

**E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.**

*(An Autonomous Institution – Affiliated to Madurai Kamaraj University)*

Re-accredited (3<sup>rd</sup> Cycle) with Grade **A+** & **CGPA 3.51** by NAAC

## **DEPARTMENT OF MATHEMATICS**



**CBCS SYLLABUS**

**BACHELOR OF SCIENCE**

**PROGRAMME CODE - M**

**COURSE STRUCTURE**

(w.e.f. 2017 – 2018 onwards)



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## **CRITERION - I**

*1.2.2 Details of Programmes offered through Choice Based Credit System (CBCS) / Elective Course System*

Syllabus copies with highlights of contents focusing on  
Elective Course System



**To be Noted:**

<b>HIGHLIGHTED</b>	<b>COURSE</b>
<div style="border: 1px solid red; width: 138px; height: 35px; margin: 0 auto;"></div>	<b>Elective</b>

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## CBCS

### DEPARTMENT OF MATHEMATICS - UG

(w.e.f. 2017- 2018 Batch onwards)

### COURSE STRUCTURE

Sem	Part	Sub Code	Title of the Paper	Lecture hours /week	Exam hrs	Marks allotted			
						C.A	S.E	Total	Credits
I	I	171T1	Tamil	6	3	25	75	100	3
	II	172E1	English	6	3	25	75	100	3
	III	17M11	<b>Core : Calculus</b>	5	3	25	75	100	5
	III	17M12	<b>Core : Theory of equations &amp; Number System</b>	5	3	25	75	100	4
	III	17AK1/17AP1	<b>Allied I : Chemistry/physics</b>	6	3	25	75	100	4
	IV	17NMM1	<b>* Mathematics for Competitive Examinations- Paper-I</b>	2	2	25	75	100	2
II	I	171T2	Tamil	6	3	25	75	100	3
	II	172E2	English	6	3	25	75	100	3
	III	17M21	<b>Core : Sequences &amp; Series</b>	5	3	25	75	100	5
	III	17M22	<b>Core : Differential Equations</b>	5	3	25	75	100	4
	III	17AK2/17AP2	<b>Allied I : Chemistry/Physics</b>	4	3	25	75	100	4
	III	17AK2P/17AP2P	<b>Allied I : Chemistry/Physics Practical</b>	2	3	40	60	100	1
	IV	17NMM2	<b>* Mathematics for Competitive Examinations- Paper-II</b>	2	2	25	75	100	2
III	I	171T3	Tamil	6	3	25	75	100	3
	II	172E3	English	6	3	25	75	100	3
	III	17M31	<b>Core : Modern Algebra</b>	6	3	25	75	100	5
	III		<b>Core : Elective - I</b>	4	3	25	75	100	4
	III	17AK3/17AP3	<b>Allied I : Chemistry/Physics</b>	6	3	25	75	100	4
	IV	17SEM31	<b>Skill Based Elective : Applications of Differential Equations</b>	2	2	-	100	100	2

Sem	Part	Sub Code	Title of the Paper	Lecture Hrs Per Week	Exam Hrs	Marks allotted			
						C.A	S.E	total	credits
IV	I	171T4	Tamil	6	3	25	75	100	3
	II	172E4	English	6	3	25	75	100	3
	III	17M41	Core : Graph Theory	6	3	25	75	100	5
	III		Core : Elective - II	4	3	25	75	100	4
	III	17AK4/17AP4	Allied I : Chemistry/Physics	4	3	25	75	100	4
	III	17AK4P/17AP4P	Allied I : Chemistry/Physics Practical	2	3	40	60	100	1
	IV	17SEM41	Skill Based Elective : Analytical Geometry – 3 Dimension	2	2	-	100	100	2
V	III	17M51	Core : Modern Analysis	5	3	25	75	100	5
	III	17M52	Core : Statistics - I	5	3	25	75	100	4
	III	17M53	Core : Dynamics	4	3	25	75	100	4
	III		Core : Elective - III	4	3	25	75	100	4
	III	17AA51	Allied II : Programming in C	4	3	25	75	100	4
	III	17AA5P	Allied II : C Practical	2	3	40	60	100	1
	IV	17SEM51	Skill Based Elective : Vector Calculus	2	2	-	100	100	2
	IV	17SEM52	Skill Based Elective : Quantitative Aptitude	2	2	-	100	100	2
	IV	174EV5	Environmental Studies	2	2	-	100	100	2
VI	III	17M61	Core : Complex Analysis	6	3	25	75	100	5
	III	17M62	Core : Statistics - II	6	3	25	75	100	5
	III	17M63	Core : Numerical Methods	6	3	25	75	100	4
	III	17AA61	Allied II : Object Oriented Programming with C++	4	3	25	75	100	4
	III	17AA6P	Allied II : C ++ Practical	2	3	40	60	100	1
	IV	17SEM61	Skill Based Elective : Discrete Mathematics	2	2	-	100	100	2
	IV	17SEM62	Skill Based Elective : Combinatorics	2	2	-	100	100	2
	IV	174VE6	Value Education	2	2	-	100	100	2
	V	175NS4/175PE4	Extension Activities : N.S.S / Physical Education	-	2	-	100	100	1
<b>Total</b>				<b>180</b>				<b>140</b>	

