: Answering questions/clearing doubts/participation in Discussion/ attendance / communication and language .

Field Trip : Participation / preparation / respect / attitude / leadership

## SEMESTER – I

### CORE - 1

#### TRIGONOMETRY AND LAPLACE TRANSFORMS

Teaching Hours: 75 hrs

Credits: 4

Course Code: MA15/1C/TLT// MC15/1C/TLT

LTP: 3 2 0

#### OBJECTIVES:

##### To enable students to

- Know the principles and concepts of Trigonometry and Laplace Transforms
- Acquire the working knowledge in this course.
- Apply the concepts to other courses.

#### COURSE OUTLINE:

- UNIT I** : Expansion of  $\sin nx$ ,  $\cos nx$ ,  $\tan nx$ ,  $\sin^n x$ ,  $\cos^n x$ . Expansion of  $\sin x$ ,  $\cos x$ ,  $\tan x$  in ascending powers of  $x$   
Book 1 Chapter 3 Sec 1, 2, 4, 5. (15 hrs)
- UNIT II** : Hyperbolic Functions: definition, relation between hyperbolic functions and Inverse hyperbolic functions.  
Book 1 Chapter 4 Sec 1, 2.1, 2.2, 2.3 (20 hrs)
- UNIT III:** Logarithm of complex quantities  
Book 1 Chapter 5 Sec 5 – 5.1, 5.2. (10 hrs)
- UNIT IV:** Summation of Trigonometric series by using complex quantities:  $C + iS$  form, Gregory series (only simple problems in both the cases)  
Book 1 Chapter 6 Sec 3 (15 hrs)
- UNIT V:** Laplace Transform: Laplace Transform- Inverse Transform, properties.  
Application of Laplace Transform to solution of the first and second order linear differential equations (with constant coefficients)  
Book 3 Chapter 6 (15 hrs)

#### BOOKS RECOMMENDED :

1. S. Narayan and T.K. Manicavachagom Pillay, Trigonometry
2. S. Narayan and T.K. Manicavachagom Pillay (2002), Calculus Volume –II, S.Viswanathan printers and publishers Pvt. Ltd, Chennai
3. P.R. Vittal , Differential Equations and Laplace Transforms, (2004) Margham Publications, Chennai.

### REFERENCE BOOKS:

1. A.Singaravelu, Algebra and Trigonometry Volume I (2003), Meenakshi Agency, Chennai
2. P.R. Vittal, Trigonometry, Margham Publications
3. P.R. Vittal, Calculus, (2004) Margham Publications, Chennai
4. A.Singaravelu and R.Ramaa, Calculus and Co-ordinate Geometry of two dimension (Paper –II), Meenakshi Agency, Chennai

### PERIODICALS:

1. The Mathematics Intelligencer.
2. Mathematics Newsletters

### WEBSITES & E-LEARNING SOURCES:

<http://www.mathforum.org>

<http://www.opensource.org>

### Question Paper Pattern

Question paper should cover all the five units.

Component	Nature of the Question	Maximum Marks
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 10 Questions to be answered without choice, 2 questions from each Unit, each carrying 2 marks

Section B: 5 questions to be answered out of 8 questions, each carrying 8 marks

Section C: 2 questions to be answered out of 4 questions, each carrying 20 marks.

## SEMESTER – I

### CORE -2

#### DIFFERENTIAL CALCULUS

Teaching Hours: 75 hrs

Credits: 4

Course Code: MA15/1C/DCL// MC15/1C/DCL

LTP: 3 2 0

#### OBJECTIVES:

To enable students to

- Learn the principle and concepts of Differential Calculus
- Acquire the working knowledge in this course
- Apply the concepts to other courses

#### COURSE OUTLINE:

- UNIT I:** Successive Differentiation-  $n^{\text{th}}$  derivative , standard results – Leibnitz Theorem (with out Proof) and its applications  
Book 1 Chapter 3 Section 1.1 -1.6 & Section 2.1 -2.2 (18hrs)
- UNIT II:** Jacobians – Maxima and minima of functions of two independent variables. Necessary and Sufficient conditions (without proof) – Lagrange’s method of undetermined multipliers (without proof)  
Book 1 Chapter 8 Section 4, 4.1, 5  
Book 2 Chapter 3 Section 3 (17hrs)
- UNIT III:** Envelopes: Curvature – Circle , radius and centre of curvature, Cartesian formula for the radius of curvature.  
Book 1 Chapter 10 Section 1.1- 1.3, 2.1-2.3 (12 hrs)
- UNIT IV:** Co-ordinates of the centre of curvature – Curvature- radius of curvature in polar Co-ordinates, p-r equations, Pedal equation of a curve  
Book 1 Chapter 10 Section 2.4, 2.6 - 2.8 (10 hrs)
- UNIT V:** Definition – Asymptotes parallel to the axis, oblique asymptotes,  $F_n + F_{n-2} = 0$  form, Intersection of a curve with its asymptotes (proofs are not included)  
Book 1 Chapter 11 Section 1 - 4 & Sections 6 - 7 (18 hrs)

#### BOOKS RECOMMENDED :

1. S. Narayanan & T.K. Manickavachagom Pillay, Calculus Volume I (2004) , S. Viswanathan Printers & Publishers
2. P.R. Vittal (2004) , Calculus , Margham Publications

## REFERENCE BOOKS :

Singaravelu, R. Ramaa, Calculus & co-ordinate geometry of 2 dimensions (Paper II),  
Meenakshi Agency, Chennai

## PERIODICALS:

1. The Mathematics Intelligencer
2. Mathematics Newsletters.

## WEBSITES AND E-LEARNING SOURCES :

<http://www.mathforum.org>

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## Question Paper Pattern

Question paper should cover all the five units.

Component	Nature of the Question	Maximum Marks
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 10 Questions to be answered without choice , 2 questions from each Unit, each carrying 2 marks

Section B: 5 questions to be answered out of 8 questions, each carrying 8 marks

Section C: 2 questions to be answered out of 4 questions, each carrying 20 marks.



### BOOKS RECOMMENDED:

T.K. Manicavachagam Pillay, T.Natarajan, K.S.Ganapathy, Algebra Volume – I & II, S.Viswanathan Pvt. Ltd,2008

### REFERENCE BOOKS:

1. P.R.Vittal and V.Malini, Algebra and Trigonometry, Margam Publishers.
2. Singaravelu, Algebra and Trigonometry Vol I & II, Meenakshi Agency, Chennai.

### PERIODICALS:

1. The Mathematics Intelligencer.
2. Mathematics Newsletters

### WEBSITES & e-LEARNING SOURCES:

<http://www.mathforum.org>

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### Question Paper Pattern

Question paper should cover all the five units.

Component	Nature of the Question	Maximum Marks
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 10 Questions to be answered without choice, 2 questions from each Unit, each carrying 2 marks

Section B: 5 questions to be answered out of 8 questions, each carrying 8 marks

Section C: 2 questions to be answered out of 4 questions, each carrying 20 marks.

## SEMESTER II

### CORE -4

#### INTEGRAL CALCULUS AND FOURIER SERIES

Teaching Hours: 75 hrs

Credits : 4

Course Code: MA15/2C/ICF //MC15/2C/ICF

LTP : 3 2 0

#### OBJECTIVES:

##### To enable students to

- Learn the principles and concepts of Integral calculus and Fourier Series
- Acquire the working knowledge in this course.
- Apply the concepts to other courses.

#### COURSE OUTLINE:

##### UNIT-I : Integral Calculus:

Reduction formulae,  $\int e^{ax} \cos bx \, dx$ ,  $\int e^{ax} \sin bx \, dx$ -  
 $\int \sin^m x \cos^n x \, dx$  (m, n being positive integers),  
 $\int x^m (\log x)^n \, dx$ ,  $\int \cos^m x \cos nx \, dx$ ,  $\int \cos^m x \sin nx \, dx$ , Bernoulli's formula  
Calculus Vol II Chap 1 Sec 1.3, 13.1 – 13.10, 14,15 (15 hrs)

**UNIT-II:** Double integrals (Cartesian co-ordinates only), change of order of integration.  
Calculus Vol II Chap 5 Sec 2.1,2.2 (15 hrs)

**UNIT-III:** Triple integrals, Application of multiple integrals in finding area and volume.  
(Cartesian co-ordinates only )  
Calculus Vol II Chap 5 Sec 4,5.1-5.3 (15 hrs)

**UNIT-IV:** Beta and Gamma functions (applications to simple problems)  
Calculus Vol II Chap 7 Sec 2.1-2.3,3,4. (15 hrs)

##### UNIT-V: Fourier Series:

Fourier series of periodic functions, Fourier series of odd and even functions  
Calculus Vol III Chap 6 Sec 1-3 (15 hrs)

#### BOOKS RECOMMENDED :

S. Narayan and T.K. Manicavachagom Pillay, Calculus Volume – II & III,  
S.Viswanathan Pvt. Ltd, 2008

#### REFERENCE BOOKS:

1. P. Kandasamy and K. Thilagavathi, Mathematics for B.Sc., - Volume II – 2004,  
S.Chand & Co., New Delhi.
2. Apostol, T.M. Calculus. Vol.I (4th Edn.) John Wiley and Sons, Inc., 1991 New York.



**PERIODICALS:**

1. The Mathematics Intelligencer.
2. Mathematics Newsletters

**WEBSITES & e-LEARNING SOURCES:**

<http://www.mathforum.org>

<http://www.opensource.org>

**Question Paper Pattern**

**Question paper should cover all the five units.**

<b>Component</b>	<b>Nature of the Question</b>	<b>Maximum Marks</b>
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 10 Questions to be answered without choice, 2 questions from each Unit, each carrying 2 marks

Section B: 5 questions to be answered out of 8 questions, each carrying 8 marks

Section C: 2 questions to be answered out of 4 questions, each carrying 20 marks.

**SEMESTER III**  
**CORE-5**  
**ALGEBRAIC STRUCTURES - I**

**Teaching Hours : 75 hrs**

**Credits :4**

**Course code : MA15/3C/AS1**

**LTP : 3 2 0**

**OBJECTIVES:**

**To enable students to**

- Understand algebraic concepts of groups and rings.
- Analyse and understand theorems on algebraic concepts.
- Apply the algebraic concepts in mathematical science.

