

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)-POLLACHI

274	MSW	Human Resource Development	20PSW4A4	2020
275	MSW	Disaster Management	20PSW3E3	2020
276	MSW	Computer Applications for Social Work	20PSW3E4	2020
277	MSW	Project Planning and Management	20PSW3E6	2020
278	B.A. History	Introduction to Tourism	21UHY5E12	2021
279	B.A. History	Tourism and Travel Management	21UHY5E13	2021
280	B.A. History	Indian Geography	21UHY5E22	2021
281	B.A. History	Archives Keeping	21UHY5E23	2021
282	B.A. History	Ethics, Integrity and Aptitude - I	21UHY5AL1	2021
283	B.A. History	Ethics and Cultural History of Tamilnadu	21UHY6E32	2021
284	B.A. History	Heritage Tourism	21UHY6E33	2021
285	B.A. History	Introduction to Industry 4.0	21UHY619	2021
286	B.A. History	Ethics, Integrity and Aptitude - II	21UHY6AL2	2021
287	B.A. English	Identity Afflictions in Literature	21UEL5E12	2021
288	B.A. English	Digital Humanities	21UEL5E13	2021
289	B.A. English	Disability Studies	21UEL6E22	2021
290	B.A. English	Issues of Humanities in Literature	21UEL6E23	2021
291	B.A. English	Fantasy Literature	21UEL6E32	2021
292	B.A. English	Green Literature	21UEL6E33	2021
293	B.A.Economics	Core III: Disaster Management	21UEO2A2	2021
294	B.A.Economics	Core III Elective: Rural Economics	21UEO5E3	2021
295	B.A.Economics	Core III Elective: Urban Economics	21UEO6E3	2021
296	B.A.Economics	Core III Elective: Computer Application in Economics	21UEO6E5	2021
297	B.A.Economics	Core III Elective: Health Economics	21UEO6E6	2021
298	B.Sc. Mathematics	SBE I: Financial Mathematics-I	21UMS5S11	2021
299	B.Sc. Mathematics	Advanced Learner Course-I: Advanced Operations Research-I	21UMS5AL	2021




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 New Course Introduced N.G.M. College, Pollachi - 642 001
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300	B.Sc. Mathematics	Core Elective I: Artificial Intelligence and Machine Learning	21UMS5E2	2021
301	B.Sc. Mathematics	SBE II: Financial Mathematics-II	21UMS6S21	2021
302	B.Sc. Mathematics	Core Elective III: Graph Theory	21UMS6E2	2021
303	B.Sc. Mathematics	Core Elective IV: Introduction to Industry 4.0	21UMS6E4	2021
304	B.Sc. Mathematics	Advanced Learner Course-II: Advanced Operations Research-II	21UMS6AL	2021
305	B.Sc. Mathematics	SBE II: Cryptography	21UMS6S2	2021
306	B.Sc. Mathematics	Programming Lab for Physics Using MATLAB/ Programming Lab for Chemistry Using MATLAB	21UPS2A3/ 21UCY2A3	2021
307	B.Sc. Physics	Mechanics	21UPS507	2021
308	B.Sc. Physics	Advanced Learner Course I: Problem Solving	21UPS5AL1	2021
309	B.Sc. Physics	Programming & Information Security	21UPS6E19	2021
310	B.Sc. Physics	Industrial Instrumentation	21UPS6E20	2021
311	B.Sc. Physics	Python Programming	21UPS6E21	2021
312	B.Sc. Physics	Advanced Learner Course II: Problem Solving	21UPS6AL2	2021
313	B.Sc. Chemistry	Core Paper – I : Inorganic and Organic Chemistry	21UCY101	2021
314	B.Sc. Chemistry	Core Paper-II : Organic and Physical Chemistry	21UCY202	2021
315	B.Sc. Chemistry	Core Practical - I : Inorganic Qualitative Analysis	21UCY203	2021
316	B.Sc. Chemistry	Non Major Elective - I : Introduction to Nanotechnology	21UCY3N11	2021
317	B.Sc. Chemistry	Non Major Elective - II : Textile Chemistry	21UCY4N21	2021
318	B.Sc. Chemistry	Core Paper – VII : Electro Chemistry	21UCY509	2021
319	B.Sc. Chemistry	Core Paper – VIII : Dye Chemistry	21UCY510	2021
320	B.Sc. Chemistry	Core Elective – I : Analytical Chemistry - I	21UCY5E11	2021
321	B.Sc. Chemistry	Core Elective - I : Pharmaceutical Chemistry - I	21UCY5E12	2021
322	B.Sc. Chemistry	Core Elective - I : Leather Chemistry	21UCY5E13	2021
323	B.Sc. Chemistry	Advanced Learner Course – I: Environmental Chemistry (Optional)	21UCY5AL1	2021
324	B.Sc. Chemistry	Core XII: Polymer Chemistry	21UCY614	2021

BoS
Highlights

Metric : 1.2.1



New Course Introduced

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PG AND RESEARCH DEPARTMENT OF MATHEMATICS
NALLAMUTHU GOUNDER MAHALINGAM COLLEGE
POLLACHI - 642001

12th Board of Studies Meeting conducted in an online mode
22.05.2021 & Time: 10.00 a.m.

Agenda

BoS / DM 12.1	:	Welcome address and Opening Remarks by Chairman, Board of studies, DEPARTMENT OF MATHEMATICS.
BoS / DM 12.2	:	Confirmation of the Minutes of the Previous meeting of Board of studies in the DEPARTMENT OF MATHEMATICS held on 22.02.20 and Action taken report of 11 th meeting of Board of studies
BoS / DM 12.3	:	12.3.1 Syllabus of I BSc MATHEMATICS under Regulation 2021.
	:	12.3.2 Syllabus of II BSc MATHEMATICS under Regulation 2021.
	:	12.3.3 Syllabus of III BSc MATHEMATICS under Regulation 2021.
	:	12.3.4 Syllabus of I MSc MATHEMATICS under Regulation 2021.
	:	12.3.5 Syllabus of II MSc MATHEMATICS under Regulation 2021.
	:	1. Decided to offer internship programme in schools for Undergraduate students during their summer vacation at the end of the fourth semester. 2. Decided to provide certificate course on Data Analytics and Python for PG students (Optional).
BoS / DM 12.4	:	Suggestion given by BOS Members
BoS / DM 12.5	:	Two more value added course for UG course.

DM – Short Form of Department of Mathematics.


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NALLAMUTHU GOUNDER MAHALINGAM COLLEGE, POLLACHI

DEPARTMENT OF MATHEMATICS

MINUTES OF BOS MEETING

The 12th Meeting of the Board of studies of the Department of Mathematics was held on 22.05.2021 at 10.00 a.m. conducted in an online mode. (<https://meet.google.com/sis-ruit-ixx>)

1. Members of the Board of Studies meeting:

1.	Dr. V. INTHUMATHI Associate Professor and Head	Chairman
2.	Dr. J. JAYASUDHA Assistant Professor	Internal Members
3.	Dr. V. CHITRA Assistant Professor	
4.	Dr. S. SIVASANKAR Assistant Professor	
5.	Mr. P. SIRAVANAN Assistant Professor	
6.	Dr. S. KALEESWARI Assistant Professor	
7.	Mrs. M. AMSAVENI Assistant Professor	
8.	Mrs. A. GNANASOUNDARI Assistant Professor	
9.	Dr. N. SELVANAYAKI Assistant Professor	
10.	Dr. M. MAHESWARI Assistant Professor	
11.	Mr. S. EARNEST RAJADURAI (SF Mathematics) Assistant Professor and Head	
12.	Mr. V. SREERAMAKRISHNAN (SF Mathematics) Assistant Professor	
13.	Ms. S. SENPAGAM(SF Mathematics) Assistant Professor	
14.	Ms. S. MAHALAKSHMI(SF Mathematics) Assistant Professor	
15.	Ms. A. ARUNADEVI(SF Mathematics) Assistant Professor	
16.	Dr. S. MONIKANDAN, Associate Professor, Department of Mathematics, M. S. University, Tirunelveli – 627 012	University Nominee

17.	Dr. NIVETHA MARTIN, Assistant Professor, Department of Mathematics, Arul Anandar College (Autonomous), Karumathur.	Academic Expert
18.	K. V. GAYATHRI (Ex) Administrative Officer, LIC of India.	Industrial Expert
19.	R.SUBASINI Assistant Professor and Head, Department of Science and Humanities, Pollachi Institute of Engineering and Technology, Pollachi – 642 205.	Alumni
20.	Dr. GOPALSEKAR, Associate Professor and Head, Department of Mathematics, KanchiMamunivarcenre for Post GraduateStudies, Pondicherry.	Academic Auditor
21.	C.KOWSALYAHARISHANTHI II M. Sc., Mathematics	Student Members
22.	V. S. RAMIDHA III B. Sc., Mathematics	


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 Associate Professor & Head
 Department of Mathematics
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**BoS/MA12.1 WELCOME ADDRESS AND OPENING REMARKS BY CHAIRMAN,
BOARD OF STUDIES, DEPARTMENT OF MATHEMATICS**

The Chairman, BoS of the Department of Mathematics welcomed and introduced the members of 12th Board of Studies and thanked each one of them for sparing their valuable time to attend the meeting.

