

**B.Sc., Mathematics ( Students admitted from 2018 - 2019 Onwards )**



**K.S. Rangasamy College of Arts and Science (Autonomous)**

**NAAC Re-accredited and an ISO 9001 : 2008 Certified Institution  
( Affiliated to Periyar University, Salem. Included under 2( f ) & 12( B ) of UGC Act, 1956 )**

**Tiruchengode - 637 215**

**SYLLABUS FOR  
B.Sc. MATHEMATICS**

**(2018 -21 Batch onwards)**



**BACHELOR OF SCIENCE (MATHEMATICS)**

**VISION**

To be a global center of excellence in Mathematics for the growth of Science and Technology.

**MISSION**

- To provide quality education and research in Mathematics through updated curriculum and effective teaching learning process.
- To inculcate innovative skills, team work and ethical practices among students so as to meet societal expectations.

**PROGRAMME EDUCATIONAL OBJECTIVES (PEO)**

**PEO 1:** To provide a degree course, suitable for students of high ability by combining and relating Mathematics, Statistics and the Social Sciences.

**PEO 2:** To prepare students for further study or for professional and managerial careers, particularly in areas requiring the applications of quantitative skills.

**PEO 3:** To develop their positive attitude, skills which will enable them to become a multi facet personality shining in any chosen field.

**PROGRAMME OUTCOMES (PO)**

After completion of the programme, the graduates will be able to

**PO 1:** Think in a critical manner and recognize when there is a need for information and use that information for solving problems effectively.

**PO 2:** Formulate and develop Mathematical arguments in a logical manner.

**PO 3:** Attain good knowledge and understanding in advanced areas of Mathematics and Statistics, chosen by the students from the given courses and acquires the ability to think independently paving way for life long learning.

**PO 4:** Understand and formulate and use quantitative models arising in social science, business and other contexts.

**PO 5:** Apply the concepts to design a Mathematical model and to solve the real life problems involving the concepts studied in Applied Mathematics.

**PROGRAMME SPECIFIC OUTCOMES (PSO)**

After completion of the programme, the graduates will be able to

**PSO 1:** Acquire the knowledge and sound understanding on fundamentals of mathematical concepts including quantity, structure, space and change.

**PSO 2:** Analyze the basic concepts of advanced Mathematics.

**PSO 3:** Comprehend a range of general skills, to solve problems, to evaluate information using computers to develop software programming and to communicate with society effectively and learn independently.

**PSO 4:** Possess the effective skills to analyze problems in diverse fields such as Science and Engineering, Education, Banking, Public services, Business etc.

**PSO 5:** Develop the Analytical, Numerical and Mathematical skills to create Mathematical Models and improve the problem solving skills to find the solution to the real life problems.

**REGULATIONS**

**ELIGIBILITY**

Candidates seeking the admission to the first year of the Bachelor of Science (Mathematics) full-time degree programme shall be required to possess a Bachelor's Degree of any Recognized University.

**DURATION OF THE COURSE**

The programme shall extend a three academic years consisting of six semesters. Each academic year will be divided into two semesters.

**MAXIMUM DURATION FOR THE COMPLETION OF THE PROGRAMME**

The maximum duration for completion of the UG Programme shall not exceed 12 semesters.

