

B.Sc. Mathematics

Syllabus

AFFILIATED COLLEGES

Program Code: 22A

2022 – 2023 onwards



BHARATHIAR UNIVERSITY

(A State University, Accredited with “A++” Grade by NAAC,
Ranked 21st among Indian Universities by MHRD-NIRF)

Coimbatore - 641 046, Tamil Nadu, India

BHARATHIAR UNIVERSITY: COIMBATORE 641 046

**B. Sc. Mathematics Curriculum (Affiliated Colleges)
(CBCS PATTERN)**

(For the students admitted from the academic year 2022-2023 and onwards)

Scheme of Examination

Part	Title of the Course	Hours/ Week	Examination				Credits
			Duration in Hours	Maximum Marks			
				CIA	CEE	Total	
Semester I							
I	Language - I	6	3	50	50	100	4
II	English - I	6	3	50	50	100	4
III	Core Paper I - Classical Algebra	4	3	50	50	100	4
III	Core Paper II-Calculus	5	3	50	50	100	4
III	Allied A : Paper I Chosen by the college	7	3	50	50	100	4
IV	Environmental Studies*	2	3	-	50	50	2
Total		30		250	300	550	22
Semester II							
I	Language – II	6	3	50	50	100	4
II	English – II	4	3	25	25	50@@	2
II	Effective English :Language Proficiency for Employability http://kb.naanmudhalvan.in/Special:Filepath/Cambridge_Course_Details.pdf	2	-	25	25	50##	2
III	Core Paper III - Analytical Geometry	4	3	50	50	100	4
III	Core Paper IV-Trigonometry, Vector Calculus and Fourier Series	5	3	50	50	100	4
III	Allied A: Paper II Chosen by the College	7	3	50	50	100	4
IV	Value Education – Human Rights*	2	3	-	50	50	2
Total		30		250	300	550	22
Semester III							
I	Language – III	6	3	50	50	100	4
II	English – III	6	3	50	50	100	4
III	Core Paper V- Differential Equations and Laplace Transforms.	3	3	50	50	100	4
III	Core Paper VI- Statics	3	3	50	50	100	4

III	Allied B : Paper I – Chosen by the college	7	3	30	45	75	3
IV	Skill based Subject - Operations Research -I	3	3	25	25	50@@	2
IV	Tamil** / Advanced Tamil* (OR) Non-major elective - I (Yoga for Human Excellence)* / Women's Rights*	2	3		50	50	2
Total		30		255	320	575	23
Semester IV							
I	Language – IV	5	3	50	50	100	4
II	English – IV	5	3	50	50	100	4
III	Core Paper VII-Dynamics	3	3	50	50	100	4
III	Core Paper VIII- Programming in C	2	3	30	45	75	3
III	Core Paper VIII -Programming in C Practical	1	3	10	15	25	1
III	Allied B - Paper II Chosen by the college	5	3	30	45	75	3
III	Allied B - Paper II Chosen by the college (For Practical Paper)	2	3	25	25	50	2
IV	Skill based Subject - Operations Research – Paper II	3	3	25	25	50@@	2
IV	Office Fundamentals :Digital Skills for Employability http://kb.naanmudhalvan.in/Special:Filepath/Microsoft_Course_Details.xlsx	2		25	25	50##	2
IV	Tamil**/Advanced Tamil* (OR) Non-major elective -II (General Awareness*)	2	3		50	50	2
Total		30		295	380	675	27
Semester V							
III	Core Paper IX-Real Analysis-I	5	3	50	50	100	4
III	Core Paper X- Complex Analysis-I	6	3	50	50	100	4
III	Core Paper XI- Modern Algebra-I	6	3	50	50	100	4
III	Core Paper XII- Discrete Mathematics	5	3	50	50	100	4
III	Elective I	5	3	30	45	75	3
IV	Skill based Subject - Operations Research - Paper III	3	3	25	25	50@@	2
Total		30		255	270	525	21