**Note:**

“\*” Offered to Other Departments.

**ELECTIVE PAPERS**

**Elective – I is to be chosen in Semester III from the following:**

1. Operations Research - 17ME3A
2. Astronomy -17ME3B

**Elective – II is to be chosen in semester IV from the following:**

1. Statics -17ME4A
2. Automata theory and Formal Language -17ME4B

**Elective – III is to be chosen in semester V from the following:**

1. Linear Algebra -17ME5A
2. Fuzzy Sets -17ME5B

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<b>Title of the paper</b>	<b>: Operations Research</b>	<b>Contact</b>	<b>: 4 hours</b>
<b>Semester</b>	<b>: III</b>	<b>Credits</b>	<b>: 4</b>
<b>Sub Code</b>	<b>:17ME3A</b>		

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**Objectives:**

1. To study the concept of Linear Programming Problems.
2. To understand the applications of Operations Research.

**Unit – I**

Mathematical Formulation of the problem - Illustrations on mathematical formulation of Lpp- Graphical solution method –General linear programming problem-The computational procedure .

**Unit – II**

Use of Artificial variable - Degeneracy in Linear programming.

**Unit – III**

General primal – Dual pair – Formulating a Dual problem – Primal- Dual pair in Matrix form – Duality and Simplex Method – Dual Simplex Method.

## Unit - IV

LP formulation of the Transportation Problem – Solution of a Transportation problem – Finding an initial basic feasible solution – Test for optimality – Transportation algorithm(MODI method) – Mathematical formulation of the Problem – Solution methods of Assignment Problem

## Unit – V

Games and strategies – Two-person zero-sum games – Some basic terms – The Maximin – Minimax Principle - Games without saddle points- Mixed Strategies – Graphic Solution of  $2 \times n$  and  $m \times 2$  games – Dominance Property.

Unit – I : Chapter 2: 2.3&2.4 Chapter 3: 3.2&3.4 Chapter 4: 4.3

Unit – II : Chapter 4: 4.4 & 4.5

Unit – III : Chapter 5: 5.2 to 5.4, 5.7 & 5.9.

Unit – IV : Chapter 10: 10.2,10.8 to 10.10 , 10.13 & Chapter 11: 11.2& 11.3.

Unit – V : Chapter 17: 17.2 to 17.7.

### Text Book: -

1. KanthiSwarup, P.K. Gupta & Man Mohan, *Operations Research*, Sultan Chand & Sons Educational Publishers, (2014).

### Reference Books:-

1. Arumugam S. & Thangapandi Isaac A., *Linear Programming*, New Gamma Publishing House, (2004).
2. Gupta P.K. & Man Mohan, *Problems in Operations Research*, Sultan Chand & Sons, Delhi, (2003).
3. Sharma J.K., *Operations Research Theory and Applications*, Macmillan Publishers India Ltd., IV-Edition, (2010).

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### **DEPARTMENT OF MATHEMATICS - UG**

(w.e.f. 2017- 2018 Batch onwards)

<b>Title of the paper</b>	: Astronomy	<b>Contact</b>	: 4 hours
<b>Semester</b>	: III	<b>Credits</b>	: 4
<b>Sub Code</b>	:17ME3B		

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#### **Objectives:**

To understand the spherical triangles and Diagrammatic Representations in Astronomy.

#### **Unit – I**

Spherical Triangles – Solutions.

#### **Unit – II**

Four system of Co-ordinates – Sidereal time.

#### **Unit – III**

Diagrammatic Representations.