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**SCHEME OF EXAMINATION**

Subject Code	Subject	Hours of Instruction	Exam Duration	Max. Marks			Credit Points
				CA	CE	Total	
<b>First Semester</b>							
<b>Part I</b>							
18UTALA101/ 18UHILA101/ 18UFRLA101	Tamil I/ Hindi I/ French I	5	3	25	75	100	3
<b>Part II</b>							
18UENLA101	Foundation English - I	5	3	25	75	100	3
<b>Part III</b>							
18UMAM101	Core I : Classical Algebra	6	3	25	75	100	4
18UMAM102	Core II : Differential Calculus	5	3	25	75	100	4
18UPHMAA101	Allied I : Physics I	4	3	25	75	100	2
18UPHMAAP101	Allied Practical I : Physics I	3	3	40	60	100	2
<b>Part IV</b>							
18UVE101	Value Education I : Yoga	2	3	25	75	100	2
<b>Total</b>		<b>30</b>				<b>700</b>	<b>20</b>
<b>Second Semester</b>							
<b>Part I</b>							
18UTALA201/ 18UHILA201/ 18UFRLA201	Tamil II/ Hindi II/ French II	5	3	25	75	100	3
<b>Part II</b>							
18UENLA201	Foundation English - II	5	3	25	75	100	3
<b>Part III</b>							
18UMAM201	Core III: Integral Calculus	6	3	25	75	100	4
18UMAM202	Core IV: Differential Equations and Laplace Transforms	5	3	25	75	100	4
18UPHMAA201	Allied II: Physics II	4	3	25	75	100	2
18UPHMAAP201	Allied Practical II: Physics II	3	3	40	60	100	2
<b>Part IV</b>							
18UVE201	Value Education II : Environmental Studies	2	3	25	75	100	2
<b>Total</b>		<b>30</b>				<b>700</b>	<b>20</b>

**B.Sc., Mathematics ( Students admitted from 2018 - 2019 Onwards )**

<b>Third Semester</b>							
<b>Part I</b>							
18UTALA301/ 18UHILA301 / 18UFRLA301	Tamil III/ Hindi III/ French III	5	3	25	75	100	3
<b>Part II</b>							
18UENLA301	Foundation English- III	5	3	25	75	100	3
<b>Part III</b>							
18UMAM301	Core V: Analytical Geometry of 2D and 3D	5	3	25	75	100	4
18UMAM302	Core VI: Statics and Dynamics	5	3	25	75	100	4
18UMAA301	Allied III : Mathematical Statistics I	3	3	25	75	100	2
18UMAAP301	Allied Practical III: Statistical Package (Ms-Excel)	2	3	40	60	100	2
<b>Part IV</b>							
18UMASB301	SBC I: Quantitative Aptitude - 100% Internal Evaluation	2	3	100	-	100	2
18UMANM301	NMEC I	2	3	25	75	100	2
<b>Non Credit</b>							
18ULS301	Career Competency Skills I	1	-	-	-	-	-
	Add-on Course *	-	-	-	-	-	-
<b>Total</b>		<b>30</b>				<b>800</b>	<b>22</b>
<b>Fourth Semester</b>							
<b>Part I</b>							
18UTALA401/ 18UHILA401 / 18UFRLA401	Tamil IV/ Hindi IV/ French IV	5	3	25	75	100	3
<b>Part II</b>							
18UENLA401	Foundation English -IV	5	3	25	75	100	3
<b>Part III</b>							
18UMAM401	Core VII: Applications of integration and Vector Calculus	5	3	25	75	100	4
18UMAM402	Core VIII: Sequences and Series	5	3	25	75	100	4
18UMAA401	Allied IV: Mathematical Statistics II	3	3	25	75	100	2
18UMAAP401	Allied Practical IV: Statistical Software (SPSS )	2	3	40	60	100	2
<b>Part IV</b>							
18UMASB401	SBC II : Statistics for Competitive Exams - 100% Internal Evaluation	2	3	100	-	100	2
18UMANM401	NMEC II	2	3	25	75	100	2
<b>Non Credit</b>							
18ULS401	Career Competency Skills II	1	-	-	-	-	-
	Add-on Course *	-	-	-	-	-	-
<b>Total</b>		<b>30</b>				<b>800</b>	<b>22</b>