**COURSE OUTLINE:**

- UNIT I** : Groups – subgroups.  
Chapter 2 sections 2.1-2.4 (15 hrs)
- UNIT II** : Normal subgroups – Quotient groups.  
Chapter 2 sections 2.5, 2.6 (15 hrs)
- UNIT III** : Homomorphism – Isomorphism – Automorphism - Cayley's theorem,  
Permutation groups.  
Chapter 2 sections 2.7-2.10 (Excluding applications 1 and 2 of section 2.7.  
Examples 2.8.1 & 2.8.2 and applications of section 2.9) (15hrs)
- UNIT IV**: Rings: Definitions – Examples - Some Special Classes of rings-  
Homomorphism - Isomorphism.  
Chapter 3 sections 3.1-3.3 (15hrs)
- UNIT V**: Ideals and quotient rings - Maximal Ideals, Principle Ideals, Principle Ideal rings –  
Euclidean rings.  
Chapter 3 sections 3.4, 3.5, 3.7 (15hrs)

**BOOKS RECOMMENDED:**

I.N.Herstein (1989) Topics in Algebra (2<sup>nd</sup> edition) Wiley Eastern Ltd. New Delhi.

**REFERENCE BOOKS:**

1. S. Arumugam (2004) Modern algebra, Scitech Publications, Chennai.
2. K. Viswanatha Naik, Modern algebra, Emerald Publishers.
3. Joseph Gallian, Contemporary Algebra, Narosa Publications, Chennai.

4. Schuam's outlines- Group theory, Benjamin baumslag, Bruce chandler, Tata Mc.Graw-Hill Publishing company Ltd.
5. M.L.Santiago (1988) Modern Algebra Arul Publications, Chennai.

**PERIODICALS:**

1. The Mathematics Intelligencer.
2. Mathematics Newsletters.

**WEBSITES & e-LEARNING SOURCES:**

<http://www.mathforum.org>

<http://www.opensource.org>

**Question Paper Pattern**

**Question paper should cover all the five units.**

<b>Component</b>	<b>Nature of the Question</b>	<b>Maximum Marks</b>
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 2 Questions, one from each Unit

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.

**SEMESTER – III**  
**CORE -6**  
**DIFFERENTIAL EQUATIONS**

**Teaching hours : 75 hrs**

**Credits: 4**

**Course Code : MA15/3C/DEQ**

**LTP: 3 2 0**

**OBJECTIVES:**

**To enable students to**

- Gain logical skills in the formulation of differential equations
- Expose students to different techniques of finding solution to these equations
- Know the basics for Mathematical modelling

**COURSE OUTLINE:**

**UNIT I:** Equations of first order and first degree equation; variable separable method, homogeneous equations. **(Not for Examination purpose)**

Chapter II Sections 1-2

Equations of first order and first degree equation: Bernoulli's equation

Equations of first order but of higher degree – Equations solvable for p – Equations solvable for x – Equations solvable for y – Clairaut's Equation

Chapter II Sections 4-5

Chapter IV Sections 1-3

(20 hrs)

**UNIT II:** Linear equation with constant coefficients, P.I for  $e^{ax}$ ,  $\cos mx$ ,  $\sin mx$ ,  $e^{ax} V$  where V is  $x^m$ ,  $\cos mx$ ,  $\sin mx$ , m being a positive integer.

Chapter V Sections 1 – 4.

(15 hrs)

**UNIT III:** Linear equation with variable coefficients:  $ax^2 \frac{d^2y}{dx^2} + bx \frac{dy}{dx} + cy = Q$ .

Method of variation of parameters-simple problems.

Chapter V Section 5

Chapter VIII Section 4.

(10 hrs)

**UNIT IV:** Exact equations : I.F  $\frac{1}{Mx+Ny}$ ,  $\frac{1}{Mx-Ny}$ ,  $\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N}$ ,  $\frac{\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}}{M}$

Total Differential Equations, Lagrange's equation:  $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$

Chapter II Section 6

Chapter VI Sections 4, 5

Chapter XI Sections 1.3, 1.4.

(15 hrs)

**UNIT V: Partial Differential Equations:** Formation of P.D.E, Complete integrals, particular integrals, singular integrals. Lagrange's Method of solving linear equation, Non-linear equations of the first order: The four standard forms.

Chapter XII Sections 1- 4, 5.1 – 5.4.

(15 hrs)

**BOOKS RECOMMENDED:**

S. Narayanan & T.K. Manicavachagam Pillay, Differential Equations and its applications Revised Ninth Edition ,S.Viswanathan Pvt. (Ltd.), Chennai.

**REFERENCE BOOKS :**

1. P.R. Vittal , Differential Equations and Laplace transformations
2. Zafar Ahsan, Differential equations and their applications

**PERIODICALS:**

1. The Mathematics Intelligencer
2. Mathematics Newsletters.

**Websites and e-Learning Sources :**

<http://www.mathforum.org>

<http://www.opensource.org>

**Question Paper Pattern**

Question paper should cover all the five units.

Component	Nature of the Question	Maximum Marks
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 2 Questions, from each Unit

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.

**SEMESTER-IV**  
**CORE-7**  
**ALGEBRAIC STRUCTURES -II**

**Teaching Hours: 75 hrs**

**Credits :4**

**Course Code : MA15/4C/AS2**

**LTP: 3 2 0**

**OBJECTIVES:**

**To enable students to**

- Understand linear algebra.
- Analyze and understand theorems on Vector space and linear transformation .
- Apply the algebraic concepts in mathematical science.

**COURSE OUTLINE:**

**UNIT I: VECTOR SPACES**

Basic concepts-Definition-Examples-Homomorphism-Internal

Direct Sum-External Direct Sum.

Book 1 Chapter 4 section 4.1

(15hrs)

**UNIT II: VECTOR SPACES ( contd.)**

Linear dependence and independence of vectors, Linear Span , Bases

Dimensions of Vector Spaces.

Book 1 Chapter 4 section 4.2

(15hrs)

**UNIT III: LINEAR TRANSFORMATION**

Algebra of Linear transformation, Regular and Singular Linear Transformations

Rank of Linear Transformation.

Book 1 Chapter 6 section 6.1

(15hrs)

**UNIT IV: LINEAR TRANSFORMATION (contd.)**

Characteristic Roots, Characteristic Vectors, Matrices, Trace and Transpose.

Book 1 Chapter 6 sections 6.2,6.3,6.8.

(15hrs)

**UNIT V: APPLICATIONS OF VECTOR SPACES AND LINEAR TRANSFORMATION**

Applications based on the concept of

a. linear dependence and independence of vectors, linear Span , bases and dimensions of Vector Spaces.

b. Linear transformation, Characteristic Roots, Characteristic Vectors & Matrices.

Book 2 Chapters 15,16,18 (problems only)

(15 hrs)

**BOOKS RECOMMENDED:**

1. I.N.Herstein (1989) Topics in Algebra(2<sup>nd</sup> edition) Wiley Eastern Ltd. New Delhi.
2. S.G Venkatachalapathy, Modern Algebra, Margham Publications

**REFERENCE BOOKS:**

1. M.L.Santiago(1988) Modern Algebra Arul Publications,Chennai.
2. S.Arumugam (2004) Modern Algebra, Scitech Publications,Chennai.
3. K.Viswanatha Naik, Modern Algebra, Emerald Publishers
4. Joseph Gallian, Contemporary Algebra, Narosa Publications,Chennai.

**PERIODICALS:**

1. The Mathematics Intelligencer.
2. Mathematics Newsletters.

**WEBSITES & e-LEARNING SOURCES:**

<http://www.mathforum.org>

<http://www.opensource.org>

**Question Paper Pattern**

**Question paper should cover all the five units.**

<b>Component</b>	<b>Nature of the Question</b>	<b>Maximum Marks</b>
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 2 Questions, from each Unit

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.

**SEMESTER-IV**  
**CORE-8**  
**VECTOR CALCULUS AND GEOMETRY**

**Teaching Hours: 75 hrs**

**Credits :4**

**Course Code: MA15 / 4C / VCG**

**LTP : 3 2 0**

**OBJECTIVES:**

**To enable students to**

- Understand the fundamental concepts of vector calculus and polar co-ordinate geometry
- Apply the knowledge of polar co-ordinate gained, to solve various problems
- Apply the various techniques of vector integration in solving volume and surface integrals

**COURSE OUTLINE:**

- UNIT I : Vector Differentiation:** Directional Derivative, gradient, unit normal to the surface, equation of tangent plane to a surface, equation of normal to a surface , Divergence, Curl, Laplace operators.  
Book1 Chapter 2 Sections 2.1 - 2.13 (20 hrs)
- UNIT II:** Evaluation of line integral, surface integral and volume integral  
Book1 Chapter 3 Sections 3.1 - 3.6 (10 hrs)
- UNIT III:** Application of Green's theorem, Gauss-Divergence theorem, Stokes' theorem (proofs of theorems not included), simple problems  
Book1 Chapter 4 Sections 4.1 - 4.8 (15 hrs)
- UNIT IV: Planes:** Equation of a plane, Angle between two planes, equation of a plane through line of intersection of two planes , length of perpendicular, To find the equation of the plane which bisects the angle between two given planes, simple problems.  
Book 2 Chapter II Sections 1-11 (15 hrs)
- UNIT V: Polar co-ordinates:**  
Distance between the points, area of triangle – equation of straight line  
Book 3 Chapter 5 (15 hrs)

**BOOKS RECOMMENDED:**

1. Duraipandian, P., Laxmi Duraipandian, Vector Calculus (2003) Emerald Publishers
2. T.K. Manicavachagam Pillay& Narayanan , Revised edition, Reprint 2001, Analytical Geometry (Part II - Three dimensions), S. Vishwanathan Printers and publishers pvt.ltd, Chennai
3. S.G. Venkatachalapathy , Analytical Geometry ( Two dimensions & Three dimensions) Margham Publications.



**REFERENCE BOOKS:**

1. M.L.Khanna, Co-ordinate Geometry, Jai Prakash Nath & co.
2. P.R. Vittal, Vector analysis, Analytical solid geometry and sequences and series.

**PERIODICALS:**

1. The Mathematics Intelligencer.
2. Mathematics Newsletters

**WEBSITES & e-LEARNING SOURCES:**

<http://www.mathforum.org>

<http://www.opensource.org>

**Question Paper Pattern**

**Question paper should cover all the five units.**

<b>Component</b>	<b>Nature of the Question</b>	<b>Maximum Marks</b>
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 2 Questions, from each Unit

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.