BoS/MA 12.2 TO CONFIRM THE MINUTES OF 11th BOS MEETING HELD ON 22.02.2020.

The minutes of the 11th Board of Studies meeting held on 22.02.2020 were communicated to the members. The comments received have been incorporated and placed for confirmation. The same was approved by the 11th Academic council.

~Action Taken Report (Enclosed in Annexure I)



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BoS/MA 12.3

BoS/MA 12.3.1

I BSc MATHEMATICS (I & II SEMESTER)

The presented syllabus was accepted by the experts fully without further suggestions.

BoS/MA 12.3.2

II BSc MATHEMATICS (III & IV SEMESTER)

The presented syllabus was accepted by the experts fully without further suggestions.

BoS/MA 12.3.3

III BSc MATHEMATICS (V & VI SEMESTER)

The presented syllabus was accepted by the experts fully without further suggestions.

New Course Added:

The following Skill Based Elective papers for III B. Sc., MATHEMATICS were accepted by the experts fully without further suggestions.

V SEMESTER- 1.Financial Mathematics – I (21UMS5S11)

VI SEMESTER-2.Financial Mathematics – II (21UMS6S21)

These changes have been made effect for the students admitted in the academic year 2021-22 with V and VI Semesters accordingly.

BoS/MA 12.3.4

I MSc MATHEMATICS (I & II SEMESTER)

The presented syllabus was accepted by the experts fully without further suggestions.

BoS/MA 12.3.5

II MSc MATHEMATICS (III & IV SEMESTER)

The presented syllabus was accepted by the experts fully without further suggestions.

New Course Added:

The following Core paper for II M. Sc., MATHEMATICS was accepted by the experts fully without further suggestions.

IV SEMESTER

Algebraic Topology(21PMS417) instead of Control Theory.


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BoS/MA12.4 SUGGESTIONS GIVEN BY THE BoS MEMBERS (External)

12.4.1: Subject Expert Dr. Nivetha Martin gave the following suggestions for the syllabus based on OBE (Outcome Based Education).

1. The programme outcomes shall be given as overall outcome for all B. Sc. degree programmes offered by the college.
2. The programme specific outcomes should be specific to the concerned branch.
3. The knowledge level of the course outcomes shall be confined for B.Sc., programmes up to level K3 and K4.

12.4.2: University Nominee Dr. S. Monikandan mentioned the following comments and recommendations.

1. Appreciated the introduction of new course Algebraic Topology as it will be more useful for higher research in Topology.
2. The existing course Operator Theory at an advanced level to take up the students for research.
3. Pointed that the content of PG courses with standard prescribed text books are strong and promising to compete with the benchmarked Institutions.
4. Asked to prescribe problem oriented text books for some PG courses.
5. To offer group Project/Internships (for UG students).

12.4.3: Dr. GopalSekar, Academic Auditor

1. Recommends internship programmes at schools for Under Graduate students during their summer vacation at the end of the fourth semester.
2. Raised a question for offering Ancillary Mathematics course for Non-Mathematics students admitted in B. Sc., Chemistry programme.

12.4.4: K. V. Gayathri, Industry Expert, highlights the opportunities in the field of Insurance and Actuary further she recalled the confidence and the subject knowledge gained during her B.Sc., Mathematics programme offered by NGM College.

12.4.5: R. Subasini, Alumni, suggested one more value added course may be offered for PG degree.

12.4.6: Kowsalyaharishanthi C., II M. Sc., Mathematics and Ramidha V.S., III B. Sc., Mathematics wished to

1. opt Projects for B. Sc. Programme.
2. have hands on training with some open source software.



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The members had a brainstorming discussion and interaction among themselves. After discussion, fruitful suggestions were incorporated appropriately in the Curriculum and Syllabi.

Based on the suggestions given by the members, BOS resolved to recommend the following to the Academic Council for further approval.

- a) The syllabus of First Year B. Sc., Mathematics under Regulation 2021-22.
- b) The syllabus of Second Year B. Sc., Mathematics under Regulation 2021-22.
- c) The syllabus of Third Year B. Sc., Mathematics under Regulation 2021-22.
- d) The syllabus of First Year M. Sc., Mathematics under Regulation 2021-22.
- e) The syllabus of Second Year M. Sc., Mathematics under Regulation 2021-22.



Head of the Department

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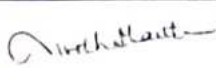
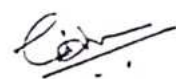
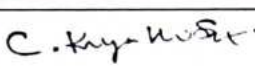
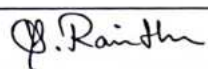


PRINCIPAL

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Members Present:

Chairman	
Dr. V. INTHUMATHI, Associate Professor and Head	V. Inthumathi
Internal Members	
Dr. J. JAYASUDHA, Assistant Professor	J. Jayasudha
Dr. V. CHITRA, Assistant Professor	V. Chitra
Dr. S. SIVASANKAR, Assistant Professor	S. Sivasankar
Mr. P. SIRAVANAN, Assistant Professor	P. Siravanan
Dr. S. KALEESWARI, Assistant Professor	S. Kaleeswari
Mrs. M. AMSAVENI, Assistant Professor	M. Amaveni
Mrs. A. GNANASOUNDARI, Assistant Professor	A. Gnanasoundari
Dr. N. SELVANAYAKI, Assistant Professor	N. Selvanayagi
Dr. M. MAHESWARI, Assistant Professor	M. Maheswari
Mr. S. EARNEST RAJADURAI, Assistant Professor and Head (SF)	S. Earnest Rajadurai
Mr. V. SREERAMAKRISHNAN, Assistant Professor (SF)	V. Sreeramakrishnan
Ms. S. SENPAGAM, Assistant Professor (SF)	S. Senpagam
Ms. S. MAHALAKSHMI, Assistant Professor (SF)	S. Mahalakshmi
Ms. A. ARUNADEVI, Assistant Professor (SF)	A. Arunadevi
University Nominee	
Dr. S. MONIKANDAN, Associate Professor, Department of Mathematics, M. S. University, Tirunelveli – 627 012	S. Monikandan
Academic Experts	

Dr. NIVETHA MARTIN, Assistant Professor, Department of Mathematics, Arul Anandar College (Autonomous), Karumathur.	
Industrial Experts	
GAYATHRI K. V. (Ex) Administrative Officer, LIC of India.	
Alumni	
R.SUBASINI Assistant Professor and Head, Department of Science and Humanities, Pollachi Institute of Engineering and Technology, Pollachi – 642 205.	
Academic Auditor	
Dr. GOPALSEKAR, Associate Professor and Head, Department of Mathematics, KanchiMamunivarcentre for Post GraduateStudies, Pondicherry.	
Student Members	
KOWSALYA HARISHANTHIC. II M. Sc., Mathematics	
RAMIDHA V.S. III B. Sc., Mathematics	


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ANNEXURE I

Minutes of the 11th Meeting – Action Taken Report

S.No	Suggestion given by expert members	Action taken
1	To implement Bharathiar University syllabus for both Allied Mathematics for Physics I & II, Allied Mathematics for Chemistry I & II as strongly recommended	Reviewed and Implemented
2	To enable the question setters, indications for theory questions(percentagewise) shall be detailed for core papers OR-I & OR-II	Implemented
3	Programming in PYTHON, R-software, MAPLE shall be included	Implemented
4	To include 1. 3D-Printing 2. Android App Development as value added programmes for B. Sc.	Implemented
5	To incorporate open electives	
6	Number Theory based paper – “Mathematics for Cyber Security” shall be considered	



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**List of Courses having focus on local, national, regional and global developmental needs
offered by the Department of Mathematics**