**B.Sc., Mathematics ( Students admitted from 2018 - 2019 Onwards )**

<b>Fifth Semester</b>							
<b>Part III</b>							
18UMAM501	Core IX: Abstract Algebra	6	3	25	75	100	5
18UMAM502	Core X: Real Analysis I	6	3	25	75	100	5
18UMAM503	Core XI: Operations Research	6	3	25	75	100	5
18UMAM504	Core XII: Programming in C	3	3	25	75	100	3
	Elective I	4	3	25	75	100	4
18UMAMP501	Core Practical I: Programming in C	2	3	40	60	100	2
<b>Part IV</b>							
18UMASB501	SBC III: Mathematics for Competitive Exams- I (100% Internal Evaluation )	2	3	100	-	100	2
<b>Part V</b>							
18UMAE501	Extension Activity	-					2
<b>Non Credit</b>							
18ULS501	Career Competency Skills III	1	-	-	-	-	-
	<b>Total</b>	<b>30</b>				<b>700</b>	<b>28</b>
<b>Sixth Semester</b>							
<b>Part III</b>							
18UMAM601	Core XIII: Linear Algebra ( Fifth Unit as Self-Study )	5	3	25	75	100	5
18UMAM602	Core XIV: Real Analysis II	6	3	25	75	100	5
18UMAM603	Core XV: Complex Analysis	5	3	25	75	100	5
18UMAM604	Core XVI: Numerical Methods	5	3	25	75	100	5
	Elective II	4	3	25	75	100	4
18UMAMP601	Core Practical II: Sci Lab	2	3	40	60	100	2
<b>Part IV</b>							
18UMASB601	SBC IV: Mathematics for Competitive Exams- II (100% Internal Evaluation )	2	3	-	100	100	2
<b>Non Credit</b>							
18ULS601	Career Competency Skills IV	1	-	-	-	-	-
		<b>30</b>				<b>700</b>	<b>28</b>
<b>Grand Total</b>						<b>4400</b>	<b>140</b>

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### ELECTIVE -I

(Student shall select any one of the following subject as Elective in fifth semester)

S.No	Subject Code	Name of the Subject
1.	18UMAEL501	Discrete Mathematics
2.	18UMAEL502	Graph Theory

### ELECTIVE - II

(Student shall select any one of the following subject as Elective in sixth semester)

S.No	Subject Code	Name of the Subject
1.	18UMAEL601	Number Theory
2.	18UMAEL602	Optimization Techniques

### NON MAJOR ELECTIVE COURSE

The department offering the following Non Major Elective Course for other than Mathematics students.

S.No	Subject Code	Name of the Subject
1	18UMANM301	Quantitative Aptitude.
2	18UMANM401	Basic Statistics.

### ADD-ON COURSE

If Students want to get a Degree with additional skills, they can do Add-on Courses offered by the Department. The Add-on Courses offered by the Department are listed below.

S.No	Subject Code	Name of the Subject
1	18UMAAC301	Data Analysis Using R-Software.
2	18UMAAC401	Numerical Computations Using MatLab.

### ADVANCED LEARNERS COURSE (ALC)

ALC to be introduced in the 4<sup>th</sup> and 5<sup>th</sup> semester.

If Students want to get a Degree with additional credits, they can do Advanced Learners Courses offered by the Department. The available advanced learners courses are listed below.

**B.Sc., Mathematics ( Students admitted from 2018 - 2019 Onwards )**

S.No	Subject Code	Name of the Subject
1	18UMAAL401	Index Numbers & Time Series Analysis.
2	18UMAAL402	Theory of Numbers & Inequalities.
3	18UMAAL501	Astronomy
4	18UMAAL502	Mathematical Modeling

**TOTAL CREDIT DISTRIBUTION**

Subjects	Total	Credits
Part - I Tamil	4 X 100 = 400	12
Part - II English	4 X 100 = 400	12
Part - III Core	16 X 100 = 1600	70
Part - III Elective	2X100 = 200	08
Part - III Core Practical	2 X 100 = 200	04
Part - III Allied	4 X 100 = 400	08
Part - III Allied Practical	4 X 100 = 400	08
Part - IV NMEC	2X100 = 200	04
Part - IV SBC	4X100 = 400	08
Part - IV Other Courses ( YOGA, EVS)	1 X 100 = 100 1 X 100 = 100	02 02
Part - V Extension Activity		02
<b>Total</b>	<b>4400</b>	<b>140</b>