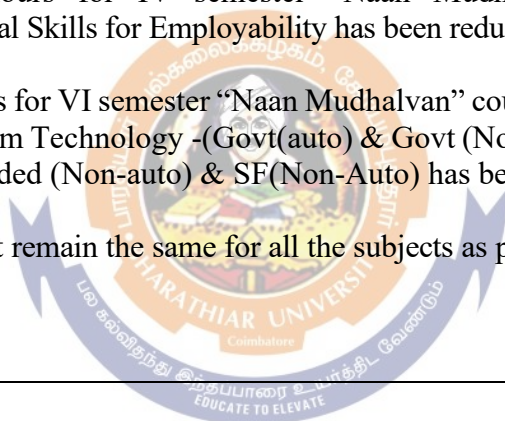
Semester VI							
III	Core Paper XIII - Real Analysis-II	5	3	50	50	100	4
III	Core Paper XIV - Complex Analysis-II	5	3	50	50	100	4
III	Core Paper XV -Modern Algebra-II	5	3	50	50	100	4
III	Elective II	5	3	30	45	75	3
III	Elective III	5	3	50	50	100	4
IV	Skill Based Subject - Operations Research- Paper IV	3	3	25	25	50@@	2
IV	Project Based learning 2- Advanced Platform Technology -(Govt(auto) & Govt (Non-Auto)) / Data Analytics & Visualization - Aided (Non-auto) & SF(Non-Auto) http://kb.naanmudhalvan.in/Bharathiar_University_(BU)	2	-	25	25	50##	2
V	Extension Activities ** / Swachh Bharath @			50		50	2
Total		30		330	295	625	25
Grand Total		180		1635	1865	3500	140
# All computer papers have theory and practical exams							
Theory				30	45	75	100
Practicals				10	15	25	
Note							
## Naan Mudhalvan –Courses- external 25 marks will be assessed by Industry and internal will be offered by respective course teacher.							
* No Continuous Internal Assessment (CIA). Only University Examinations							
** No University Examinations. Only Continuous Internal Assessment (CIA).							
@ Swachh Bharath Internship Scheme (SBIS) is to be added for 2 credits in the extension activities.							
@@ University semester examination will be conducted for 50 marks (As per existing pattern of Examination) and it will be converted for 25 marks.							
Allied Subjects(Colleges can choose any two subjects)							
1.Physics 2. Chemistry 3.Accountancy 4.Statistics.							

List of Elective papers		
(Colleges can choose any one of the paper as electives)		
Elective – I	A	Astronomy- I
	B	Numerical -Methods-I
Elective – II	A	Astronomy—II
	B	Numerical Methods-II
Elective – III	A	Graph Theory
	B	Automata Theory & Formal Languages
	C	Programming in C++ #
	D	Number Theory
	E	Introduction to Industry 4.0

Changes for 2022 -2023 Syllabus

1. The number of Hours for Operations Research II and Operations Research IV has been increased from 2 to 3.
2. The number of hours for IV semester “Naan Mudhalvan” course in Office Fundamentals: Digital Skills for Employability has been reduced from 3 to 2.
3. The number of hours for VI semester “Naan Mudhalvan” course Project Based learning 2- Advanced Platform Technology -(Govt(auto) & Govt (Non-Auto)) / Data Analytics & Visualization -Aided (Non-auto) & SF(Non-Auto) has been reduced from 3 to 2.

The syllabus and the content remain the same for all the subjects as published for the year 2022-2023.



Course code	OPERATIONS RESEARCH – PAPER II		L	T	P	C
Core/Elective/Supportive	SKILL BASED SUBJECT		3	-	-	2
Pre-requisite	Knowledge in Basic Mathematical Concepts		Syllabus Version		2022-2023	
Course Objectives:						
To impart knowledge in Assignment Problems, Game theory, performance measures of queues and optimal use of Inventory.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Identify the importance of stocks the reasons for holding stock in an organization, determine the optimal order quantity for models.					K1
2	Explain the various costs related to inventory system.					K2
3	Apply game theory concepts to articulate real-world situations by identifying, analyzing and practicing strategic decisions.					K3
4	Apply and extend queueing models to analyze real world systems.					K4
5	Build and solve assignment model.					K4
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create						
Unit:1	Assignment Model				9 hours	
The Assignment Problems – Assignment algorithm – optimum solutions – Unbalanced Assignment Problems.						
Unit:2	Game Theory				9 hours	
Game Theory – Two-person zero sum game – The Maximin – Minimax principle – problems - Solution of 2 x 2 rectangular Games – Domination Property – (2 x n) and (m x 2) graphical method – Problems.						
Unit:3	Queueing Model				9 hours	
Queueing Theory – Introduction – Queueing system – Characteristics of Queueing system – Symbols and Notations – Classifications of queues – Problems in (M/M/1) : (∞ /FIFO)						
Unit:4	Multi-Channel Queueing Models				9 hours	
Problems in (M/M/1):(N/FIFO); (M/M/C) : (∞ /FIFO); (M/M/C) : (N/FIFO) Models.						
Unit:5	Inventory Models				9 hours	
Inventory control – Types of inventories – Inventory costs – EOQ Problem with no shortages – Production problem with no shortages – EOQ with shortages – Production problem with shortages – EOQ with price breaks.						
Total Lecture hours					45 hours	