**SEMESTER –V**  
**CORE: 9**  
**REAL ANALYSIS**

**Teaching Hours : 75 hrs**

**Credits: 4**

**Course Code : MA15 / 5C / RAN**

**LTP: 3 2 0**

**OBJECTIVES:**

**To enable students to**

- get acquainted with the concepts of real analysis
- work comfortably with concepts
- explore sequence and series , the varies limiting processes viz. continuity, differentiability and integrability

**COURSE OUTLINE:**

- UNIT I:** Countability, Real numbers, least upper bounds, sequences and subsequences, limit of a sequence, convergent and divergent sequence , bounded sequences , Monotone sequences, Cauchy sequences.  
Chapter 1 sections 1.5 - 1.7  
Chapter 2 sections 2.1 - 2.8, 2.10. (15 hrs)
- UNIT II:** Convergence and divergence of series, series of non-negative terms, alternating Series, conditional and absolute convergence. test for absolute convergence .  
Chapter 3 sections 3.1 - 3.4 , 3.6 (15hrs)
- UNIT III:** Limit of a function, metric spaces, functions continuous at a point on a real line, Open sets, closed sets.  
Chapter 4 sections 4.1 , 4.2  
Chapter 5 sections 5.1 - 5.5 (15 hrs)
- UNIT IV:** Connectedness and Completeness  
Connectedness, Bounded sets and totally bounded sets, completeness  
Chapter 6 sections 6.1-6.4 (15 hrs)
- UNIT V:** Compactness.  
Calculus: Sets of measure zero, Definition of Riemann integral, Existence of Riemann integral.  
Chapter 6 section 6.5  
Chapter 7 sections 7.1 - 7.3 (15 hrs)

**BOOKS RECOMMENDED:**

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

## REFERENCE BOOKS:

1. Tom.M.Apostol , Mathematical Analysis Narosa Publishing house ,II edition
2. Rudin W.Principles of Mathematical Analysis ,1976,Tata Mc Graw Hill company, New York.
3. Malik .S.C & Savita Arora, Mathematical Analysis ,1991,Wiley eastern Limited, New Delhi
4. Sanjay Arora & Bansi Lai ,Introduction to Real Analysis,1991, Satya Prakashan , NewDelhi
5. Gelbaum .B.R & Olmsted, Counter Examples in Analysis, 1964,Holden Day, San Fransis Co.
6. A.L.Gupta & N.R.Gupta, Principles of Real Analysis ,2003, Pearson Education (India Print)

## PERIODICALS:

1. The Mathematics Intelligencer
2. Mathematics News Letter.

## WEBSITES & e-LEARNING SOURCES:

<http://www.mathforum.org>

<http://www.opensource.org>

## Question Paper Pattern

**Question paper should cover all the five units.**

Component	Nature of the Question	Maximum Marks
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 2 Questions, from each Unit

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.

**SEMESTER – V**  
**CORE –10**  
**STATICS**

**Teaching Hours: 90**

**Credits: 4**

**Course Code : MA15 / 5C / STT**

**L T P : 3 3 0**

**OBJECTIVES:**

**To enable students to:**

- Understand the development of skills in formation of suitable mathematical models.
- Understand the problem solving techniques
- Understand the basic concepts of forces, moments, couple, friction and centre of gravity.

**COURSE OUTLINE:**

- UNIT I: Forces:** Linear momentum - Friction - Laws of Friction - angle and Cone of Friction - Resultant of two, three and several forces acting on a particle.  
Chapter 2 Section 2.1, 2.2 (15 hrs)
- UNIT II: Equilibrium of a Particle:** Triangle Law of forces and its Converse - Lami's Theorem, Equilibrium of a particle under several forces-Limiting Equilibrium of a particle on an Inclined Plane.  
Chapter 3 Section 3.1, 3.2 (15 hrs)
- UNIT III: Forces on a Rigid Body:** Moment of a force - General Motion of a Rigid Body - Equation of motion of a rigid body (statement only)-Equivalent Systems of forces-Resultant of Like and Unlike parallel forces - Varignon's theorem-Forces along the sides of a triangle  
Chapter 4 Section 4.1, 4.2, 4.3, 4.4, 4.5 (20 hrs)
- UNIT IV: Couples:** Moment of a couple - Arm and axis of a couple - resultant of several coplanar forces - Moment of a certain couple as area - Couples in a parallel planes – Resultant of a couple and a force - Equation of the line of action of the resultant.  
Chapter 4 Section 4.6, 4.7, 4.8. (22 hrs)
- UNIT V: Centre of Mass:** Centre of Gravity (C.G) - CG of a plane area - CG of an arc of a Circle - segment of a circle - CG of solid and hollow cone - Solid and Hollow hemisphere.  
Chapter 6 Section 6.1, 6.2 (Omit 6.2.3 and 6.2.4) (18 hrs)

**BOOKS RECOMMENDED:**

Duraipandian, P., Laxmi Duraipandian, Muthamizh Jayapragasam. (2005). Mechanics. (6<sup>th</sup> Revised Edition), New Delhi: S. Chand and Co.

**REFERENCE BOOKS:**

1. Dharmapadam, A.V. Mechanics. (1991). Chennai: S.Viswanathan and Co.,
2. Viswanath Naik, K. Statics, (2000). Chennai: Emerald Publishers (Reprint).

**PERIODICALS:**

1. The Mathematics Intelligencer
2. Mathematics News Letter.

**WEBSITES & e - LEARNING SOURCES:**

[http:// www.mathforum.org](http://www.mathforum.org)

[http:// www.opensource.org](http://www.opensource.org)

**Question Paper Pattern**

**Question paper should cover all the five units.**

<b>Component</b>	<b>Nature of the Question</b>	<b>Maximum Marks</b>
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 2 Questions, from each Unit

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.

**SEMESTER – V**  
**CORE: 11**  
**DISCRETE MATHEMATICS**

**Teaching Hours : 75 hrs**

**Credits :4**

**Course Code : MA15/5C/DIM**

**LTP: 3 2 0**

**OBJECTIVES:**

**To enable students to**

- Develop construction and verification of mathematical logic.
- Gain fundamental knowledge about lattices and Boolean Algebra.
- Learn the basics of Graph Theory and its application.

**COURSE OUTLINE :**

**UNIT I: PROPOSITIONAL CALCULUS**

Tautology and contradiction – Equivalence of formulae - Equivalent formulae – duality law – Tautological implications – Functionally complete set of connectives – other connectives- Normal forms – disjunctive normal forms – conjunctive normal forms.  
Book 1 Chapter 4 (12 hrs)

**UNIT II : RELATIONS and LATTICES**

Basic concepts – Binary Relations – Properties of binary relations – Equivalence relations – Partial ordering – partially ordered set – Hasse diagram. Lattices – Introduction- Principle of duality - Properties of Lattices – sub Lattice – distributive lattice, modular lattice – bounded lattice - complemented lattice.  
Book 1 Chapter 5, 6 and 7 (15 hrs)

**UNIT III: BOOLEAN ALGEBRA**

Definition – Other basic laws of Boolean Algebra – Principle of duality for Boolean Algebras – ATOM definition - ATOMIC Boolean algebra – Finite Boolean Algebra. Boolean expression – definition – Boolean function – Literal – minterm and maxterm, Normal forms and Canonical forms – Simplification of Boolean functions by Karnaugh Map method.  
Book 1 Chapter 8 and 9 (18 hrs)

**UNIT IV: GRAPHS, SUBGRAPHS AND CONNECTEDNESS**

Introduction – definition and examples – degrees – subgraphs – Isomorphisms – walks, trails and paths – connectedness and components – blocks – connectivity.  
Book 2 Chapter 2 section 2.0-2.4  
Chapter 4 section 4.0-4.4 (15 hrs)

**UNIT V: EULERIAN AND HAMILTONIAN GRAPHS**

Introduction - Eulerian graphs – Hamiltonian graphs.  
Book 2 Chapter 5 (15 hrs)

### BOOKS RECOMMENDED :

1. Dr.S.P. Rajagopalan, Dr.R.Sattanathan, Discrete Mathematics, Margham Publications 2007, Chennai -17.
2. S.Arumugam, S.Ramachandran: Invitation to graph theory, Scitech Publications (India) Pvt.ltd 2008, Chennai -17.

### REFERENCE BOOKS:

1. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, Prentice-Hall of India, 2004.
2. Trembley J.P and Manohar .R , Discrete Mathematical Structures with Applications to Computer Science, 2003. Tata Mcgraw – Hill Publication Co., limited, New Delhi.
3. Ralph.P. Grimaldi, Discrete and Combinatorial Mathematics: An Applied Introduction 4<sup>th</sup> edition, Pearson Education Asia, Delhi 2002.

### PERIODICALS:

1. The Mathematics Intelligencer
2. Mathematics News Letter.

### WEBSITES AND e-LEARNING SOURCES:

[http:// www.mathfourm.org](http://www.mathfourm.org)  
[http:// www.opensource.org](http://www.opensource.org)

### Question Paper Pattern

Question paper should cover all the five units.

Component	Nature of the Question	Maximum Marks
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 2 Questions, from each Unit

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.

**SEMESTER – V**  
**CORE - 12**  
**OPTIMIZATION TECHNIQUES**

**Teaching Hours : 75**

**Credits : 4**

**Course Code : MA15/5C/OPT**

**LTP : 3 2 0**

**Objectives:**

- To develop computational skills
- To develop logical thinking in formulating industry oriented problems
- To apply these techniques in real life situations

**UNIT I: Linear programming:**

General LPP- Mathematical formulation-Solution for LPP by Graphical Method and Simplex Method (finite optimal solution, unbounded solution, alternative optimal solution) - slack and surplus variables

Chapter 6 Sections 6.1-6.12 (15 hrs)

**UNIT II: Artificial Variable Technique- Big-M Method – concept of Duality- Dual theorem (only statement) - Reading solution of the dual from the final simplex table of the primal and vice-versa .**

Chapter 6 Sections 6.23-6.28,6.31,6.33-6.34 (15 hrs)

**UNIT III: Transportation problem – Mathematical formulation- North-West corner rule- Least cost Method- Vogel’s approximation method- Optimality test.**

Chapter 9 Sections 9.1- 9.7 , (15 hrs)

**UNIT IV: Assignment problem - Hungarian method of solving an assignment problem –Unbalanced assignment problems – Travelling Salesman (routing) problem .**

Chapter 8 Sections 8.1-8.5 , Chapter 10 Sections 10.9 (15 hrs)

**UNIT V: Queuing theory - General concepts and definitions- classification of queues- Poisson process- properties of Poisson process, Models**

i. (M/M/1) : ( $\infty$ / FCFS)

ii. (M/M/1) : (N/ FCFS)

iii. (M/M/S) : ( $\infty$ / FCFS)

Chapter 5 Sections 5.1-5.6 ,5.14 , 5.17- 5.18 (15 hrs)

**BOOKS RECOMMENDED:**

1. R.K. Gupta, Operations Research, 12<sup>th</sup> edition, Krishna Prakashan Media (P) Ltd.



## REFERENCE BOOKS:

1. S.D. Sharma, Operations Research, 8<sup>th</sup> edition , Kedhar Nath Ram Nath & co, Meerut
2. Gupta P.K & Hira D.S (2000) Problems in Operations Research, S.Chand & Co, Delhi
3. V.Sundaresan, K.S. Ganapathy Subramanian, & K.Ganesan, Resource Management Techniques (Operations Research), Reprint June 2002, A.R. Publications, Nagapattinam District .