**B.Sc., Mathematics ( Students admitted from 2018 - 2019 Onwards )**

<b>18UMAEL501</b>	<b>ELECTIVE I: DISCRETE MATHEMATICS</b>	<b>SEMESTER V</b>	
<b>COURSE OBJECTIVES</b>			
The course aims			
<ul style="list-style-type: none"> <li>• To introduce the concepts of mathematical logic.</li> <li>• To learn about the algebraic structures, lattices and Boolean algebra.</li> <li>• To provide a sound knowledge of graphs and digraphs.</li> </ul>			
<b>Credits: 04</b>		<b>Total Hours: 50</b>	
<b>UNIT</b>	<b>CONTENTS</b>	<b>Hrs</b>	<b>CO</b>
<b>I</b>	<b>Mathematical Logic:</b> <b>Introduction:</b> Statements and Notation. <b>Connectives:</b> Negation- Conjunction - Disjunction -Statement formulas and Truth tables - Well-formed Formulas - Tautologies - Equivalence of Formulas - Duality Law - Tautological Implications. <b>Chapter I (Sections 1-1, 1-2.1 to 1-2.4, 1-2.7 to 1-2.11)</b>	<b>10</b>	<b>CO1</b>
<b>II</b>	<b>Normal Forms:</b> Disjunctive Normal Forms - Conjunctive Normal Forms - Principal Disjunctive Normal Forms - Principal Conjunctive Normal Forms. <b>Chapter - 1 (Sections 1-3.1 to 1-3.4)</b>	<b>10</b>	<b>CO2</b>
<b>III</b>	<b>Relations and Orderings:</b> Relations - Properties of Binary relations in a set- Equivalence relations. <b>Functions:</b> Definition and Introduction - Composition of functions - Inverse functions. <b>Chapter - 2 (Sections 2-3.1,2-3.2, 2-3.5, 2-4.1 to 2-4.3)</b>	<b>10</b>	<b>CO3</b>
<b>IV</b>	<b>Lattices:</b> <b>Introduction:</b> Lattices as Partially Ordered Sets - Some properties of Lattices - Lattices as Algebraic systems- Sub Lattices, Direct product, and Homomorphism - Some special Lattices. <b>Chapter - 4 (Sections 4-1.1 to 4-1.5)</b>	<b>10</b>	<b>CO4</b>
<b>V</b>	<b>Boolean Algebra:</b> Definition and Examples - Subalgebra, Direct Product and Homomorphism. <b>Boolean Functions:</b> Boolean Forms and Free Boolean Algebras - Value of Boolean Expressions and Boolean Functions. <b>Chapter - 4 (Sections 4-2.1 to 4-2.2, 4-3.1 to 4-3.2)</b>	<b>10</b>	<b>CO5</b>
<b>TEXT BOOK</b>			
1.	<i>Tremblay,J.P., Manohar.R.,2015. Discrete Mathematical Structures with Applications to Computer Science , Tata McGraw-Hill Company, New Delhi</i>		

**REFERENCE BOOKS** **B.Sc. Mathematics ( Students admitted from 2018 - 2019 Onwards )**

1.	<i>Venkataraman, M.K., Sridharan,N. and Chandrasekaran,N.</i> 2001. <b>Discrete Mathematics.</b> The National Publishing Company, Chennai.
2.	<i>Sundaresan, V., Ganapathy Subramanian, K.S. and Ganesan, K.</i> 2006. <b>Discrete Mathematics.</b> Tata Mc Graw Hill, New Delhi.
3.	<i>Somasundaram, R.M.</i> 2003. <b>Discrete Mathematical structures.</b> Prentice Hall of India Pvt. Ltd., New Delhi.

**COURSE OUTCOMES (CO)**

After completion of the course, the students will be able to

<b>CO1</b>	Understand the concepts of mathematical logic such as negation, conjunction, disjunction and formulate truth table.
<b>CO2</b>	Describe the principle of conjunctive normal form and disjunctive normal form.
<b>CO3</b>	Discuss about relation, function and its properties.
<b>CO4</b>	Acquire knowledge about lattices, homomorphism and its properties.
<b>CO5</b>	Compute Boolean algebra and Boolean function.

**MAPPING**

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

<b>18UMAEL502</b>	<b>ELECTIVE I: GRAPH THEORY</b>	<b>SEMESTER V</b>
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## COURSE OBJECTIVES

The course aims

- To introduce the concepts of graphs.
- To learn about various types of graphs.
- To provide a sound knowledge on Trees and Digraphs.