DEPARTMENT OF MATHEMATICS						
Programme: B. Sc., Mathematics					Year: 2021	
Course Code	Course Title	Need				Rationale
		Local	National	Regional	Global	
21UMS101	Classical Algebra			✓		School and College teaching
21UMS102	Calculus			✓		School and College teaching
21UMS1A1	Mathematical Statistics-I		✓			UGC, CSIR and NET exams
21UMS203	Trigonometry, Vector Calculus and Fourier Series			✓		School and College teaching
21UMS204	Analytical Geometry			✓		School and College teaching
21UMS2A2	Mathematical Statistics-II		✓			UGC, CSIR and NET exams
21UMS305	Dynamics			✓		School and College teaching
21UMS306	Numerical Techniques				✓	Employability in IT sector
21UMS3N11 / 21UMS3N12	Quantitative Aptitude-I/ Astronomy-I		✓			UGC, CSIR and NET exams
21UMS407	Statics			✓		School and College teaching
21UMS408	Operations Research-I				✓	Pursue research
21UMS4N21 / 21UMS4N22	Quantitative Aptitude-II/ Astronomy-II		✓			UGC, CSIR and NET exams
21UMS509	Modern Algebra				✓	Pursue research
21UMS510	Real Analysis-I				✓	Pursue research
21UMS511	Operations Research-II				✓	Pursue research
21UMS512	Theory of Numbers			✓		School and College teaching
21UMS5E11	Programming in C				✓	Employability in IT sector
21UMS5E21	Programming lab in C				✓	Employability in IT sector

21UMS5S11	Financial Mathematics-I		✓			UGC, CSIR and NET exams
21UMS613	Linear Algebra				✓	Pursue research
21UMS614	Real Analysis-II				✓	Pursue research
21UMS615	Complex Analysis				✓	Pursue research
21UMS6E31	Discrete Mathematics			✓		School and College teaching
21UMS6E41	OOP with C++				✓	Employability in IT sector
21UMS6E51	Programming lab in OOP with C++				✓	Employability in IT sector
21UMS6S21	Financial Mathematics-II		✓			UGC, CSIR and NET exams



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Programme: M. Sc., Mathematics						Year: 2021
Course Code	Course Title	Need				Rationale
		Local	National	Regional	Global	
21PMS101	Algebra				✓	Pursue research
21PMS102	Real Analysis				✓	Pursue research
21PMS103	Complex Analysis				✓	Pursue research
21PMS104	Ordinary Differential Equations				✓	Pursue research
21PMS1E1	Matlab				✓	Employability in IT sector
21PMS1E2	Programming Lab in Matlab				✓	Employability in IT sector
21PMS205	Linear Algebra				✓	Pursue research
21PMS206	Mathematical Statistics				✓	Pursue research
21PMS207	Partial Differential Equations				✓	Pursue research
21PMS208	Mechanics				✓	Pursue research
21PMS209	Numerical Analysis				✓	Employability in IT sector
21PMS210	Programming lab in Numerical Analysis using Matlab				✓	Employability in IT sector
21PMS2N1/ 21PMS2N2	Mathematical Statistics and Techniques/ Mathematics in Finance		✓			UGC, CSIR and NET exams
21PMS311	Topology				✓	Pursue research
21PMS312	Functional Analysis				✓	Pursue research
21PMS313	Combinatorics			✓		School and College teaching

21PMS314	Graph Theory		✓			UGC, CSIR and NET exams
21PMS415	Fluid Dynamics		✓			UGC, CSIR and NET exams
21PMS416	Operator Theory		✓			UGC, CSIR and NET exams
21PMS417	Algebraic Topology				✓	Pursue research
21PMS4E5	Mathematical Methods		✓			UGC, CSIR and NET exams



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**List of Courses having focus on employability/ entrepreneurship/ skill development offered
by the Department of Mathematics**

DEPARTMENT OF MATHEMATICS						
Programme: B. Sc. Mathematics					Year: 2021	
Course Code	Course Title	Employability (EM) / Entrepreneurship (EN) / Skill Development (SD)			Focus	Year of Introduction
		EM	EN	SD		
21UMS408	Operations Research – I	✓	✓	✓	Solving real life problems	2013
21UMS511	Operations Research – II	✓	✓	✓	Solving real life Problems	2013
21UMS3N11	NME - Quantitative Aptitude – I	✓		✓	Logical & Verbal reasoning	2013
21UMS4N21	NME - Quantitative Aptitude – II	✓		✓	Logical & Verbal reasoning	2013
21UMS1A1	Mathematical Statistics – I	✓	✓	✓	Survey, Data Analysis	2013
21UMS2A1	Mathematical Statistics – II	✓	✓	✓	Survey, Data Analysis	2013
21UMS5E11	Programming in C	✓		✓	Software Management	2013
21UMS6E41	OOP with C++	✓		✓	Software Management	2013
21UMS306	Numerical Techniques	✓		✓	Skill development (Problem Solving)	2017
21UMS5S11	Financial Mathematics-I	✓	✓	✓	Debit and credit management	2021
21UMS6S21	Financial Mathematics-II	✓	✓	✓	Debit and credit management	2021



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DEPARTMENT OF MATHEMATICS						
Programme: M. Sc., Mathematics					Year: 2021	
Course Code	Course Title	Employability (EM) / Entrepreneurship (EN) / Skill Development (SD)			Focus	Year of Introduction
		EM	EN	SD		
21PMS104	Ordinary Differential Equations	✓		✓	Skill development (Problem Solving)	2013
21PMS207	Partial Differential Equations	✓		✓	Skill development (Problem Solving)	2013
21PMS313	Combinatorics	✓		✓	Skill development (Problem Solving)	2013
21PMS3E3	Latex		✓	✓	Technical Skills to prepare Research Articles	2013
21PMS1E1	Matlab		✓	✓	Technical Skills on Software Management	2015
21PMS206	Mathematical Statistics	✓	✓	✓	Survey, Data Analysis	2015
21PMS209	Numerical Analysis	✓		✓	Skill development (Problem Solving)	2015
21PMS210	Programming Lab in Numerical analysis using Matlab	✓		✓	Software Management	2015
21PMS2N1	Mathematical Statistics & Techniques	✓	✓	✓	Survey, Data Analysis	2015


Head of the Department

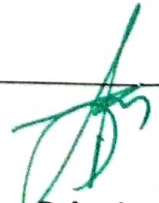
Dr. V. Inthumathi, Ph.D.,
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PRINCIPAL
Dr. R. NUTHUKUMARAN M.A., M.Phil., B.Ed., Ph.D.,
Principal
Nallamuthu Gounder Mahalingam College,
Pollachi - 642 001.

Percentage of Revision of B. Sc. Mathematics Syllabus under Regulation 2021

S.No	Course Code	Course Title	Change Details	% of Changes	Reason for Change
1.	21UMS5S11	Financial Mathematics-I	New paper	100%	For skill development and employability.
2.	21UMS5AL	Advanced Operations Research-I	New paper	100%	It offers a unique blend of traditional course work and real world problem solving experience designed to position students for success in today's competitive world.
3.	21UMS5E2	Artificial Intelligence and Machine Learning	New paper	100%	Studying Artificial Intelligence and Machine Learning promises a bright career in the current scenario.
4.	21UMS5VA	Adobe Photoshop	New paper	100%	It enables to improve the students self-employability.
5.	21UMS6S21	Financial Mathematics-II	New paper	100%	For skill development and employability.
6.	21UMS6E2	Graph Theory	New paper	100%	To promote research in Graph Theory
7.	21UMS6E4	Introduction to Industry 4.0	New paper	100%	Helps the students to prepare for the changes in the industries.
8.	21UMS6AL	Advanced Operations Research-II	New paper	100%	To enhance the analytic method of problem solving and decision making skills that will be useful in the management of organisations.
9.	21UMS6S2	Cryptography	New paper	100%	To understand the principles and practices of cryptographic Techniques.
10.	21UMS6VA	Python Training	New paper	100%	Python certification course will give hands on development experience and prepare the students for an exciting career as a Python programmer
11.	21UPS2A3/ 21UCY2A3	Programming Lab for Physics Using MATLAB/ Programming Lab for Chemistry Using MATLAB	New Paper	100%	To make students aware of mathematical tools and also to provide practical knowledge by developing algorithms for computing, manipulating and visualizing mathematical concepts.