## PERIODICALS:

1. The Mathematics intelligencer
2. Mathematics Newsletter

## WEBSITES & E- LEARNING SOURCES:

<http://www.mathforum.org>

<http://www.opensource.org>

## Question Paper Pattern

Question paper should cover all the five units.

Component	Nature of the Question	Maximum Marks
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 2 Questions, from each Unit

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.

**SEMESTER – V**  
**ELECTIVE - 1**  
**PROGRAMMING LANGUAGE ‘C’**

**Teaching Hours: 90**

**Credits: 3**

**Course Code : MA15/5E/PLC**

**LTP : 2 4 0**

**OBJECTIVES:**

- To enable the students to learn a high level language
- To introduce to the students the concepts in ‘C’
- To enable the students to develop programming skill in ‘C’ language

**UNIT I : About C** – Introduction – Importance – programming structure data types and Variables – character set – C tokens – keywords & identifiers – constants – variables –Data types – declaration – assigning values to the variables.  
Chapter 1 Sections 1.1-1.4  
Chapter 2 Sections 2.1-2.9 (10 hrs)

**UNIT II: Operators and expressions:** Arithmetic, Relational, Logical, Assignment, Increment/Decrement, Conditional Bitwise operators, Precedence of Arithmetic Operators – Arithmetic expressions, Evaluation of expressions, Type conversions in expressions, Input/output operations, Reading/Writing a character – formatted Input/output.  
Chapter 3 Sections 3.1-3.14  
Chapter 4 Sections 4.1-4.5 (15hrs)

**UNIT III: Control Statements –Decision making and Looping:** While, do-while, for, Nested Loop – jump in Loops.  
**Decision Making and branching:** if else – switch, break and continue, goto statements.  
Chapter 5 Chapter 6 (20 hrs)

**UNIT IV: Array:** One and Two dimensional arrays – initializing two dimensional arrays  
**Strings:** Handling of character strings – declaring and initializing string variables – Reading strings from the terminal – Writing strings to screen – Arithmetic Operation on characters – Putting strings together – Comparison of strings – String handling functions  
Chapter 7 Sections 7.1-7.4  
Chapter 8 Sections 8.1-8.8 (30 hrs)

**UNIT V: Functions:** Defining, Accessing – Passing arguments to functions – Specifying Argument data types – The scope and Life time of variables in functions – Recursion.  
Chapter 9 Sections 9.1-9.15 (Omit 9.14) (15 hrs)

### **BOOKS RECOMMENDED:**

Programming in ANSI C, Second Edition, E.Balaguruswamy (Case Study Excluded), Tata Mc-Graw Hill, New Delhi.

### **REFERENCE BOOKS:**

1. Programming in 'C' , Schaum series, Bryon S. Gottfried, 1998, Tata Mc-Graw Hill, New Delhi.
2. Let us C, Yashavant P.Kanetkar, BPB Publications.

### **PERIODICALS:**

1. The Mathematics Intelligencer
2. Mathematics News Letter.

### **WEBSITES & e - LEARNING SOURCES:**

[http:// www.mathforum.org](http://www.mathforum.org)

[http:// www.opensource.org](http://www.opensource.org)

### **Question Paper Pattern**

**Question paper should cover all the five units.**

<b>Component</b>	<b>Nature of the Question</b>	<b>Maximum Marks</b>
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 2 Questions, from each Unit

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions

## PROGRAMMING LANGUAGE C – PRACTICALS

Teaching Hours : 45

Credits-2

Course Code : MA15 / 5E /PR1

L T P : 0 0 3

### PRACTICAL PROGRAMS

1. Program to find roots of a quadratic equation.
2. Program to reverse the digits of a number and also their sum.
3. Program to generate prime numbers between any two given numbers.
4. Program to find the GCD & LCM of two numbers.
5. Program to find integer power of a number.
6. Program to evaluate  $1 + x + x^2 + x^2 + \dots + x^n$ .
7. Program to read the cost price and selling price and calculate the Profit or loss and also the loss percentage or profit percentage.
8. Program to print election result after checking the eligibility of age.
9. Program to calculate mean and standard deviation of a given set of numbers using arrays.
10. Program to sort a given set of numbers in ascending order by interchange sort.
11. Program to find the transpose and trace of a matrix.
12. Program to find matrix addition and subtraction.
13. Program to multiplication of matrices.
14. Program to assign grade to the average mark obtained by a student.
15. Program to accept a line of text and to count the number of vowels, consonants and special characters and number of words in the text.
16. Program to get a string and check it for a Palindrome using string handling function and without string handling function.
17. Program to get two strings and concatenate the strings and get the length of the strings.
18. Program using function sub- program, ternary operator and recursive function to find the factorial of a given number.
19. Program using function, to find the binomial co-efficient for a given n and r.
20. Program using function, to generate Fibonacci series.

**Assessment:** Computer Practical Examination.

Duration - 3 hrs

Maximum marks 100 (Aggregate of examination and record);

Practical examination – 90 (3 x 30 ) Marks.

Record -10 Marks

There will be three questions with or without subsections to be asked for the practical examination.

## **Assessment of Computer Practical Examination.**

### **For each question**

Programming skill (writing) - 10 marks

Technical Skill (Keying) - 10 marks

Debugging and generating output - 10 marks

Two **internal examiners** (appointed in consultation with Head of the department / Principal of the college) to be appointed to conduct the practical examination.

**SEMESTER – VI**  
**CORE: 13**  
**COMPLEX ANALYSIS**

**Teaching Hours : 75**

**Credits: 4**

**Course Code : MA15 / 6C /CAN**

**LTP: 3 2 0**

**OBJECTIVES:**

**This course provided:**

- A modern treatment of concepts and techniques of Complex Function Theory.
- Methods to solve problems in pure as well as in Applied Mathematics.

**COURSE OUTLINE:**

**UNIT I: Analytic functions:** Functions of complex variables – Limit , continuity – Uniform continuity – Analytic function – Cauchy-Riemann equations. (12 hrs)

**UNIT II: Transformations :** Definitions – Definition of Conformal Mapping – Necessary and sufficient conditions for conformal mapping – The transformations  $w = az+b / (cz+d)$  ,  $w = 1/z$  (15 hrs)

**UNIT III : Complex Integration:** Rectifiable arcs, Contours – complex line integration – Cauchy’s theorem, Cauchy – Goursat theorem (statement only) – Cauchy’s Integral formula - Cauchy’s integral formula for first order derivative – Extension of Cauchy’s integral formula (without proof). Liouville’s Theorem, Fundamental Theorem of Algebra, (simple problems) (18 hrs)

**UNIT IV:** Taylor’s and Laurent’s Series (statement only), Residue Calculus – Zeros and Poles of a function – Meromorphic function – The Residue at a pole – Residue Theorem – Argument principle – Rouché’s Theorem, (simple problems) (15 hrs)

**UNIT V: Contour integration:** Evaluation of  
(i)  $\int f(\cos\theta, \sin\theta) d\theta$   
(ii)  $\int f(x) dx$  where  $f(x)$  is a rational polynomial having no poles on the Real Axis  
(iii)  $\int f(x) \sin mx dx$   
(iv)  $\int f(x) \cos mx dx$ , where  $m > 0$  and  $f(x)$  is a rational function having no poles on the Real Axis. (15 hrs)

**BOOKS RECOMMENDED:**

1. R.V. Churchill and J.W Brown (1990), Complex variable and application (5<sup>th</sup> edition) McGraw Hill International Book Co., New York.
2. P. Duraipandian and Laxmi Duraipandian (1976), Complex Analysis, Emerald Publishers, Chennai.

### REFERENCE BOOKS:

1. S. Ponusamy (2000), Foundation of Complex Analysis, Narosa Publishing House, New Delhi.
2. B.S.Tyagi (2015), Functions of a Complex Variable, Kedar Nath and Ram Nath Publishers, Meerut.
3. S.Arumugam , A. Thngapandi Isaac, A. Somasundaram, Complex Variable , Scitech Publications, Chennai.

### PERIODICALS:

1. The Mathematics Intelligencer
2. Mathematics News Letter.

### WEBSITES AND e-LEARNING SOURCES:

1. [http:// www.mathfourm.org](http://www.mathfourm.org)
2. [http:// www.opensource.org](http://www.opensource.org)

### Question Paper Pattern

Question paper should cover all the five units.

Component	Nature of the Question	Maximum Marks
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 2 Questions, from each Unit

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.

**SEMESTER – VI**  
**CORE –14**  
**DYNAMICS**

**Teaching Hours: 90**

**Credits: 4**

**Course Code: MA15 /6C/DYN**

**LTP : 3 3 0**

**OBJECTIVES:**

**To enable students to:**

- Understand some real life problems in motion.
- Understand the motion of projectiles, impact of spheres and central orbits.
- Interpret and logically deduct physics aspects of the problems.

**COURSE OUTLINE:**

**Unit-I: Kinematics:** Velocity-resultant Velocity- relative velocity-Acceleration-velocity and acceleration in a coplanar motion-Angular velocity-Relative angular velocity.  
Chapter 1 Sections 1.1, 1.2, 1.3, 1.4. (18 hrs)

**Unit-II: Work, Energy and Power:** Units of work- work done in stretching an elastic string- Energy- Conservation of Energy-Power. Rectilinear motion under varying force-Simple harmonic motion- composition of two simple harmonic motions.  
Chapter 11 & 12 - Sections 11.1, 11.2, 11.3, 12.1 only (Omit 12.2, 12.3, 12.4). (12 hrs)

**Unit-III: Projectiles:** Forces on a projectile-Nature of trajectory-Results pertaining to the motion of a projectile-Maximum horizontal range for a given velocity- Two trajectories with a given speed and range- projectile projected horizontally and on an inclined plane-Maximum range on an inclined plane.  
Chapter 13 Sections 13.1, 13.2 only ( Omit 13.3)  
**Impact:** Impulsive force-Laws of impact- Direct and oblique impact of two smooth spheres- Impulse loss of kinetic energy due to impact.  
Chapter 14 Sections 14.1, 14.2, 14.3, 14.5 (Omit 14.4) (27 hrs)

**Unit-IV: Central Orbits:** General Orbits- central force- differential equation of a central orbit- Laws of central force-method to find the central orbit-Conic as a central orbit-Kepler's law of planetary motion.  
Chapter 16 Sections 16.1, 16.2, 16.3. (15 hrs)

**Unit-V: Moment of Inertia:** Moment of two dimensional and solid bodies, Radius of Gyration, Perpendicular and parallel axes theorem.  
Chapter 17 Sections 17.1 (18 hrs)

**BOOKS RECOMMENDED:**

Duraipandian, P., Laxmi Duraipandian, Muthamizh Jayapragasam. (2005). Mechanics, (6<sup>th</sup> Revised Edition), New Delhi: S. Chand and Co.