#### **Unit - IV**

Earth – Zones of Earth – Dip of Horizon.

#### **Unit – V**

Refraction – Tangent Formula and Cassini's formula.

#### **Text Book: -**

Kumaravelu and SusheelaKumaravelu, *Astronomy*, Muruga Bhavanum Publishers,  
Chidhambara nagar, 2003.

#### **Reference Books:-**

G.V.Ramachandran, *Astronomy*, St.Joseph's College, Trichy.



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### **CBCS**

### **DEPARTMENT OF MATHEMATICS-UG**

(w.e.f. 2017- 2018 Batch onwards)

<b>Title of the paper</b>	: Statics	
<b>Semester</b>	: IV	<b>Contact : 4 hours</b>
<b>Sub Code</b>	: 17ME4A	<b>Credits : 4</b>

#### **Objective:**

To develop the skill to differentiate forces acting at a point and forces acting on a rigid body when the body is at rest.

#### **Unit– I**

Forces acting at a point – Resultant and Components- Simple cases of finding the resultant- Parallelogram of forces-Analytical Expression for the Resultant of two forces acting at a point- Triangle of forces –Perpendicular Triangle of forces- Converse of the Triangle of forces –The Polygon of forces- Lami's Theorem.

#### **Unit – II**

Resolution of a force – Components of a force along two given directions- Theorems on resolved parts – Resultant of any number of forces and coplanar forces acting at a point: Graphical Method & Analytical Method – Conditions of equilibrium of any number of forces acting upon a particle.

### **Unit – III**

Parallel forces and Moments – Resultant of two like and unlike parallel forces – Resultant of a number of parallel forces acting on a rigid body-Conditions of Equilibrium of three coplanar parallel forces-Centre of two parallel forces- Moment of a force – Varignon’s theorem.

### **Unit – IV**

Couples - Equilibrium of two couples - Equivalence of two couples-Couples in parallel planes – Representation of a couple by a vector- Resultant of coplanar couples - Resultant of a couple and a force.

### **Unit – V**

Friction - Definition –Experimental results – Statical, Dynamical and Limiting friction- Laws of friction- Friction a passive force- Coefficient of friction angle of friction- Cone of friction -Friction on inclined planes - Simple problems.

### **Text Book:-**

M.K. Venkataraman, *Statics*, 16<sup>th</sup> Edition, Agasthiar Publications, 2013.

Unit – I : Chapter 2 : 1 to 9

Unit – II : Chapter 2 : 11 to 16

Unit – III : Chapter 3 : 2 to 7

Unit – IV : Chapter 4: 1 to 10

Unit – V : Chapter 7 : 1 to 8 & 10 to 12

### **Reference Books:-**

1. Dharmapadam A.V., *Statics*, S.Viswanathan (Printers and Publishers) Pvt , Ltd. 1<sup>st</sup> Edition, 2006.
2. Khanna M.L., *Statics*, 7<sup>th</sup> Edition, Jai Prakash Nath & Co, Garth Road, Meerut.
3. Venkatachalapathy S.G., *Statics*, Marghak Publications, Chennai, 2005.

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<b>Title of the paper</b>	<b>: Automata Theory and Formal Languages</b>	<b>Contact</b>	<b>: 4 hours</b>
<b>Semester</b>	<b>: III</b>	<b>Credits</b>	<b>: 4</b>
<b>Sub Code</b>	<b>:17ME4B</b>		

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**Objectives:**

To study Properties of Regular sets and Push down Automata.

**Unit – I**

Strings, Alphabets and Languages – Graphs and trees – Inductive proof- Set notation – Relations – Synopsis of the book.

**Unit – II**

Finite state system – Basic definitions – Non deterministic finite automata- Finite automata with Moves – Regular Expression – Two way finite automata.

**Unit – III**

Properties of Regular sets – The pumping lemma for regular sets – Closure properties of regular sets – The Myhill – Nerode Theorem and Minimization of finite automata.

**Unit - IV**

Properties of Regular sets – The pumping lemma for regular sets – Closure properties of regular sets – The Myhill – Nerode Theorem and Minimization of finite automata.

**Unit – V**

Properties of Regular sets – The pumping lemma for regular sets – Closure properties of regular sets – The Myhill – Nerode Theorem and Minimization of finite automata.

**Text Book: -**

1. John.E. Hopcroft, Jeffrey D. Ullman, *Introduction to Automata Theory, Languages and Computation* Narosa Publishing House, 1999.