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Principal
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 M.A., M.Phil., B.Ed., Ph.D.,
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 Coimbatore District

N.G.M College - Curriculum Development Cell
B. Sc. Mathematics Scheme of Examination For (2021 – 2024 Batch)
Choice Based Credit System & OBES

For Part I and Part II in First & Second Semesters Only

SEMESTER – I

Part	Subject Code	Title of the Paper	Hrs / Week		Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P		Internal	External		
I	21UTL101 / 21UHN101 / 21UFR101	Tamil Paper - I /	6	-	3	50	50	100	3
		Hindi Paper - I /		-					
		French Paper – I		-					
II	21UEN101	Communication Skills - I (Level I)	5	-	3	50	50	100	3
	21UEN102	Communication Skills - I (Level II)		-					
III	21UMS101	Core - I : Classical Algebra	5	-	3	50	50	100	4
	21UMS102	Core - II : Calculus	6	-	3	50	50	100	5
	21UMS1A1	Allied - I : Mathematical Statistics-I	6	-	3	50	50	100	5
IV	21UHR101	Human Rights	1	-	2	-	50	50	2
	21HEC101	Human Excellence - Personal Values & SKY Yoga Practice – I	1	-	2	25	25	50	1
V		Extension Activities - Annexure I	-	-	-	-	-	-	-
CC	21CFE101	Fluency in English - I	-	-	-	-	-	-	-
		Online Course (Optional) (MOOC / NPTEL / SWAYAM)	-	-	-	-	-	-	Grade
Total			30		19	300	300	600	23

SEMESTER-2

Part	Subject Code	Title of the Paper	Hrs / Week		Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P		Internal	External		
I	21UTL202 / 21UHN202 / 21UFR202	Tamil Paper - II /	6	-	3	50	50	100	3
		Hindi Paper - II /		-					
		French Paper - II		-					
II	21UEN202	Communication Skills - II (Level I)	5	-	3	50	50	100	3
	21UEN203	Communication Skills - II (Level II)		-					
III	21UMS203	Core - III :Trigonometry, Vector Calculus and Fourier Series	5	-	3	50	50	100	4
	21UMS204	Core - IV: Analytical Geometry	5	-	3	50	50	100	4
	21UMS2A2	Allied - II: Mathematical Statistics II	6	-	3	50	50	100	5
IV	21EVS201	Environmental Studies	2	-	2	-	50	50	2
	21HEC202	Human Excellence - Family Values & SKY Yoga Practice – II	1	-	2	25	25	50	1
V		Extension Activities - Annexure I	-	-	-	-	-	-	-
CC	21CFE202	Fluency in English - II	-	-	-	-	-	-	-
	21CMM201	ManaiyiyalMahathuvam - I	-	-	2	-	50	50	Grade
	21CUB201	UzhavuBharatham - I	-	-	2	-	50	50	Grade
		Online Course (Optional) (MOOC / NPTEL / SWAYAM)	-	-	-	-	-	-	Grade
Total			30		19	300	300	600	22

SEMESTER – III										
Part	Subject Code	Title of the Paper	Hrs / Week			Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P			Internal	External		
I	21UTL303 / 21UHN303 / 21UFR303	Tamil Paper - III /	5	-		3	50	50	100	3
		Hindi Paper - III /		-						
		French Paper - III		-						
II	21UEN303 21UEN304	Communication Skills - III (Level I)	6	-		3	50	50	100	3
		Communication Skills - III (Level II)		-						
III	21UMS305	Core - V: Dynamics	5	-		3	50	50	100	4
	21UMS306	Core - VI: Numerical Techniques	4	-		3	50	50	100	3
	21UMS3A1	Allied - III: Physics for Mathematics And Chemistry I	8	-		3	50	50	100	4
IV	21UMS3N1 / 21UMS3N2	Non Major Elective - I : Quantitative Aptitude - I/ Astronomy –I	1	-		2	-	50	50	2
	21HEC303	Human Excellence - Professional Values & Ethics – III	1	-		2	25	25	50	1
V		Extension Activities - Annexure I	-	-		-	-	-	-	-
CC	21CFE301	Fluency in English - III	-	-		-	-	-	-	-
	21CMM301	ManaiyiyalMahathuvam - II	-	-		2	-	50	50	Grade
	21CUB301	UzhavuBharatham - II	-	-		2	-	50	50	Grade
Total			30			19	300	300	600	20

SEMESTER – IV

Part	Subject Code	Title of the Paper	Hrs / Week		Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P		Internal	External		
I	21UTL404	Tamil Paper - IV /	5	-	3	50	50	100	3
	21UTL404	Hindi Paper - IV/		-					
	21UTL404	French Paper – IV		-					
II	21UEN404	Communication Skills - IV (Level I)	6	-	3	50	50	100	3
	21UEN405	Communication Skills - IV (Level II)		-					
III	21UMS407	Core - VII : Statics	4	-	3	50	50	100	4
	21UMS408	Core - VIII : Operations Research-I	5	-	3	50	50	100	4
	21UMS4A2	Allied - VI : Physics for Mathematics And Chemistry II	8	-	3	50	50	100	4
	21UMS4A3	Allied Lab : Physics lab for Mathematics And Chemistry	-	-	3	50	50	100	2
IV	21UMS4N1 / 21UMS4N2	Non Major Elective - II : Quantitative Aptitude- II/ Astronomy - II	1	-	2	-	50	50	2
	21HEC404	Human Excellence - Social Values & SKY Yoga Practice – IV	1	-	2	25	25	50	1
V		Extension Activities - Annexure I	-	-	-	-	50	50	1
CC	21CFE401	Fluency in English - IV	-	-	-	-	-	-	-
	21CMM401	ManaiyiyalMahathuvam - III	-	-	2	-	50	50	Grade
	21CUB401	UzhavuBharatham - III	-	-	2	-	50	50	Grade
Total			30		22	350	400	750	24

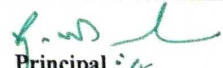
SEMESTER – V

Part	Subject Code	Title of the Paper	Hrs / Week		Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P		Internal	External		
III	21UMS509	Core - IX : Modern Algebra	6	-	3	50	50	100	4
	21UMS510	Core - X : Real Analysis-I	6	-	3	50	50	100	4
	21UMS511	Core - XI : Operations Research-II	5	-	3	50	50	100	4
	21UMS512	Core - XII : Theory of Numbers	5	-	3	50	50	100	4
	21UMS5E1/ 21UMS5E2	Core Elective I : Programming in C/ Artificial Intelligence and Machine Learning	4	-	3	50	50	100	3
	21UMS5E3	Core Elective LabII: Programming lab in C	-	2	3	25	25	50	2
	21 UMS5AL	Advanced Learner Course -I (Optional): Advanced Operations Research - I -Self study	-	-	-	50	50	100	3*
	21UMS5VA	Department Specific Value Added Course : Adobe Photoshop (Mandatory)	30 hrs		-	-	-	-	2*
IV	21UMS5S1/ 21UMS5S2	Skill Based Elective - I : Financial Mathematics-I / Network and Information Security	1	-	2	-	50	50	2
	21HEC505	Human Excellence - National Values & SKY Yoga Practice - V	1	-	2	25	25	50	1
	21GKL501	General Knowledge and General Awareness - Self Study	SS		2	-	50	50	2
CC	21CFE505	Fluency in English - V	-	-	-	-	-	-	-
Total			28	2	24	325	375	800	26

SEMESTER – VI									
Part	Subject Code	Title of the Paper	Hrs / Week		Exam Hrs.	Maximum Marks		Total Marks	Credits
			L	P		Internal	External		
III	21UMS613	Core - XIII :Linear Algebra	6	-	3	50	50	100	4
	21UMS614	Core - XIV : Real Analysis II	6	-	3	50	50	100	4
	21UMS615	Core - XV : Complex Analysis	5	-	3	50	50	100	4
	21UMS6E1/ 21UMS6E2	Core Elective III: Discrete Mathematics/ Graph Theory	5	-	3	50	50	100	5
	21UMS6E3/ 21UMS6E4	Core Elective IV: OOP with C++/ Introduction to Industry 4.0	4	-	3	50	50	100	3
	21UMS6E5	Core Elective Lab V: Programming lab in OOP with C++	-	2	3	25	25	50	2
	21 UMS6AL	Advanced Learner Course - II (Optional) -Advanced Operations Research - II - Self Study	-	-	-	50	50	100	3*
	21UMS6VA	Department Specific Value Added Course: Python Training (Mandatory)	30 hrs		-	-	-	-	2*
IV	21UMS6S1/ 21UMS6S2	Skill Based Elective - II : Financial Mathematics-II/ Cryptography	1		2	-	50	50	2
	21HEC606	Human Excellence - Global Values & SKY Yoga Practice - VI	1	-	2	25	25	50	1
CC	21CFE606	Fluency in English–VI	-	-	-	-	-	-	Grade
Total			28	2				750	25
Grand Total								4100140	


Head of the Department

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Principal

Dr. R. MANICKA CHEZIAN M.Sc.,M.S.,Ph.D.,
PRINCIPAL i/c
Nallamuthu Gounder Mahalingam College
Pollachi - 642 001, Coimbatore District.