**REFERENCE BOOKS:**

1. Dharmapadam, A.V. Mechanics, (1991), Chennai: S. Viswanathan and Co.,
2. Viswanath Naik.K. and Kasi M.S. (2000), Dynamics. Chennai: Emerald Publishers (Reprint).

**PERIODICALS:**

1. The Mathematics Intelligencer
2. Mathematics News Letter

**WEBSITES & e - LEARNING SOURCES:**

[http:// www.mathforum.org](http://www.mathforum.org)

[http:// www.opensource.org](http://www.opensource.org)

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Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 2 Questions, from each Unit

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.

**SEMESTER – VI**

**CORE: 15**

**ELEMENTARY NUMBER THEORY**

**Teaching Hours : 75**

**Credits: 4**

**Course Code : MA15 /6C/ENT**

**L T P : 3 2 0**

**OBJECTIVES:**

**To enable students to:**

- To have conceptual understanding of the fundamentals of Number theory.
- To know the connections of number theory with other branches.
- To gain competence in solving problems.

**UNIT I: Introduction:** Basic Binary Operations on the set of Integers- Ordering of the Integers- Well ordering principle-mathematical Induction.  
Chapter 1 Sections 1.3 - 1.6 (7 hrs)

**UNIT II: Divisibility Theory:** Greatest common Divisor- Relatively Prime integers – Algorithm to Find G.C.D : Investigation of the set of Integers  $\{ bx+cy \}$ - Least Common Multiple.  
Chapter 2 Sections 2.3 - 2.5 and 2.7. (17 hrs)

**UNIT III: Linear Diophantine Equations:** Linear Diophantine Equations- The Equation  $ax+by=c$  - Diophantine Equation in Three or More Unknowns- Diophantine Equation of the Second Degree  
Chapter 3 Sections 3.2 - 3.5 (17 hrs)

**UNIT IV: Primes and their Distributions:** Prime Number- The Sieve of Eratosthenes – Positive Divisors of a Positive integer -The Goldbach Conjecture.  
Chapter 4 Sections 4.2 - 4.5 (17 hrs)

**UNIT V: Congruences:** Congruence- Properties of Congruences- Special Divisibility Tests- Linear Congruence.  
Chapter 5 Sections 5.2, 5.3, 5.6, 5.7 (17 hrs)

**BOOKS RECOMMENDED:**

Theory of Numbers –Pundir & Pundir – Pragati Prakashan – Third revised edition 2012.

**REFERENCE BOOKS:**

1. Elementary theory of numbers, cy. Hsiung, Allied publishers, 1995.
2. Elementary Number Theory, Allyn and Bacon Inc., Boston, 1980.
3. Introduction to Analytic Number Theory, Tom. M. Apostol, Narosa Publishing House, New Delhi, 1989.

**PERIODICALS:**

1. The Mathematics Intelligencer
2. Mathematics News Letter

**WEBSITES & e - LEARNING SOURCES:**

[http:// www.mathforum.org](http://www.mathforum.org)

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Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 2 Questions, from each Unit

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.

**SEMESTER –VI**  
**ELECTIVE: 2**  
**OPERATIONS RESEARCH**

**Teaching Hours: 75 hrs**

**Credits: 5**

**Course Code: MA15/ 6E / OPR**

**LTP: 4 1 0**

**OBJECTIVES:**

- To develop computational skills
- To develop logical thinking in formulating industry oriented problems
- To apply these techniques in real life situations

**UNIT I: Sequencing problems:**

Introduction- n jobs to be operated on two machines-n jobs to be operated on three machines-sequence decision problem for n jobs on m machines- problem involving two jobs and m machines- Graphical method.

Book 1 Chapter 10 Sections 10.1-10.8 (10hrs)

**UNIT II :Game theory:**

Two persons zero sum games, the maxmin- minmax principle- saddle point and value of games- games without saddle points-pure strategies and mixed strategies-properties of optimal mixed strategies(without proof)-Dominance property-graphical method for  $2 \times n$  and  $m \times 2$  games.

Book 1 Chapter 12 Sections 12.1-12.16 (10hrs)

**UNIT III: Inventory theory:**

Introduction- variables in an inventory problem - Need of inventory- Inventory problems - Advantages and disadvantages of inventory- Classification of inventory Models - Economic lot size models

**Model I:** Economic lot size model with uniform rate of demand, infinite rate of production and no shortages.

**Model II:** Economic lot size model with uniform rate of demand, finite rate of replenishment having no shortages.

Book 1 Chapter 3 Sections 3.1-3.9, 3.12 (20hrs)

**UNIT IV: Network Analysis:**

Introduction- Network diagram representation - rules for drawing

Network diagram- labelling: Fulkerson's 'I-J' rule- time estimates and critical path in Network analysis- Forward pass, Backward pass computation- Determination of floats and slack times- Determination of critical path.

Book 2 Chapter 25 Sections 25.1-2.5.8 (20 hrs)

**UNIT V: Project Evaluation and Review Techniques (PERT) -** Optimistic time- most likely time-Pessimistic time- expected time-variance- Rules for finding variance of events - problems in PERT.

Book 2 Chapter 25 Sections 25.10 (15 hrs)

**BOOKS RECOMMENDED:**

1. R.K. Gupta, Operations Research, 12<sup>th</sup> edition, Krishna Prakashan Media (P) Ltd.
2. S.D. Sharma, Operations Research, 8<sup>th</sup> edition, Kedhar Nath Ram Nath & co, Meerut

**REFERENCE BOOKS:**

1. Gupta P.K & Hira D.S (2000) Problems in Operations Research, S.Chand & Co, Delhi
2. V.Sundaresan, K.S. Ganapathy Subramanian, & K.Ganesan, Resource Management Techniques (Operations Research), Reprint June 2002, A.R. Publications, Nagapattinam District

**PERIODICALS:**

1. The Mathematics intelligencer
2. Mathematics Newsletter

**WEBSITES & e- LEARNING SOURCES:**

<http://www.mathforum.org>

<http://www.opensource.org>

**Question Paper Pattern**

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Section A: Short Answer: 2 Questions from each Unit

Section B: 5 questions to be answered out of 8 questions.

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**SEMESTER – VI**  
**ELECTIVE: 3**  
**PROGRAMMING LANGUAGE ‘C’ & INTRODUCTION TO OOP**

**Teaching Hours: 90**

**Credits: 3**

**Course Code: MA15 /6E /PCO**

**LTP: 2 4 0**

**OBJECTIVES:**

- To enable the students to learn a high level language
- To introduce to the students the concepts in ‘C’
- To enable the students to develop programming skill in ‘C’ language

**COURSE OUTLINE:**

**UNIT I: Structures:** Structure definition giving values to members – structure initialization, Arrays of Structures – Arrays within Structures – Structures within structures  
Book 1 Chapter 10 Section 10.1-10.8 (20 hrs)

**UNIT II: Pointers:** Understanding Pointers – Accessing address of a variable – Declaring and Initializing pointers – Accessing a variable through its pointer – Pointers and Arrays-Pointers and Structures  
Book 1 Chapter 11 Section 11.1-11.8 (20 hrs)

**UNIT III: File Management:** Defining and opening a file – Closing a file – Input / Output, operations on files. Random access to files.  
Book 1 Chapter 12 Section 12.1-12.6 (10 hrs)

**UNIT IV: Dynamic Memory Allocation and Linked Lists:** Introduction –Dynamic memory allocation, concepts, advantages and types of linked list Representation of Linked Lists in memory. Creation of a linked list. Insertion into Linked List – Deletion from a Linked List. **(programs not included)**  
Book 1 Chapter 13 Section 13.1-13.7 (20 hrs)

**UNIT V: Concepts of OOP -** Need for object oriented programming, Procedural languages, object oriented approach, Characteristics of object oriented Languages. Objects, classes, inheritance, reusability, creating new data types, polymorphism and over loading, Comparison of C with C++ **(programs not included)**  
Book 2 Chapter 1 (20 hrs)

### **BOOKS RECOMMENDED :**

1. Programming in ANSI C Second Edition, E.Balaguruswamy (Case Study Excluded), Tata Mc-Graw Hill, New Delhi.
2. Object Oriented Programming with C++ , Sixth Edition, E.Balagurusamy, McGraw Hill Education India) Private Limited.

### **REFERENCE BOOKS:**

1. Programming in 'C' , Schaum series, Bryon S. Gottfried, 1998, Tata Mc-Graw Hill, New Delhi.
2. Let us C, Yashavant P.Kanetkar, BPB Publications.

### **PERIODICALS:**

1. The Mathematics Intelligencer
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### **Question Paper Pattern**

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Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 2 Questions, from each Unit

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.

**SEMESTER – VI**  
**PROGRAMMING LANGUAGE ‘C’ & INTRODUCTION TO OOP**  
**PRACTICALS**

**Teaching Hours : 45 HOURS**

**Credits : 2**

**Course Code : MA15 /6E/PR2**

**LTP :0 0 3**

**PRACTICAL PROGRAMS:**

1. Program to exchange two strings using pointers.
2. Program using pointers to compute the sum and average of all numbers stored in an array.
3. Program to read a name, grade and ten test scores into a structure and print them with high, low and average score.
4. Program to get and print title, author and price of three books, using structures and pointers to structure variables.
5. Program to generate pay bill of an employee using structures and structure element.
6. Program to generate admission list using structures and structure element.
7. Program to generate Telephone bill using structures and structure element.
8. Program to interpolate using Newton – Gregory Forward interpolation formula.
9. Program to interpolate using Newton – Gregory Backward interpolation formula.
10. Program to solve a system of Linear Algebraic Equations by Gauss Elimination method.
11. Program to interpolate using Lagrange Interpolation formula.
12. Program to evaluate an integral using Simpson one third rule for Numerical Integration.
13. Program to read the data from the keyboard, write it to a file, called “INPUT”, read the same data from the same file and to display it on the screen.
14. Program to create a file called DATA containing a series of integer numbers, to read these numbers and then to write all odd numbers to a file to be called ODD and all even numbers to a file to be called EVEN, read the Data stored in ODD and EVEN files and to display them on the screen.
15. Program to create a file of records of students and to read, update and write the contents of the file.