**Reference Books:-**

1. Alexander Meduna, *Automata and Languages*, Springer, 2000.
2. ShyamalenduKandar, *Automata Theory and Formal Languages*, Dorling Kindersley (India) Pvt. Ltd., 2012.
3. Dr. M.K. Venkataramam, Dr.N.Sridharan, N. Chandrasekaran, *Discrete Mathematics*,The National Publishing Company, 2009.

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<b>Title of the paper</b>	<b>: Linear Algebra</b>	
<b>Semester</b>	<b>: V</b>	<b>Contact Hours :4</b>
<b>Sub Code</b>	<b>:17ME5A</b>	<b>Credits :4</b>

**Objective :**

To enable the students to understand and apply the different concepts and methods in vector space.

**Unit: I Vector Spaces:** Definition and Examples – Subspaces - Linear Transformations.

**Unit: II Vector Spaces:** Span of a set - Linear Independence - Basis and Dimension - Rank and Nullity - Matrix of a Linear Transformation.

**Unit: III Inner Product Space:** Definition and Examples – Orthogonality -Orthogonal Complement.

**Unit: IV Theory of Matrices:** Algebra of Matrices – Types of Matrices – Inverse of Matrix.

**Unit: V Theory of Matrices:** Elementary Transformations – Rank of a Matrix– Simultaneous Linear Equations – Characteristic Equation And Cayley Hamilton Theorem - Eigen Values And Eigen Vectors

**Text Book: -**

1. S. Arumugam & A .Thangapandi Isaac, *Modern Algebra*, SCITECH Publications (INDIA) Pvt. Ltd., (2003).

**Chapters:-**

Unit I: Chapter 5: Sections (5.1 to 5.3)

Unit II: Chapter 5: Sections (5.4 to 5.8)

Unit III: Chapter 6: Sections (6.1 to 6.3)

Unit IV: Chapter 7: Sections (7.1 to 7.3)

Unit V: Chapter 7: Sections (7.4 to 7.8)

**Reference Books :-**

1. Krishnamurthy.V & Arora J.L, *Linear Algebra*, Affiliated East- West Press PVT. LTD., 1976.
2. Schaum's Outlines, *Linear Algebra*, TATA Mcgraw-Hill Edition, 2012.
3. Stephen H. Friedberg, Arnold J. Insel, Lawrence & E. Spence, *Linear Algebra*, Prentice – Hall of India Private Limited, 2004.

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**CBCS****DEPARTMENT OF MATHEMATICS****B.Sc. MATHEMATICS**

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<b>Title of the paper</b>	<b>: Fuzzy Sets</b>	
<b>Semester</b>	<b>: V</b>	<b>Contact Hours :4</b>
<b>Sub Code</b>	<b>: 17ME5B</b>	<b>Credits :4</b>

**Objective :**

1.To Introduce the basic ideas of Fuzzy Mathematics.

**Unit :I Crisp sets and Fuzzy sets** - Introduction - Crisp sets - The notation of Fuzzy sets-basic concepts of fuzzy sets- classical logic- fuzzy logic

**Unit : II Operations on Fuzzy Sets** -General discussion -fuzzy complement- fuzzy union - fuzzy intersection - combinations of operations - general aggregation operations.

**Unit :III Fuzzy relations** - Crisp and fuzzy relations - binary relations - binary relations on a single set - equivalence and similarity relations.

**Unit :IV** Compatibility or tolerance relations - Orderings.

**Unit : V** Morphisms - fuzzy relation equations.

**Text Book: –**

1. George J.Klir and T.A. Folger, *Fuzzy Sets , Uncertainty and Information*, Prentice Hall of India, (2012).

**Chapters:**

- Unit I: Chapter 1: Sections (1.1 to 1.6)
- Unit II: Chapter 2: Sections (2.1 to 2.6)
- Unit III: Chapter 3: Sections (3.1 to 3.4)
- Unit IV: Chapter 3: Sections (3.5 and 3.6)
- Unit V: Chapter 3: Sections (3.7 and 3.8)

**Reference Books:-**

1. Dr. Bhargava A.K., *Fuzzy Set Theory Fuzzy Logic and Their Applications*, S.Chand & Company Pvt. Ltd., (2013).
2. George J.Klir & Bo Yuan, *Fuzzy sets Fuzzy Logic, Theory and Applications*, Prentice Hall of India, (2002).