Programme Code:	B.Sc.	Programme Title:	B.Sc. Mathematics	
Course Code:	21UMS5S1	Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	1	FINANCIAL MATHEMATICS-I	Semester:	V
			Credits:	2

Course Objective

This course provides an introduction to the basic mathematical concepts and techniques used in finance and business, highlighting the inter-relationships of the mathematics and developing problem solving solutions with a particular emphasis on financial and business applications

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate an understanding of the term structure of interest rates.	K2
CO2	Define and describe in detail, the use of simple and compound rates of interest and distinguish between nominal and effective rates of interest	K3
CO3	Demonstrate an understanding of concepts relating to annuities	K3
CO4	Describe in detail the various types of annuities and perpetuities and use them to solve financial transaction problems	K3
CO5	Demonstrate their ability to apply the technical solutions related to the course in a practical context.	K3

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	M	H	H	M	M	M	M
CO2	H	H	M	H	H	M	M	H	M
CO3	H	H	M	M	M	M	M	M	M
CO4	H	H	M	H	H	H	M	M	M
CO5	H	H	H	H	H	H	M	M	M

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Rates of interest – Simple and Compound interest rates – Accumulation and Present value of payments – Nominal rate of interest – Effective rate of interest. Solving problems associated with the above topics.	2
Unit II	Limiting case of $i^{(m)}$ - Concept of Force of interest ' δ ' – Establishing relationship between the effective, nominal and force of interest – Application of Euler's theorem. Solving problems associated with the above topics.	3
Unit III	Introduction to Series of Payments - Definition of Annuity – Annuity certain – Immediate and deferred annuities - Accumulations and Present values of Annuities where the payments and interest rates have same frequencies. Solving problems associated with the above topics.	2
Unit IV	Definition and Derivation of $a_{\overline{n} }$, $s_{\overline{n} }$, . Definition of Perpetuity- Expressions for $a_{\infty }$, $\ddot{a}_{\infty }$. Increasing and Decreasing annuities – Expressions for $(Ia)_{\overline{n} }$, $(Is)_{\overline{n} }$ and $(Da)_{\overline{n} }$. Values of annuities where the successive installments form an arithmetic progression / geometric progression. Solving problems associated with the above topics.	3
Unit V	Accumulations and Present values of Annuities where payments and interest rates have different frequencies. Definition and derivation of $a_{\overline{n} }^{(p)}$, $\ddot{a}_{\overline{n} }^{(p)}$ and their corresponding accumulated values. Solving problems associated with the above topics.	3
Total Contact Hrs.		13

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Books:

1. CM 1 - Actuarial Mathematics-Combined material pack-The Actuarial Education Company on behalf of the Institute and Faculty of Actuaries, London, 2019.
2. IC - 81- Mathematical Basis of Life Assurance – published by Insurance Institute of India, 1991.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://youtu.be/mFI58RRCDbs>
2. <https://youtu.be/A7eKB6xRuYM>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name:Dr. V.INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Signature	Name:  Signature	Name:  Signature

Dr. V. Inthumathi, Ph.D.,
Associate Professor & Head
Department of Mathematics
N.G.M College, Pollachi - 642 001.

K. SRINIVASAN, M.C.A.,
Co-ordinator
Curriculum Development Cell (CDC)
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Dr. R. MANICKA CHEZIAN, M.Sc., M.S., Ph.D.,
Controller of Examinations
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POLLACHI - 642 001.

Programme Code:	B.Sc.	Programme Title:	B.Sc. Mathematics	
Course Code:	21UMS5AL	Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	-	ADVANCED LEARNER COURSE (OPTIONAL): ADVANCED OPERATIONS RESEARCH - I	Semester:	V
			Credits:	3*

Course Objective

The course aims to introduce some OR techniques like Integer programming, Goal programming, dynamic programming etc. to build capabilities in students for analyzing different business situations involving limited resources and obtained logical solutions.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	recall Linear programming techniques, understand and apply advanced techniques in linear programming and duality to real life problems	K2 & K3
CO2	understand and solve variety of problems such as replacement problems, transportation problem etc.	K2 & K3
CO3	sketch the theoretical workings of Integer programming, Goal programming, Dynamic programming problems and their solution procedures.	K3
CO4	analyze any real system and formulate Mathematical models.	K4
CO5	make effective decisions under various business situations by applying appropriate optimization techniques.	K4

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	M	M	H	H
CO2	H	M	H	H	H	H	M	H	H
CO3	H	H	H	H	M	M	M	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content
Unit I	Duality in Linear Programming: Economic Interpretation of Duality - Dual Simplex method. LPP - Advanced Techniques: Introduction - Revised Simplex Method - Bounded Variables. Chapter 5: Sections: 5.8, 5.9. Chapter 9: Sections: 9.1, 9.2and 9.4.
Unit II	Integer Programming: Introduction - Pure And Mixed Integer Programming Problems - Gomory's All-IPP Method - Construction of Gomory's constraint Fractional Cut Method - All Integer LPP, Fractional Cut Method - Mixed Integer LPP - Branch and Bound Method. Chapter 7: Sections: 7.1 - 7.7.
Unit III	Goal Programming: Introduction - Categorization of Goal Programming -Formulation of Linear Goal Programming Problem – Graphical Goal Attainment Method – Simplex Method for Goal Programming Problem. Chapter 8: Sections: 8.1 - 8.5.
Unit IV	Dynamic Programming: Introduction - The Recursive Equation Approach - Characteristics of Dynamic Programming - Dynamic Programming Algorithm. Chapter 13: Sections: 13.1 - 13.4.
Unit V	Replacement problem and System Reliability: Replacement of Equipment that fails suddenly - Recruitment and Promotion problem. Transportation Problem: Stepping Stone Solution Method - Time Minimization Transportation Problem - Transshipment Problems. Chapter 18: 18.3 and 18.4. Chapter 10: 10.14, 10.16 and 10.17.

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Kanti Swarup, Gupta P.K. & Man Mohan, Operations Research (2014), Sultan Chand & Sons, New Delhi.

Books for Reference :

1. Philips T, Ravindran A and Solberg J, *Operations Research: Principles and Practice*, John Willey & Sons, 1976.

2. Taha H. A, *Operation Research - An introduction*, Prentice Hall of India Pvt. Ltd, New Delhi, 2006.
3. P. K Gupta & D. S Hira, *Operations Research*, S. Chand and company Ltd, New Delhi, 2014.
4. S. Dharani Venkatakrishnan, *Operations Research principles problems*, Keerthi Publishing house Pvt. Ltd., 1994.

Related Online Contents[MOOC, SWAYAM, NPTEL, Websites etc.,]

1. <https://www.youtube.com/watch?v=xGkpXkAnWU&list=PLjc8ejfjpgTf0LaDEHgLB3gCHZYcNtsoX&index=30>
2. <https://www.youtube.com/watch?v=h0bdo06qNVw&list=PLjc8ejfjpgTf0LaDEHgLB3gCHZYcNtsoX&index=33>
3. <https://www.youtube.com/watch?v=H58TPQNr2kM&list=PLjc8ejfjpgTf0LaDEHgLB3gCHZYcNtsoX&index=34>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. J. JAYASUDHA  Signature	Name: Dr. V. INTHUMATHI  Signature	Name:  Signature	Name:  Signature

Dr. V. Inthumathi, Ph.D.,
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Dr. R. MANICKA CHEZIAN, M.Sc., M.S., Ph.D.,
Controller of Examinations
NGM College (Autonomous)
POLLACHI - 642 001.