**Assessment:** Computer Practical Examination.

Duration - 3 hrs

Maximum marks 100 (Aggregate of examination and record);

Practical examination – 90 (3 x 30) Marks

Record -10 Marks.

There will be three questions with or without subsections to be asked for the practical examination.



## **Assessment of Computer Practical Examination.**

### **For each question**

Programming skill ( writing ) - 10 marks

Technical Skill (Keying) - 10 marks

Debugging and generating output - 10 marks

Two **internal examiners** (appointed in consultation with Head of the department / Principal of the college) to be appointed to conduct the practical examination.

# **Allied Courses-offered to B.Sc., Mathematics**

## **SYLLABUS**

**(Effective from the academic year 2015-16)**

**SEMESTER – I**  
**B. Sc Mathematics**  
**ALLIED - 1 (For I B. Sc Mathematics)**  
**CALCULUS OF FINITE DIFFERENCES – I**

**Teaching Hours: 90 hrs**

**Credits: 5**

**Course Code: MA15 / 1A / FD1**

**LTP: 4 2 0**

**OBJECTIVES:**

**To enable students to**

- Learn some numerical techniques
- Develop computational skills
- Develop logical thinking.

**COURSE OUTLINE:**

**UNIT I : FINITE DIFFERENCES**

Forward, Backward, Divided difference and Shift Operators, Relation between operators, representation of polynomials in factorial notations, Successive differences of polynomial- Differences of zero. Simple problems. (Proof of theorems in finite differences excluded) (20hrs)

**UNIT II : INTERPOLATION**

Newton's forward and backward formulae for interpolation- Central difference formulae- Gauss forward, Gauss backward, Stirling's and Bessel's formulae (Derivations not included for all the formulae) (20 hrs)

**UNIT III : INTERPOLATION (contd)**

Largange's formula for interpolation – Newton's divided differences formula. Lagrange's inverse formula. (Derivations are not included) (15 hrs)

**UNIT IV : NUMERICAL DIFFERENTIATION**

Methods of derivatives using interpolation formulae (only first order), maxima and minima using Newton's forward formula – simple problems. (15 hrs)

**UNIT V : NUMERICAL INTEGRATION**

Quadrature formula for equidistant ordinates based on Newton's Forward formula – trapezoidal rule – Simpson's one third rule – Simpson's three Eighth rule. (20 hrs)

**BOOKS RECOMMENDED:**

1. B.D.Gupta (2001) Numerical Analysis, Konark Pub.Ltd., Delhi.
2. S.G.Venkatachalapathy, Calculus of finite differences and Numerical analysis Margham publications, Chennai.
3. Dr. M.K. Venkataraman, Numerical Methods in Science & Engineering, The National Publishing Company.

### REFERENCE BOOKS:

1. H.C. Saxena, Finite difference and numerical analysis(1991) S.Chand & Co.Delhi.
2. S.Arumugham ,Numerical Methods, (2003) New Gamma Publishing, Palayamkottai.

### PERIODICALS:

1. The Mathematics Intelligencer
2. Mathematics News Letter.

### WEBSITES AND E-LEARNING SOURCES:

[http:// mathforum.org](http://mathforum.org)

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### Question Paper Pattern

**Question paper should cover all the five units.**

Component	Nature of the Question	Maximum Marks
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Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 10 Questions to be answered without choice, 2 questions from each Unit, each carrying 2 marks

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Section C: 2 questions to be answered out of 4 questions, each carrying 20 marks

**SEMESTER – II**  
**B. Sc Mathematics**  
**ALLIED -2 (For I B. Sc Mathematics)**  
**CALCULUS OF FINITE DIFFERENCES – II**

**Teaching hours: 90 hrs**

**Credits: 5**

**Course Code: MA15/2A/FD2**

**LTP: 4 2 0**

**OBJECTIVES:**

**To enable students to**

- Learn some numerical techniques
- Develop computational skills
- Develop logical thinking.

**COURSE OUTLINE :**

**UNIT I:** Summation of series: Use of forward difference operators – Summation using Euler – Maclaurin’s formula. (20 hrs)

**UNIT II:** Solution of Algebraic and Transcendental Equations: Numerical solutions of polynomial and Transcendental equations in one variable. (20 hrs)

1. Bisection Method
2. Method of false position (Regular falsi Method)
3. Newton Raphson Method
4. Method of iteration

**UNIT III:** Solution of a system of Algebraic Equations: Numerical solution of Simultaneous Linear Equations in three variables by (20 hrs)

1. Gauss Elimination Method
2. Gauss Jordan Method
3. Jacobi Iteration Method
4. Gauss Seidel Method

**UNIT IV:** Difference equations: Definition, method of solutions, First order linear difference equation with constant, variable coefficients, second order linear difference equation with constant Coefficients- Particular integrals Of type (15 hrs)

1.  $a^x$
2.  $x^m$
3.  $x^m a^x$  – Simple problems.

**UNIT V:** Numerical solution of ordinary differential equations of first order. (15 hrs)

1. Euler’s method
2. Modified Euler Method
3. Picard’s method of successive approximation
4. Runge- Kutta Method of order four.

### **BOOKS RECOMMENDED :**

1. B.D.Gupta (2001) Numerical Analysis \_Konark Pub.Ltd., Delhi.
2. S.G.Venkatachalapathy, Calculus of finite differences and Numerical analysis Margham publications, Chennai.
3. Dr. M.K. Venkataraman, Numerical Methods in Science& Engineering, The National Publishing Company

### **REFERENCE BOOKS :**

1. H.C. Saxena (1991) Finite difference and numerical analysis S.Chand & Co.Delhi.
2. S.Arumugham (2003) Numerical Methods, New Gamma Publishing, Palayamkottai.

### **PERIODICALS:**

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Section C: 2 questions to be answered out of 4 questions, each carrying 20 marks.

**SEMESTER – III**  
**ALLIED – 3 (for B.Sc Mathematics)**  
**MATHEMATICAL STATISTICS –I**

**Teaching hours: 90 hrs**

**Credits: 5**

**Course Code: MA15 / 3A / MS1**

**L T P : 4 1 1**

**OBJECTIVES:**

**To enable students to**

- Acquaint the students with statistical tools.
- Draw valid inferences from them.

**COURSE OUTLINE:**

Concept of probability to be revised (not included for examination purpose)

**THEORY COMPONENT**

**UNIT I : RANDOM VARIABLES**

Definition of a random variable, discrete and continuous random variable, mathematical expectation of a discrete and continuous random variable.

Book 1 Chapter 5 Sections 5.1 - 5.4.1

Chapter 6 Sections 6.1 - 6.7

(15hrs)

**UNIT II : DISCRETE DISTRIBUTIONS**

Binomial, Poisson distributions - Definitions, mean, median, mode, recurrence formula for moments, moment generating function, additive property, fitting of distributions.

Book 1 Chapter 7

(15 hrs)

**UNIT III : CONTINUOUS DISTRIBUTION**

Rectangular distribution, Normal distribution - Definition, limiting form of Binomial distribution, (derivation excluded). Chief characteristics of normal distribution. Normal probability curve, mean, mode, median, moment generating functions, moments, Area property, fitting of normal distribution.

Book 1 Chapter 8 Sections 8.1-8.2.14

(15hrs)

**UNIT IV: CORRELATION & REGRESSION**

Simple correlation - Rank correlation, product moment correlation for raw and grouped data. Regression lines for X on Y and Y on X, computation of means, variances and correlation coefficient from regression lines.

(Derivation of formulae for correlation and regression lines excluded).

Book 1 Chapter 10 Sections 10.1-10.6.1, 10.7- 10.7.5

(30hrs)

## PRACTICAL COMPONENT

### UNIT V: COMPUTATIONAL STATISTICS USING “R” SOFTWARE

Diagrammatic representation of data by subdivided and multiple Bar diagram, pie chart. Graphical representation of frequency data Rod & Spike graph, frequency polygon . Less than and more than Ogives. Correlation and rank correlation between two variables. Regression lines of X on Y and Y on X  
( **Practical examination only , No questions for the end semester examination**)  
Book 2. (15hrs)

### BOOKS RECOMMENDED:

1. S.C. Gupta and V.K. Kapoor, Elements of Mathematical Statistics, Sultan Chand & Sons publications.
- 2 . Sudha G.Prohit, Sharad D.Gore and Shailaja R. Deshmukh, Statisitcs using R , Second edition, Narosa Publishing house

### REFERENCE BOOKS:

1. P.R. Vittal, Mathematical Statistics, Margham Publications
2. S.C. Gupta and V.K. Kapoor, Fundamentals\_of Mathematical Statistics, Sultan Chand & Sons publications

### PERIODICALS:

1. The Mathematics Intelligencer
2. Mathematics NewsLetters.

### WEBSITES AND e-LEARNING SOURCES:

<http://www.mathforum.org>

<http://www.opensource.org>

### Question Paper pattern

**Question paper should cover only the first four units. Unit V is evaluated only through practicals**

Component	Nature of the Question	Maximum Marks
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answers: Not more than three questions from each unit.

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.



## SEMESTER –IV

### ALLIED- 4 (for B.Sc Mathematics)

### MATHEMATICAL STATISTICS -II

Teaching Hours : 90 hrs

Credits: 5

Course Code : MA15/4A/MS2

LTP: 4 1 1

#### OBJECTIVES:

##### To enable students to

- Understand the concepts of sampling, testing of hypothesis, critical region and standard error.
- Understand the significance of the connection between statistics and their applications to the real world.

#### COURSE OUTLINE:

#### THEORY COMPONENT

##### UNIT I : SAMPLING THEORY:

Tests of Hypothesis, Concepts of standard Error, Null Hypothesis, Alternative Hypothesis, Error in Sampling, Critical region and Level of Significance, One tailed and Two tailed tests, degrees of freedom, Simple and composite hypothesis, Size and power of a test.

Book 1 Chapter 12 Sections 12.1 - 12.7

(15 hrs)

##### UNIT II : TEST OF SIGNIFICANCE FOR LARGE SAMPLES:

Test of significance of single mean, Test of significance of difference of two means, Difference between two standard deviation, Test for single proportion, test of significance for difference of two proportions, Confidence intervals.

Book 1, Chapter 12, Sections 12.8 -12.9.2, 12.13 – 12.15.