**Credits: 04**

**Total Hours: 50**

UNIT	CONTENTS	Hrs	CO
I	Introduction - Definitions and examples - Degrees - Sub graphs - Isomorphism - Independent sets and Coverings - Matrices - Operations on Graphs. <b>Chapter 2 (Sections 2.0 - 2.4, 2.6, 2.8 and 2.9)</b>	10	CO1
II	Introduction - Walks, Trails and Paths - Connectedness and Components - Blocks - Connectivity. <b>Chapter 4 (Sections 4.0 - 4.4)</b>	10	CO2
III	Introduction - Eulerian Graphs - Konigsberg Bridge Problem - Hamiltonian Graphs. <b>Chapter 5 (Sections 5.0 - 5.2)</b>	10	CO3
IV	Introduction - Characterization of Trees - Centre of a Tree. <b>Chapter 6 (Sections 6.0 - 6.2)</b>	10	CO4
V	Introduction - Definitions and Basic properties - Paths and Connections - Digraphs and Matrices - Tournament. <b>Chapter 10 (Sections 10.0 - 10.4)</b>	10	CO5

## TEXT BOOK

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

## REFERENCE BOOKS

1. Parthasarathy, K.R. 2001. **Basics of Graph Theory**. TMH Publishing Company, Ltd., NewDelhi.
2. Kumaravelu, S. and Suseela Kumaravelu. 1996. **Graph Theory**. SKV Printers.
3. Chodowm, S.A. 1997. **A First Course in Graph Theory**. Macmillan Publishers, Chennai.

**COURSE OUTCOMES (CO)**

After completion of the course, the students will be able to

<b>CO1</b>	Understand the concepts of graph, sub graph and covering.
<b>CO2</b>	Compute walk, trail, path and connectivity.
<b>CO3</b>	Discuss about Eulerian graph and its theorem.
<b>CO4</b>	Understand the concepts of characterization of tree.
<b>CO5</b>	Describe about digraph, matrices and tournament.

**MAPPING**

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAEL601	ELECTIVE II: NUMBER THEORY	SEMESTER VI	
<b>COURSE OBJECTIVES</b>			
The course aims			
<ul style="list-style-type: none"> <li>• Introduction to elementary concepts of number theory.</li> <li>• To learn about quadratic reciprocity and some functions in number theory.</li> <li>• To provide the knowledge about Diophantine equations.</li> </ul>			
<b>Credits: 04</b>		<b>Total Hours: 50</b>	
UNIT	CONTENTS	Hrs	CO
I	<b>Divisibility:</b> Introduction - Divisibility - Primes. <b>Congruences:</b> Congruences - Solutions of Congruences. <b>Chapter 1 (Sections 1.2, 1.3) Chapter 2 (Sections 2.1, 2.2)</b>	10	CO1
II	<b>Congruences:</b> Prime power moduli - Prime modulus - Primitive roots and Power Residues - Congruences of degree two, Prime Modulus. <b>Chapter 2 (Sections 2.6 - 2.9)</b>	10	CO2
III	<b>Quadratic Reciprocity:</b> Quadratic residues - Quadratic Reciprocity - The Jacobi symbol. <b>Some Functions of Number Theory:</b> Greatest Integer Function. <b>Chapter 3 (Sections 3.1 - 3.3) Chapter 4 (Section 4.1)</b>	10	CO3
IV	<b>Some Functions of Number Theory:</b> Arithmetic functions - The Mobius inverse formula - Recurrence functions. <b>Chapter 4 (Sections 4.2 - 4.4)</b>	10	CO4
V	<b>Some Diaphantine Equations:</b> The equation $ax+by=c$ - Simultaneous linear equations - Pythagorean triangles - Assorted examples. <b>Chapter 5 (Sections 5.1 - 5.4)</b>	10	CO5

TEXT BOOK	
1.	<i>Ivan Niven, Zuckerman, H.S and Montgomery, H.L.</i> 2014. <b>An Introduction to the Theory of Numbers.</b> [Fifth Edition]. Wiley Eastern Ltd., New Delhi.
REFERENCE BOOKS	
1.	<i>Burton, D.M.</i> 2001. <b>Elementary Number Theory.</b> [Ninth Edition]. Universal Book Stall, New Delhi.
2.	<i>Tom. M. Apostol.</i> 1998. <b>Introduction to Analytic Number Theory.</b> [Eighth Edition]. Narosa Publication House, Chennai.