Programme Code:	B.Sc.	Programme Title:	B.Sc. Mathematics	
Course Code:	21UMS5E2	Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	4	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	Semester:	V
			Credits:	3

Course Objective

On successful completion of the course the students are able to understand the concepts of problem solving logics, reasoning knowledge, Decision making, Learning with searches and algorithms.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To recall the basic logical searches, learning algorithms and improve decision making systems.	K1
CO2	To Summarize the idea about knowledge representation and reasoning	K2
CO3	To illustrate new knowledge with probabilistic reasoning solutions	K3
CO4	To Analyze Decision making system and its different process	K4
CO5	To evaluate the learning skills with many observations and machine learning algorithms	K5

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	M	H	H	H	H
CO2	H	M	H	H	H	H	H	H	H
CO3	H	H	H	H	H	H	H	H	H
CO4	H	M	H	H	H	H	M	H	H
CO5	H	H	H	H	M	M	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	INTRODUCTION: The Introduction of AI - The History of AI - Intelligent agents – Agents based system. PROBLEM SOLVING: State Space models – Searching for solution – Uniformed/ Blind search – Informed/Heuristic search - A* search - Hill - climbing search - Meta Heuristic: Genetic Algorithm - Adversary based search: Minimax - Expect Imax- Alpha Beta pruning - Constraint satisfaction problem - Backtracking search.	11
Unit II	KNOWLEDGE REPRESENTATION AND REASONING: Knowledge representation - Logics - bivalent logic - inference - Fuzzy logic: membership - Fuzzy rules and reasoning - Fuzzy inference	11
Unit III	UNCERTAIN KNOWLEDGE AND PROBABILISTIC REASONING: Uncertainty - Probabilistic reasoning - Semantics of Bayesian network - Exact inference in Bayesian network- Approximate inference in Bayesian network -Probabilistic reasoning overtime Inference in temporal models - HiddenMarkov Models Dynamic BayesianNetworks	10
Unit IV	DECISION-MAKING: Basics of utility theory, Utility functions - Sequential decision problems - Markov decision process - Value iteration - Policyiteration - Decisions in Multi agent system: Multi agent decision theory - Group decision making	10
Unit V	Machine learning: Introduction- Probability distributions: Binary variables, Multinomial variables. Neural networks feed forward network function-Error propagation. Kernel methods-radial bias function networks .Graphical models-Bayesian networks-Discrete variables, linear Gaussian model. Mixture models andEM-K means clustering-.Combining models-Boosting Algorithm.	10
	Total Contact Hrs.	52

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Books:

1. Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, Pearson Education, 2014.
2. David Pool and Alan Mackworth, *Artificial Intelligence: Foundations of Computational agents*, Cambridge University Press, 2017.
3. Christopher M.Bishop, *Pattern Recognition and Machine Learning*, Springer, 2013.

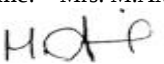
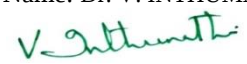
Books for Reference:

1. C. S. Krishnamoorthy, S.. Rajeev, *Artificial Intelligence and Expert Systems for Engineers*, CRCPress, 1996.
2. Nils J. Nilsson, *The Quest for Artificial Intelligence: A History of Ideas and achievements*, Cambridge University press, 2010.
3. Alpaydin Ethem, *Introduction to Machine Learning*, Massachusetts Institute of Technology Press, 2009.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1.<https://youtu.be/yaL5ZMvRRqE>

2.<https://youtu.be/ukzFI9rgwfU>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Mrs. M.AMSAVENI  Signature	Name: Dr. V. INTHUMATHI  Signature	Name:  Signature	Name:  Signature

Dr. V. Inthumathi, Ph.D.,
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Curriculum Development Cell (CDC)
NGM College (Autonomous)
Pollachi - 642 001.

Dr. R. MANICKA CHEZIAN, M.Sc., M.S., Ph.D.,
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Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	21UMS6S1	Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	1	FINANCIAL MATHEMATICS -II	Semester:	VI
			Credits:	2

Course Objective

The course on financial mathematics focuses on the mathematical properties and relations between concepts of financial and currency markets in investment and other economic activities.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	use a generalized cash-flow model to describe financial transactions.	K2
CO2	describe how a loan may be repaid by regular instalments of interest and capital.	K3
CO3	analyze straightforward compound interest problems and solve resulting equations of value, including for the implied rate of return.	K4
CO4	apply discounted cash flow techniques to investment project appraisal.	K3
CO5	communicate the difference in capital budgeting decision tools like Net Present Values, Interval Rates of Return and Discounted Payback Periods.	K3

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	M	H	M	M	M	M	M
CO2	H	H	H	H	M	M	M	M	M
CO3	H	H	M	H	M	M	M	M	M
CO4	H	H	H	H	M	M	M	M	M
CO5	H	H	M	H	M	M	M	M	M

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Annuities payable continuously - Definition and derivation of $\bar{a}_{n }$, $(I\bar{a})_{n }$, $\bar{s}_{n }$, $(I\bar{s})_{n }$ - Annuities where payments are increasing continuously and payable continuously – definition and derivation of $(\bar{Ia})_{n }$, $(\bar{Is})_{n }$. Annuities where payments and interest both are varying continuously - Evaluation of $\int_0^n \rho(t)v(t)dt$. Solving problems associated with the above topics.	3
Unit II	Equated monthly installments - Loan schedules- Principal and interest portion of annuity payments - Calculation of outstanding loan amount at any given time 't'. Solving problems associated with the above topics.	2
Unit III	Calculation of Purchase price to yield a specified rate of return - Dealing with changes arising due to modification of the original terms and conditions of the loans. Solving problems associated with the above topics.	3
Unit IV	Appraisal of Projects – Cash flows, net present value and accumulated profit in an investment project. Solving problems associated with the above topics.	3
Unit V	Internal rate of return, Payback period, Discounted payback period. Solving problems associated with the above topics.	2
	Total Contact Hrs.	13

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Books:

1. CM 1 - Actuarial Mathematics-Combined material pack-The Actuarial Education Company on behalf of the Institute and Faculty of Actuaries, London, 2019.
2. IC - 81- Mathematical Basis of Life Assurance – published by Insurance Institute of India, 1991.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. https://youtu.be/chzYFfBxU_Y
2. <https://youtu.be/LuK0PiD0EsM>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name:Dr. V.INTHUMATHI  Signature	Name: Dr. V. INTHUMATHI  Signature	Name:  Signature	Name:  Signature

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Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	21UMS6E2	Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	5	GRAPH THEORY	Semester:	VI
			Credits:	5

Course Objective

Graph theory is a major area of Combinatorics. In this Course we introduce the learners to some basic topics in graph theory.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	recall the basic concepts and definitions of graphs along with types and their examples.	K1
CO2	demonstrate the concepts of connectivity and line connectivity.	K3
CO3	compare the features of Eulerian graphs and Hamiltonian graphs.	K4
CO4	apply the concept of directed graphs to solve network flow problems.	K3
CO5	relate the graph theory to the real world problems.	K4

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	M	H	H	H	H	H
CO2	H	M	H	M	H	H	M	H	H
CO3	H	M	M	M	M	H	M	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H – HIGH; M – MEDIUM; L – LOW.

Units	Contents	Hrs.
Unit-I	Graphs: Varieties of graphs - Walks and connectedness - Degrees - Operation on Graphs. Matrices: The adjacency matrix - The incidence Matrix.	14
Unit-II	Blocks: Cut points - bridges - and blocks - Block graphs and cut point graphs. Trees: Characterization of trees - Centers and centroids.	13
Unit-III	Connectivity: Connectivity and line-connectivity. Traversability: Euclerian graphs.	13
Unit-IV	Traversability: Hamiltonian graphs. Factorization: 1-factorization - 2-factorization.	12
Unit-V	Planarity: Plane and planar graphs - Outer planar graphs.	13
	Total Contact Hrs.	65

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Frank Haray. (2001). *Graph Theory*. Narosha Publishing.