##### TEST OF SIGNIFICANCE FOR SMALL SAMPLES:

t- Test – Test for single mean, test of significance for difference between two population means, t-Test for paired observations, F- test.

Book 1 Chapter 14 Sections 14.1-14.2.7, 14.3.2

(40 hrs)

##### UNIT III : CHI-SQUARE TEST:

Chi-square test for homogeneity, Chi-square test of Goodness of Fit, Test of independence of two attributes.

Book 1 Chapter 11 Sections 11.7 – 11.8

Chapter 13 Sections 13.5.2, 13.5.3

(10 hrs)

##### UNIT IV : ANALYSIS OF VARIANCE:

ANOVA – One way classification, Two way classification

Chapter 17 Sections 17.1 – 17.3

(10 hrs)

## PRACTICAL COMPONENT

### UNIT V: COMPUTATIONAL STATISTICS USING “R” SOFTWARE

Measures of central tendency, Dispersion, Skewness and Kurtosis. Fitting of distribution Binomial, Poisson and Normal. Chi-Square test of Goodness of fit.

Test of Significant difference between two means and two proportions .

Paired t- test ,ANOVA one way classification.

**(Practical examination only , No questions for the end semester examination)**

Book 2

(15 hrs)

### BOOKS RECOMMENDED:

1. S.C. Gupta and V.K Kapoor, Elements of Mathematical Statistics, Sultan Chand Publications .
2. Sudha G.Prohit, Sharad D.Gore and Shailaja R. Deshmukh, Statistics using R , Second edition, Narosa Publishing house

### REFERENCE BOOKS:

1. P.R. Vittal, Mathematical Statistics, Margham publications
2. D.C.Sancheti, V.K.Kapoor, Statistics(Theory ,Methods and Application) Sultan Chand & Sons publications

### PERIODICALS:

1. The Mathematics Intelligencer
2. Mathematics News Letter.

### WEBSITES AND e-LEARNING SOURCES:

[http:// www.mathfourm.org](http://www.mathfourm.org)

[http:// www.opensource.org](http://www.opensource.org)

### Question Paper pattern

**Question paper should cover only the first four units. Unit V is evaluated only through practicals**

Component	Nature of the Question	Maximum Marks
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answers: Not more than three questions from each unit.

Section B: 5 questions to be answered out of 8 questions.

Section C: 2 questions to be answered out of 4 questions.

# **Courses offered to other Departments**

## **SYLLABUS**

**(Effective from the academic year 2015-16)**

## SEMESTER – I

### ALLIED - 1 (for I yr Physics & Chemistry)

#### ALLIED MATHEMATICS – I

Teaching Hours: 90

Credits: 5

Course Code: MA15 / 1A / AM1

LTP: 3 3 0

#### OBJECTIVES:

To enable students to

- To introduce the concepts of Algebra
- To introduce the concepts of Trigonometry
- To introduce the concepts of Calculus.

#### COURSE OUTLINE:

**UNIT I: Matrices:** Eigen values and Eigen vectors, Cayley Hamilton Theorem (No proof) verification of Cayley Hamilton theorem, Inverse of a Matrix using Cayley Hamilton Theorem. (17 hrs)

**UNIT II: Theory of equations:** Roots of polynomial Equations, Symmetric functions of roots in Terms of coefficients, Transformation of equations, Formation of equations, Reciprocal Equations. (20 hrs)

**UNIT III: Trigonometry:** Expansions of  $\cos n\theta$ ,  $\sin n\theta$ , Expressions of  $\cos \theta$ ,  $\sin \theta$ ,  $\tan \theta$  in powers of  $\theta$ , Hyperbolic functions and Inverse Hyperbolic functions. Real and imaginary parts of  $\sin(\alpha+i\beta)$ ,  $\cos(\alpha+i\beta)$ ,  $\tan(\alpha+i\beta)$ ,  $\tan^{-1}(\alpha + i\beta)$ . (18 hrs)

**UNIT IV: Integral calculus:** Bernoulli's formula  
Reduction formulae  $\int e^{ax} \cos bx \, dx$ ,  $\int e^{ax} \sin bx \, dx$ -  
 $\int \sin^m x \cos^n x \, dx$  (m, n being positive integers),  
 $\int x^m (\log x)^n \, dx$ ,  $\int \cos^m x \cos nx \, dx$ ,  
 $\int \cos^m x \sin nx \, dx$ . (20 hrs)

**UNIT V: Fourier Series:** Definition- Finding Fourier coefficients for a given periodic functions with period  $2\pi$ - odd and even function- Half range series. (15 hrs)

#### BOOKS RECOMMENDED :

Narayanan and Manicavachagom Pillay, Ancillary Mathematics Book I, II, and III  
Viswanathan Printers and publishers Private limited, Chennai.

#### REFERENCE BOOKS:

1. P.R.Vittal ,Allied Mathematics, (2003), Margham Publications, Chennai
2. P.Duraipandian and S.Udayabaskaran, Ancillary Mathematics, vol I &II , (1997) Muhil Publisher, Chennai.

**PERIODICALS:**

1. The Mathematics Intelligencer
2. Mathematics News Letter.

**WEBSITES & e-LEARNING SOURCES:**

<http://www.mathforum.org>

<http://www.opensource.org>

**Question Paper Pattern**

**Question paper should cover all the five units.**

<b>Component</b>	<b>Nature of the Question</b>	<b>Maximum Marks</b>
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 10 Questions to be answered without choice, 2 questions from each Unit, each carrying 2 marks

Section B: 5 questions to be answered out of 8 questions, each carrying 8 marks

Section C: 2 questions to be answered out of 4 questions, each carrying 20 marks.

## SEMESTER II

### ALLIED -2 (for I yr Physics & Chemistry)

#### ALLIED MATHEMATICS- II

Teaching Hours: 90

Credits: 5

Course Code: MA15 / 2A /AM2

LTP: 3 3 0

#### OBJECTIVES:

To enable students to

- To introduce the concepts of Differential Equations
- To introduce the concepts of Laplace Transforms
- To introduce the concepts of Vector Analysis
- To introduce the concepts of Interpolation.

#### COURSE OUTLINE:

**UNIT I : Ordinary Differential Equations:** Linear differential equations with constant co-efficients, particular integral of polynomial and  $Ve^{mx}$ , where V is a polynomial or sin x or cos x. (20 hrs)

**UNIT II : Partial Differential Equations :** Formation, Complete Integral, Four standard types, Lagrange's Equation, simple problems. (20 hrs)

**UNIT III: Laplace Transforms:** Laplace Transforms of Standard functions, Simple theorems. (no proof) Inverse Laplace Transforms, solving first order differential equations with constant coefficients using Laplace transforms. (20 hrs)

**UNIT IV: Vector Analysis:** Introduction, operator  $\nabla$ , Gradient, Directional derivative, unit Normal to surface. Divergence and curl of vectors, solenoidal and irrotational vectors, the operator  $\nabla^2$ , harmonic functions. (15 hrs)

**UNIT V: Interpolation** – Newton's forward and backward formulae for interpolation (no proof) Lagrange's formula for interpolation (No Proof) – Simple problems. (15 hrs)

#### BOOKS RECOMMENDED:

1. Narayanan and Manicavachagom Pillay, Ancillary Mathematics Book I, II, and III Viswanathan Printers and publishers Private limited, Chennai.
2. Singaravelu, R. Ramaa, Allied Mathematics, Meenakshi Agency, Chennai

#### REFERENCE BOOKS:

1. P.R.Vittal, Allied Mathematics, (2003) Margham Publications, Chennai
2. P.Duraipandian and S.Udayabaskaran, Ancillary Mathematics, vol I &II (1997) Muhil Publisher, Chennai.

### PERIODICALS:

1. The Mathematics Intelligencer
2. Mathematics News Letter.

### WEBSITES & e-LEARNING SOURCES:

<http://www.mathforum.org>

<http://www.opensource.org>

### Question Paper Pattern

**Question paper should cover all the five units.**

Component	Nature of the Question	Maximum Marks
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 10 Questions to be answered without choice , 2 questions from each Unit, each carrying 2 marks

Section B: 5 questions to be answered out of 8 questions, each carrying 8 marks

Section C: 2 questions to be answered out of 4 questions, each carrying 20 marks.

## SEMESTER – I

### ALLIED – 1 (for I B.Com)

#### BUSINESS MATHEMATICS – I

**Teaching Hours: 90**

**Credits: 5**

**Course Code: MA15/1A/BM1**

**LTP: 3 3 0**

#### **OBJECTIVES:**

This paper aims to introduce and develop basic concepts of mathematics and operations research that can be applied in real life situations with special reference to business.

#### **COURSE OUTLINE:**

##### **UNIT I: MATRICES**

Introduction, Types of matrices, Cayley Hamilton Theorem (no proof), Inverse of a matrix using Cayley Hamilton Theorem. Solution of simultaneous equations using Gauss Elimination Method.

Book 1 Chapter 2 Sections 1.1, 1.2, 1.6.3, 1.6.4 (18 hrs)

##### **UNIT II: DIFFERENTIATION**

First and second order derivative of a function of one variable, derivatives of power function, product of two functions, quotient of two functions, derivative of logarithmic function, logarithmic differentiation. (Trigonometric functions excluded) Maxima and Minima-Application to Business Problems

Book 2 Chapter 7 Sections 7.1, 7.2, 7.4, 7.4.1, 7.4.2, 7.8, 7.8.1 (20 hrs)

##### **UNIT III: INTEGRATION**

Introduction, some standard integrals, integrals reducible to standard form, integration by parts, integration by partial fractions. (Trigonometric functions excluded)

Book 2 Chapter 8 Sections 8.1, 8.4, 8.5.2, 8.5.3 (20 hrs)

##### **UNIT IV: LINEAR PROGRAMMING**

General linear programming problem, Mathematical formulation of a LPP, Graphical procedure and Simplex procedure. (Excluding artificial variable).

Book 3 Chapter 12 Sec 6.2, 6.3, 6.10, 6.11 (18 hrs)

##### **UNIT V: GAME THEORY**

Two persons zero sum games, the maximin-minimax principle, saddle point and value of the games, Games without saddle points, mixed strategies, Dominance property.