**COURSE OUTCOMES (CO)**

After completion of the course, the students will be able to

<b>CO1</b>	Understand the concepts of divisibility and congruence.
<b>CO2</b>	Solve the problems involving the concept of primitive roots and power residue.
<b>CO3</b>	Analyze Quadratic residues and reciprocity .
<b>CO4</b>	Understand the concepts of arithmetic functions and recurrence function.
<b>CO5</b>	Apply the concepts of simultaneous linear equation.

**MAPPING**

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low

18UMAEL602		ELECTIVE II: OPTIMIZATION TECHNIQUES B.Sc., Mathematics ( Students admitted from 2018 - 2019 Onwards )		SEMESTER VI	
<b>COURSE OBJECTIVES</b>					
The course aims					
<ul style="list-style-type: none"> <li>To formulate and solve problems as networks and graphs.</li> <li>To learn the techniques for converting the industrial problems as mathematical problems and solving them.</li> </ul>					
<b>Credits: 05</b>			<b>Total Hours: 60</b>		
UNIT	CONTENTS			Hrs	CO
I	<b>Inventory control</b> - Introduction - Types of inventory - EOQ - Deterministic inventory problem - EOQ problem with price-Break. <b>Chapter 19 (Sections 19.1 - 19.12)</b>			12	CO1
II	<b>Queuing Theory</b> -Introduction - Characteristics of Queuing system - Classification of Queues - Poisson process and Exponential distribution - Poisson queueing system - The M/G/1 queuing system. <b>Chapter 21 (Sections 21.1 - 21.9)</b>			12	CO2
III	<b>Replacement problems and system reliability</b> - Introduction - Replacement of equipment that fails suddenly - Recruitment and promotion problem - Equipment renewal problem - Reliability and system failure rates. <b>Chapter 18 (Sections 18.1 - 18.6)</b>			12	CO3
IV	<b>Games and Strategies</b> - Introduction - Two person zero sum game - The maximum and minimum principle games - Games without saddle points - Mixed strategies - Graphical method - Dominance Property. <b>Chapter 17 (Sections 17.1 - 17.7)</b>			12	CO4
V	<b>Sequencing problem</b> - Introduction - n jobs to be operated on two machines - Problems - n jobs to be operated on three machines - Problems - n jobs to be operated on m machines - Problems - Two jobs to be operated on m machines (Graphical method) - Problems. <b>Chapter 12 (Sections 12.1 - 12.6)</b>			12	CO5
<b>TEXT BOOK</b>					
1.	<i>Kanti swarup., Gupta, P.K. and Man Mohan. 2014. Operations Research. [Seventeenth Edition]. Sultan Chand and Sons, New Delhi.</i>				

**REFERENCE BOOKS****B.Sc., Mathematics ( Students admitted from 2018 – 2019 Onwards )**

1.	<i>Gupta, P.K. and Hira, D.S.</i> 2004. <b>Operations Research.</b> [Eighth Edition]. S.Chand and Company, New Delhi.
2.	<i>Hamdy A Taha.</i> 1996. <b>Operations Research.</b> [Eighth Edition]. Prentice Hall Publications, New Delhi.
3.	<i>Kantiswarup., Gupta, P.K. and Man Mohan.</i> 2001. <b>Operations Research.</b> [Ninth Edition]. Sultan Chand and Sons, New Delhi.

**COURSE OUTCOMES (CO)**

After completion of the course, the students will be able to

<b>CO1</b>	Understand the concepts of inventory control
<b>CO2</b>	Analyze queuing theory and poisson process.
<b>CO3</b>	Finding recruitment and promotion problems
<b>CO4</b>	Discuss game, strategies on dominance property.
<b>CO5</b>	Compute sequencing problems using graphical method.

**MAPPING**

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	H	H
CO2	H	M	M	H	H
CO3	H	H	H	M	M
CO4	H	M	M	M	M
CO5	H	H	M	L	M

H-High; M-Medium; L-Low



*M.P.*  
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