Books for Reference:

1. Balakrishnan, R. and Ranganathan. K. (2000). *A Text Book on Graph Theory*. New York: Springer Verlag.
2. Gould, R. (1988). *Graph Theory*, California: The Benjamin/ Cummings Publishing Company, Inc.
3. Hartsfield, N. and Ringel, G. (1990) *Pearls in Graph Theory*, Academic Press.
4. Bondy, J.A. and Murty U.S.R. (1976) *Graph Theory with Applications*, Macmillan Company.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://youtu.be/1h2BoCtobXw>
2. <https://youtu.be/R9R9hhue614>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Dr. V. CHITRA  Signature	Name: Dr. V. INTHUMATHI  Signature	Name:  Signature	Name:  Signature

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Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	21UMS6E4	Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	4	INTRODUCTION TO INDUSTRY 4.0	Semester:	VI
			Credits:	3

Course Objective

To impart knowledge on Industry 4.0, need for digital transformation and the following Industry 4.0 tools:

1. Artificial Intelligence
2. Big Data and Data Analytics
3. Internet of Things

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Know the reason for adopting Industry 4.0 and Artificial Intelligence.	K1
CO2	Understand the need for digital transformation.	K2
CO3	Apply the industry 4.0 tools.	K3
CO4	Analyze the applications of Big Data .	K4
CO5	Examine the applications and security of IoT Applications.	K4

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	M	M	H	H	M	H	M	M	H
CO2	M	M	H	H	M	H	M	M	H
CO3	H	H	H	H	H	H	H	M	H
CO4	H	H	H	H	H	H	H	M	H
CO5	H	H	H	H	H	H	H	M	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content	Hrs.
Unit I	Industry 4.0: Need – Reason for Adopting Industry 4.0 -Definition – Goals and Design Principles - Technologies of Industry 4.0 – Big Data – Artificial Intelligence (AI) – Industrial Internet of Things - Cyber Security – Cloud – Augmented Reality. .	11
Unit II	Artificial Intelligence : Artificial Intelligence : Artificial Intelligence (AI) – What & Why? - History of AI – Foundations of AI -The AI -environment - Societal Influences of AI - Application Domains and Tools - Associated Technologies of AI - Future Prospects of AI - Challenges of AI .	10
Unit III	Big Data And IoT : Big Data : Evolution - Data Evolution - Data : Terminologies - Big Data Definitions - Essential of Big Data in Industry 4.0 - Big Data Merits and Advantages - Big Data Components : Big Data Characteristics - Big Data Processing Frameworks - Big Data Applications - Big Data Tools - Big Data Domain Stack : Big Data in Data Science - Big Data in IoT - Big Data in Machine Learning- Big Data in Databases - Big Data Use cases Big Data in Social Causes - Big Data for Industry - Big Data Roles and Skills -Big Data Roles - Learning Platforms; Internet of Things (IoT) : Introduction to IoT - Architecture of IoT - Technologies for IoT - Developing IoT Applications -Applications of IoT - Security in IoT .	11
Unit IV	Applications And Tools Of Industry 4.0: Applications of IoT – Manufacturing – Healthcare – Education – Aerospace and Defense – Agriculture – Transportation and Logistics – Impact of Industry 4.0 on Society: Impact on Business, Government, People. Tools for Artificial Intelligence, Big Data and DataAnalytics, Virtual Reality, Augmented Reality, IoT, Robotics.	10
Unit V	Jobs 2030: Industry 4.0 – Education 4.0 – Curriculum 4.0 – Faculty 4.0 – Skills required for Future - Tools for Education – Artificial Intelligence Jobs in 2030 –Jobs2030 Framework foraligning Education with Industry 4.0 .	10
	Total Contact Hrs.	52

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.
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Assessment Methods:

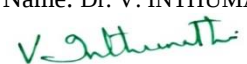
Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Higher Education for Industry 4.0 and Transformation to Education 5.0(2021)-P.Kaliraj&
T. Devi

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

1. <https://nptel.ac.in/courses/106/105/106105195/>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name: Mrs. A. GNANASOUNDARI  Signature	Name: Dr. V. INTHUMATHI  Signature	Name:  Signature	Name:  Signature

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Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	21UMS6AL	Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	-	ADVANCED LEARNER COURSE (OPTIONAL): ADVANCED OPERATIONS RESEARCH - II	Semester:	V
			Credits:	3*

Course Objective

The course aims to expose non-linear programming and simulation. Further it helps the student to understand different computational algorithms used in solving non-linear programming problems. The course also enables to schedule projects and build mathematical models to study the real world system.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	understand non-linear programming problems and familiarize different solving procedures	K2& K3
CO2	formulate and solve non-linear programming problems using appropriate techniques and interpret the results.	K3
CO3	simulate Various real life probabilistic situations using methods like Monte Carlo simulation	K4
CO4	analyze the resources efficiently under various constrains and estimate the probability of completing a project on time.	K4
CO5	develop critical and analytical skills that enable to apply optimization techniques constructively to any business environment and draw wise decisions.	K4

Mapping

PO / PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	M	M	H	H
CO2	H	H	H	H	M	H	M	H	H
CO3	H	M	H	H	H	M	H	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	H	H	H	H	H	H	H	H

H - HIGH; M - MEDIUM; L - LOW.

Units	Content
Unit I	Non-linear Programming: Introduction - Formulating a Non-linear Programming Problem (NLPP) - General Non-linear Programming Problem - Constrained Optimization with Equality Constraints - Constrained Optimization with Inequality Constraints. Chapter 27: Sections: 27.1- 27.5.
Unit II	Non-linear Programming - Methods: Introduction - Quadratic Programming - Wolfe's Modified Simplex Method - Beale's Method. Chapter 28: Sections: 28.1, 28.4 – 28.6.
Unit III	Simulation: Introduction - Why simulation? - Process of simulation - Simulation models - Event-type simulation - Generation of random numbers - Monte-Carlo Simulation. Chapter 22: Sections: 22.1 - 22.7.
Unit IV	Simulation: Simulation of inventory problems - Simulation of a Queueing System - Simulation of Job Sequencing. Chapter 22: Sections: 22.8, 22.9 and 22.12.
Unit V	Resource Analysis in Network scheduling: Introduction - Project cost - Time-cost Optimization Algorithm. Chapter 26: Sections: 26.1 - 26.3.

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

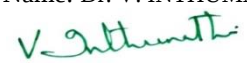
Kanti Swarup, Gupta P.K., *Operations Research*, Sultan Chand & Sons, New Delhi - 2014.

Reference Books:

1. Philips T, Ravindran A and Solberg J, *Operations Research: Principles and Practice*, John Willey & Sons, 1976.
2. Taha H. A, *Operation Research - An introduction*, Prentice Hall of India Pvt. Ltd, New Delhi, 2006.
3. P. K Gupta & D. S Hira, *Operations Research*, S. Chand and company Ltd, New Delhi, 2014.
4. S. Dharani Venkatakrishnan, *Operations Research principles problems*, Keerthi Publishing house Pvt. Ltd, 1994.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://www.youtube.com/watch?v=xGkpXkAnWU&list=PLjc8ejfjpgTf0LaDEHgLB3gCHZYcNtsoX&index=30>
2. <https://www.youtube.com/watch?v=h0bdo06qNVw&list=PLjc8ejfjpgTf0LaDEHgLB3gCHZYcNtsoX&index=33>
3. <https://www.youtube.com/watch?v=H58TPQNr2kM&list=PLjc8ejfjpgTf0LaDEHgLB3gCHZYcNtsoX&index=34>

Course Designed by	Verified by HOD	Checked by	Approved by
Name and Signature	Name with Signature	CDC	COE
Name:DR. J. JAYASUDHA  Signature	Name: Dr. V. INTHUMATHI  Signature	Name:  Signature	Name:  Signature

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Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	21UMS6S2	Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	1	CRYPTOGRAPHY	Semester:	VI
			Credits:	2

Course Objective

To enable the learners to explore the basic techniques of modern cryptography and to re-visit some mathematical results which are foundations for several modern cryptographic algorithms.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	understand the fundamentals of cryptography including data and advanced encryption standards.	K2
CO2	learn to encrypt and decrypt messages using block ciphers.	K2
CO3	acquire knowledge about the uses of RSA crypto system.	K3
CO4	learn about how to maintain the confidentiality, Integrity and availability of a data.	K4
CO5	analyze and apply the concepts of public number generation and public key encryption in real life situations.	K4

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	H	H	H	H	H	H	H	H	H
CO2	H	H	M	H	H	H	M	H	H
CO3	H	M	M	H	M	M	M	H	H
CO4	H	H	H	H	H	H	H	H	H
CO5	H	M	H	H	H	H	M	H	H

H – HIGH; M – MEDIUM; L – LOW.