Book 3 Chap 12 Sec 12.5, 12.9, 12.10, 12.12 – 12.15 (14 hrs)



### **BOOKS RECOMMENDED:**

1. Manicavachagom Pillay, Narayanan, S.Viswanathan ,Algebra ,Printers & Publishers.
2. .D.C. Sancheti and V.K. Kapoor, Business mathematics, Sultan Chand &Co.
3. R.K. Gupta, Operations research, Krishna Prakashan Mandir

### **REFERENCE BOOKS:**

1. Narasimhan, Ramachandran , Veeraragavan, Ramana, Business Mathematics and business statistics, K.C.S. Desikan and Co.
2. P.R. Vittal, Business Mathematics, Margham Publications.
3. P.A.Navaneetham, Business Mathematics and Statistics for B.Com., BBM, Jai Publishing House , Trichy.
4. Sundaresan and Jayaseelan- An Introduction to Business Mathematics, S.Chand and Company, New Delhi.

### **PERIODICALS:**

- 1.The Mathematics Intelligencer.
- 2.Mathematics Newsletters.

### **WEBSITES & e-LEARNING SOURCES:**

<http://www.mathforum.org>

<http://www.opensource.org>

### **Question Paper Pattern**

**Question paper should cover all the five units.**

<b>Component</b>	<b>Nature of the Question</b>	<b>Maximum Marks</b>
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 10 Questions to be answered without choice, 2 questions from each Unit, each carrying 2 marks

Section B: 5 questions to be answered out of 8 questions, each carrying 8 marks

Section C: 2 questions to be answered out of 4 questions, each carrying 20 marks.

**SEMESTER – II**  
**ALLIED - 2 (for I B.Com)**  
**BUSINESS MATHEMATICS – II**

**Teaching Hours: 90**

**Credits: 5**

**Course Code: MA15/2A/BM2**

**LTP: 3 3 0**

**OBJECTIVES:**

This paper aims to introduce and develop basic concepts of mathematics and operations research that can be applied in real life situations with special reference to business.

**COURSE OUTLINE:**

**UNIT I: PERMUTATION AND COMBINATION**

Fundamental rule of Counting, Permutations, Factorial notation, Permutation of  $n$  different things, Circular Permutations, Permutation of things not all different, Restricted permutations, Combinations- Restricted Combination, Combination of things not all different.

Book1: Chapter 3 – sec 3.2,3.4 – 3.9, 3.11,3.12 (20 hrs)

**UNIT II: ARITHMETIC AND GEOMETRIC PROGRESSION**

Arithmetic progression, sum of series in AP, arithmetic mean, geometric progression, sum of series in GP, geometric mean.

Book1: Chapter 2 – Sec 2.5, 2.5.1,2.5.2,2.6,2.6.1,2.6.4 (15 hrs)

**UNIT III: TRANSPORTATION PROBLEM**

Introduction, Transportation problem, initial feasible solution, North-West corner Rule, Lowest cost method, Vogel's method optimality test (only problems) degeneracy excluded .

Book 2: Chapter 9 – Sec 9.1,9.2,9.6 (20 hrs)

**UNIT IV: ASSIGNMENT PROBLEM**

Introduction, Assignment problem-Hungarian method of solving an assignment problem -Unbalanced assignment problems-Travelling Salesman (routing) problem.

Book 2: Chapter 8 – Sec 8.1,8.2,8.4,8.5  
Chapter 10 – Sec 10.9 (15 hrs)

**UNIT V: SEQUENCING**

Introduction - sequencing problems, general assumptions, sequencing decision problems for  $n$ -Jobs on two machines, sequencing decision problems for  $n$ -Jobs on three machines.

Book 2: Chapter10 – Sec 10.1 – 10.5 (20 hrs)

### **BOOKS RECOMMENDED:**

1. .D.C. Sancheti and V.K. Kapoor, Business mathematics, Sultan Chand &Co.
2. R.K. Gupta, Operations research, Krishna Prakashan Mandir.

### **REFERENCE BOOKS:**

1. Narasimhan, Ramachandran , Veeraragavan, Ramana, Business Mathematics and business statistics, K.C.S. Desikan and Co.
2. P.R. Vittal, Business Mathematics, Margham Publications.

### **PERIODICALS:**

1. The Mathematics Intelligencer.
2. Mathematics News letter.

### **WEBSITES & e-LEARNING SOURCES:**

<http://www.mathforum.org>

<http://www.opensource.org>

### **Question Paper Pattern**

**Question paper should cover all the five units.**

<b>Component</b>	<b>Nature of the Question</b>	<b>Maximum Marks</b>
Section A	Short Answers (10X 2)	20 Marks
Section B	Understanding Description /Problems (5 X 8)	40 Marks
Section C	Application/ Analysis/ Synthesis/ Evaluation (2 X 20)	40 Marks

Section A: Short Answer: 10 Questions to be answered without choice, 2 questions from each Unit, each carrying 2 marks

Section B: 5 questions to be answered out of 8 questions, each carrying 8 marks

Section C: 2 questions to be answered out of 4 questions, each carrying 20 marks.

## SEMESTER I

### CORE - 1 (for I M.Com)

#### STATISTICAL TOOLS FOR BUSINESS MANAGEMENT – I

Teaching hours: 90 hrs

Credits: 5

Course Code: 7P15/1C/ST1

LTP: 3 3 0

#### OBJECTIVES:

##### To enable students to

- Acquaint the students with statistical tools
- Develop some techniques for collect, handling and analyzing data to be used in business
- To draw valid inferences from them

#### COURSE OUTLINE:

**UNIT I:** Theoretical discrete distributions – Binomial and Poisson( simple problems only)  
Fitting of Binomial and Poisson distributions. (15 hrs)

**UNIT II:** Theoretical Continuous distributions – Rectangular and Normal distributions.  
Fitting of Normal Distribution ( simple problems only) (15 hrs)

**UNIT III:** Partial and multiple correlations. Regression lines of  $x$  on  $y$  and  $y$  on  $x$ .  
(problems only) (15 hrs)

**UNIT IV:** Statistical decision theory – Decision Environment – Decision making under  
Certainty and Uncertainty- Expected Monetary Value, Expected Monetary Loss  
and Marginal Analysis. Expected Value of Perfect Information. Decision tree  
analysis. (25 hrs)

**UNIT V:** Interpolation and extrapolation – Newton forward, backward, Lagrange's  
Method for unequally spaced arguments. (20 hrs)

#### BOOKS RECOMMENDED

1. Statistical Methods – S.P. Gupta
2. Statistics (Theory , Methods & Application ) – D.C. Sancheti & V.K. Kapoor

#### REFERENCE BOOK

S.C.Gupta & V.K.Kapoor , Fundamentals of Mathematical Statistics.

#### PERIODICALS:

1. The Mathematics Intelligencer.
2. Mathematics Newsletters

**WEBSITES & e-LEARNING SOURCES:**

<http://www.mathforum.org>

<http://www.opensource.org>

**Question Paper Pattern**

**Question paper should cover all the five units.**

**Maximum marks: 100**

**SECTION A:** 5 questions to be answered out of 8 questions,  
each question carrying 8 marks.

$(5 \times 8 = 40)$

**SECTION B:** 3 questions to be answered out of 5 questions,  
each question carrying 20 marks.

$(3 \times 20 = 60)$

## SEMESTER – II

### CORE-2 (For I M.Com)

#### STATISTICAL TOOLS FOR BUSINESS MANAGEMENT – II

Teaching Hours: 75 hrs

Credits: 5

Course Code: 7P15 / 2C / ST2

LTP: 4 1 0

#### OBJECTIVES:

##### To enable students to

- Acquaint the students with statistical tools
- Develop some techniques for collect, handling and analyzing data to be used in Business
- To draw valid inferences from them

#### COURSE OUTLINE:

**UNIT I:** Sampling Distribution –Standard errors , errors in sampling , Level of significance,One – tailed and Two- tailed test (15 hrs)

**UNIT II:** Large sample Tests – difference between two means, standard deviations and proportions, Confidence limits. (15 hrs)

**UNIT III:** Small sample tests –  $t$  tests, means, difference between two means, paired  $t$  tests for difference of means. F test. (15 hrs)

**UNIT IV:** Chi square tests – Test of goodness of fit. Test of independence of attributes. Association of two attributes – Comparison method, proportion method, Yule's Co efficient of association. (15 hrs)

**UNIT V:** Analysis of variance – One way and two way classification. (15 hrs)

#### BOOKS RECOMMENDED:

1. S.P Gupta ,Statistical Methods,Sultan Chand & sons.
2. Statistical ( Theory, Methods & Application) – D.C. Sancheti & V.K.Kapoor

#### REFERENCE BOOK

S.C.Gupta & V.K.Kapoor , Fundamentals of Mathematical Statistics.

#### PERIODICALS:

1. The Mathematics Intelligencer.
2. Mathematics Newsletters

**WEBSITES & e-LEARNING SOURCES:**

<http://www.mathforum.org>

<http://www.opensource.org>

**Question Paper Pattern**

**Question paper should cover all the five units. Maximum marks: 100**

**SECTION A:** 5 questions to be answered out of 8 questions,  
Each question carrying 8 marks. (5x8 = 40)

**SECTION B:** 3 questions to be answered out of 5 questions,  
Each question carrying 20 marks. (3x 20 = 60)

**SEMESTER – I / II**  
**NON MAJOR ELECTIVE**  
**STATISTICS USING EXCEL**

**Course Code:** MA15 / 1N / SUE (or) MA15 / 2N / SUE

**Credits: 2**

**Teaching hours: 30 hrs**

**LTP: 0 0 2**

**OBJECTIVES:**

**To enable students to**

- Understand the basic concepts of collection, classification and tabulation of data.
- Find the measures of averages and dispersion for given data.
- Represent the various measures using MS Excel.

**COURSE OUTLINE:**

**UNIT I: DIAGRAMMATIC REPRESENTATION OF DATA**

One – dimensional diagrams: – Simple bar diagram, multiple bar diagram, sub-divided bar diagram. Two – dimensional diagram: – Pie diagram. (10 hrs)

**UNIT II: MEASURES OF AVERAGES**

Simple arithmetic mean, Median, Mode (raw data & Discrete Series only). ( 10 hrs)

**UNIT III: MEASURES OF DISPERSION**

Range, Standard deviation, Variance (raw data & Discrete Series only). ( 10 hrs)

**(All the units to be covered through practical sessions)**

**BOOKS RECOMMENDED :**

R.S.N. Pillai & V. Bagavathi, Statistics, S.Chand & Company Ltd.

**REFERENCE BOOKS:**

1. P.R. Vittal, Mathematical Statistics, Margham Publications
2. S.P. Gupta Statistical methods, Sultan Chand & Sons publications

**PERIODICALS:**

1. The Mathematics Intelligencer
2. Mathematics NewsLetters.

**WEBSITES AND e-LEARNING SOURCES:**

<http://www.mathforum.org>

<http://www.opensource.org>

**Question Paper Pattern**

5 questions are to be answered carrying 10 marks each (Practical)