Text Book	
1	Operations Research – Kanti Swarup, P. K. Gupta, Man Mohan (S. Chand & Sons Education Publications, New Delhi, 12th Revised edition,2003)
Reference Books	
1	Operations Research – Prem Kumar Gupta D. S. Hira (S. Chand & Company Ltd, Ram Nagar, New Delhi,2014)
2	Operations Research Principles and Problems- S. Dharani Venkata Krishnan (Keerthi publishing house PVT Ltd.1994)
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/111/102/111102012/
2	https://youtu.be/zADj0k0waFY https://youtu.be/xvDdrswAj8M https://www.youtube.com/watch?v=xVPoWkkQTrQ https://www.youtube.com/watch?v=7kDtTAnvuww https://www.youtube.com/watch?v=IfLsPHKk51w
3	https://nptel.ac.in/courses/109/103/109103021/
4	https://nptel.ac.in/courses/110/105/110105082/ https://nptel.ac.in/courses/110/106/110106045/
Course Designed By: 1. Dr.T.Narppasalai Arasu 2. Dr.P.Rajarajeswari	

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	S	S	M	S	M	M	M	S	S
CO2	M	M	M	M	S	S	M	M	M	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	M	S	M	S	M	S	M

*S-Strong; M-Medium; L-Low

Course code		OPERATIONS RESEARCH - PAPER -IV	L	T	P	C
Core/Elective/Supportive		Skill Based Subject	3		-	2
Pre-requisite		Knowledge in Basics of Operations Research	Syllabus Version		2022-2023	
Course Objectives:						
To enhance the students' knowledge in decision analysis, sequencing of the jobs to be carried out based on cost optimization, replacement policies and analyze the cases according to their categories.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Know the principles and applications of information theory.					K1
2	To understand sequencing, replacement problems.					K2
3	Demonstrate skills to achieve their objective using sequencing models.					K3
4	Apply decision making under different business environments.					K4
5	Determine a solution to a rectangular game using simplex method.					K3
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create						
Unit:1	Decision Analysis				9 hours	
Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.						
Unit:2	Sequencing Problems				9 hours	
Introduction-problem of sequencing - basic terms used in sequencing- processing n-jobs through 2 machines - processing n –jobs through k machines - processing 2 jobs through k machines (Problems only).						
Unit:3	Replacement Problems				9 hours	
Introduction - Replacement of equipment / assets that deteriorates gradually - replacement of equipment that fails suddenly and problems.						
Unit:4	Information Theory				9 hours	
Introduction- A measure of Information-Axiomatic Approach to Information- Entropy-The expected information- Some properties of entropy function-Joint and conditional entropies						
Unit:5	Applications				9 hours	
General solution of (mxn) rectangular games using simplex method - Reliability and system failure rates using replacement problems.						
Total Lecture hours					45 hours	

Text Book	
1	Operations Research -Kanti Swarup, P. K. Gupta , Man Mohan (S.Chand & sons education publications ; New Delhi,2003)
Reference Books	
1	Operations Research - P K Gupta & D S Hira (S. Chand and company ltd. Ram Nagar; New Delhi,2014.)
2	Operations Research principles problems - S Dharani Venkata Krishnan (keerthi publishing house Pvt. Ltd.1994)
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/117/104/117104129/
2	https://nptel.ac.in/courses/110/105/110105082/
3	https://nptel.ac.in/courses/110/106/110106045/
Course Designed By: 1. Dr.T.Narppasalai Arasu 2. Dr.P.Rajarajeswari	

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	M	S	S	S	S	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	M
CO5	S	M	M	S	S	S	S	S	M	S

*S-Strong; M-Medium; L-Low