Unit	Content	Hrs
Unit-I	Encryption: Encryption Schemes, Symmetric and Asymmetric Cryptosystems, Cryptanalysis, Alphabets and Words, Permutations, Block Ciphers.	3
Unit-II	Encryption: Matrices and Linear Maps, Affine Linear Block Ciphers, Vigenere, Hill and Permutation Ciphers.	3
Unit-III	DES: Feistel Ciphers, DES Algorithm.	3
Unit-IV	Public Number Generation: Trial Division, Fermat Test, Carmichael Numbers, Miller-Rabin Test.	2
Unit-V	Public Key Encryption: Idea, Security, RSA Cryptosystem.	2
	Total Contact Hrs.	13

Pedagogy:

Direct Instruction, Flipped Class, Power Point Presentation.

Assessment Methods:

Seminar, Chalk and talk, Quiz, Assignments, Group Task.

Text Book:

Buchmann, J. (2001). *Introduction to Cryptography*. Second edition. Springer verlog.

Reference Books

1. Holfstein, J. Pipher, J. and Silverman, J.H. *An Introduction to Mathematical Cryptography*. Springer.
2. Rossen, K.H. *Cryptography theory and practice*. Discrete Mathematics and applications.

Related Online Contents[MOOC, SWAYAM,NPTEL, Websites etc.,]

1. <https://youtu.be/5jpgMXt1Z9Y>
2. <https://youtu.be/5jpgMXt1Z9Y>

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	21UPS2A3	Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	4	Programming Lab for Physics using MATLAB	Semester:	II
			Credits:	2

List of programs:

1. Program for creating a matrix 5×4
2. Program for finding the characteristic equation of the 3×3 matrix
3. Program to illustrate the row vector problem in a given matrix $\begin{bmatrix} 6 & 43 & 2 & 11 & 87 \\ 12 & 6 & 34 & 0 & 5 \\ 34 & 18 & 7 & 41 & 9 \end{bmatrix}$
4. Program to illustrate the column vector problem in a given matrix $\begin{bmatrix} 2 & 4 & 6 & 8 & 10 \\ 3 & 6 & 9 & 12 & 15 \\ 7 & 14 & 21 & 28 & 35 \end{bmatrix}$
5. Program to illustrate the creation of sub matrix from a given 4×7 matrix
6. Program to finding the eigen values of the 3×3 matrix
7. Program to check the matrix 3×3 is symmetric or skew symmetric

$$4x - 2y + 6z = 8$$
8. Program to solve the system of linear equations $2x + 8y + 2z = 4$

$$6x + 10y + 3z = 0$$
9. Program to create a 6×6 matrix in which the middle rows and the middle two columns are 1's and the rest are zeros.
10. The following were the daily maximum temperature (in °F) in Washington In during the month of April, 2002: 58 73 73 53 50 48 56 73 66 69 63 74 82 91 93 89 91 80 59 69 56 64 63 66 64 74 63 69, (data from the U.S. National Organic and Atmospheric Administrations). Use relational and logical operations determine the following:
A) The number of days the temperature was above 75°
B) The number of days the temperature was between 65° and 80°
C) The days of the month that the temperature was between 50° and 60°
11. A worker is paid according to his hourly wage up to 40 hours, and 50% more for overtime. Write a program in a script file that calculates the pay to a worker. The programs ask the user to enter the number of hours and the hourly wage. The program the displays the pay.
12. A vector is given by $V=[5,17,-3,8,0,-1,12,15,20,-6,6,4,-7,16]$. Write a program as a script file that doubles the elements that are positive and are divisible by 3 and/or 5, and raise to the power of 3 the elements that are negative but greater than -5.
13. For the polynomial $f(x) = x^5 - 12.1x^4 + 40.59x^3 - 17.015x^2 - 71.95x + 35.88$
A) Calculate $f(9)$
B) Calculate $f(x)$ for $0 \leq x \leq 10$
14. Create 3×3 matrix to demonstrate that matrix multiplication is not commutative.
15. Program to find the first and second derivative of $f(x) = x^5 - 12.1x^4 + 40.59x^3 - 17.015x^2 - 71.95x + 35.88$

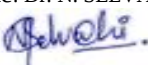
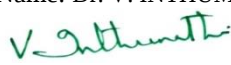
16. Program to find the first and second derivative of $f(x) = e^{3x+2}$
17. Program to find the first and second derivative of $f(x) = 2 + \log x$
18. Program to find $\int_0^{\infty} e^{-x^2} (\ln x)^2 dx$
19. Program to find $\int_0^{\frac{\pi}{2}} \sin(2x) dx$
20. Program to find $\int_{-\infty}^{\infty} \frac{1}{a^2+x^2} dx$
21. Program for divide the polynomial $15x^5 + 35x^4 - 37x^3 - 19x^2 + 41x - 15$ by polynomial $5x^3 - 4x + 3$

Text Book:

Amos Gilat, *MATLAB - An Introduction with Application*, John Wiley & Sons, Singapore, Third Edition, 2007.

Books for Reference:

1. Etter D. M., Kuncicky D. C. and Moore H., Introduction to MATLAB 7, Prentice Hall, New Jersey, 2009.
2. Palm W. J., Introduction to MATLAB 7 for Engineers, McGraw-Hill Education, New York, 2005.
3. Prata R. P., Getting Started with MATLAB - A Quick Introduction for Scientist and Engineers, Oxford University Press, New Delhi, 2010.

Course Designed by	Verified by HOD	Checked by	Approved by
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Programme Code:	B.Sc.	Programme Title:	Mathematics	
Course Code:	21UCY2A3	Title	Batch:	2021 - 2024
Lecture Hrs./Week or Practical Hrs./Week	4	Programming Lab for Chemistry using MATLAB	Semester:	II
			Credits:	2

List of programs:

1. Program for creating a matrix 5×4
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3. Program to illustrate the row vector problem in a given matrix $\begin{bmatrix} 6 & 43 & 2 & 11 & 87 \\ 12 & 6 & 34 & 0 & 5 \\ 34 & 18 & 7 & 41 & 9 \end{bmatrix}$
4. Program to illustrate the column vector problem in a given matrix $\begin{bmatrix} 2 & 4 & 6 & 8 & 10 \\ 3 & 6 & 9 & 12 & 15 \\ 7 & 14 & 21 & 28 & 35 \end{bmatrix}$
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8. Program to solve the system of linear equations $2x + 8y + 2z = 4$
 $6x + 10y + 3z = 0$
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B) The number of days the temperature was between 65° and 80°
C) The days of the month that the temperature was between 50° and 60°
11. A worker is paid according to his hourly wage up to 40 hours, and 50% more for overtime. Write a program in a script file that calculates the pay to a worker. The programs ask the user to enter the number of hours and the hourly wage. The program the displays the pay.
12. A vector is given by $V=[5,17,-3,8,0,-1,12,15,20,-6,6,4,-7,16]$. Write a program as a script file that doubles the elements that are positive and are divisible by 3 and/or 5, and raise to the power of 3 the elements that are negative but greater than -5.
13. For the polynomial $f(x) = x^5 - 12.1x^4 + 40.59x^3 - 17.015x^2 - 71.95x + 35.88$
a) Calculate $f(9)$
b) Calculate $f(x)$ for $0 \leq x \leq 10$
14. Create 3×3 matrix to demonstrate that matrix multiplication is not commutative.
15. Program to find the first and second derivative of $f(x) = x^5 - 12.1x^4 + 40.59x^3 - 17.015x^2 - 71.95x + 35.88$

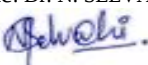
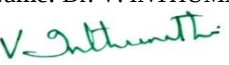
16. Program to find the first and second derivative of $f(x) = e^{3x+2}$
17. Program to find the first and second derivative of $f(x) = 2 + \log x$
18. Program to find $\int_0^{\infty} e^{-x^2} (\ln x)^2 dx$
19. Program to find $\int_0^{\frac{\pi}{2}} \sin(2x) dx$
20. Program to find $\int_{-\infty}^{\infty} \frac{1}{a^2+x^2} dx$
21. Program for divide the polynomial $15x^5 + 35x^4 - 37x^3 - 19x^2 + 41x - 15$ by polynomial $5x^3 - 4x + 3$

Text Book:

Amos Gilat, *MATLAB - An Introduction with Application*, John Wiley & Sons, Singapore, Third Edition, 2007.

Books for Reference:

1. Etter D. M., Kuncicky D. C. and Moore H., Introduction to MATLAB 7, Prentice Hall, New Jersey, 2009.
2. Palm W. J., Introduction to MATLAB 7 for Engineers, McGraw-Hill Education, New York, 2005.
3. Prata R. P., Getting Started with MATLAB - A Quick Introduction for Scientist and Engineers, Oxford University Press, New Delhi, 2010.

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