CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

Nationally Accredited (III Cycle) with 'A' Grade by NAAC

ISO 9001:2015 Certified

ANNAMALAI NAGAR, TIRUCHIRAPPALLI – 620 018.

DEPARTMENT OF COMPUTER APPLICATIONS

BACHELOR OF COMPUTER APPLICATIONS

SYLLABUS

2022 -2023 and Onwards

I & II SEMESTERS

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

VISION

- To produce globally competent computer professionals by providing high quality education and also focus on developing the skills of technical competency.
- To make an incorporated framework that meets the higher instructive necessities of the community.
- To prepare the students for technical training with revolutionary vision so they can create employment opportunities for themselves as well as for others.

MISSION

- To produce a quality learning environment that helps students to enhance problem solving skills and practical knowledge.
- To provide technical education to the students through well-equipped labs.
- Giving personal attention to slow learners consequently, allowing them to cope up with other wards.
- To impart the professional and communication skills training to the students to get better placement.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	**LEARNING ENVIRONMENT** To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.
PEO2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal.
PEO3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation.
PEO5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development.

PROGRAMME OUTCOMES for B.Sc Computer Science,

B.Sc Computer Science with Cognitive Systems , BCA and

B.Sc Information Technology PROGRAMME

PO NO.	On completion of B. Sc Computer Science / B. Sc Computer Science with Cognitive Systems / BCA/ B. Sc Information Technology Programme**,** the students will be able to
PO 1	**ACADEMIC SKILLS & SOCIAL RESPONSIBILITY** Apply Computing, Mathematical and Scientific Knowledge in Various disciplines by understanding the concerns of the society.
PO 2	**CRITICAL THINKING AND INNOVATIVE PROGRESS** Design the software applications with varying intricacies using programming languages for innovative learning in techno world to meet the changing demands.
PO 3	**PERSONALITY DEVELOPMENT** Perceive Leadership skills to accomplish a common goal with effective communication and understanding of professional, ethical, and social responsibilities.
PO 4	**LIFELONG LEARNING** Identify resources for professional development and apply the skills and tools necessary for computing practice to gain real life experiences.
PO 5	**CREATIVITY AND HOLISTIC APPROACH** Create a scientific temperament and novelties of ideas to support research and development in Computer Science to uphold scientific integrity and objectivity.

PROGRAMME SPECIFIC OUTCOMES FOR BCA

PSO NO.	The students of Bachelor of Computer Applications will be able to	POs Addressed
PSO 1	Understand the concepts of logical and critical thinking with adequate practical skills.	PO1 PO2 PO4 PO5
PSO 2	Adopt necessary technical, scientific, managerial and financial knowledge to be employable or purse higher education.	PO1 PO2 PO4
PSO 3	Apply neoteric technology in various domains and evaluate the method of implementing it.	PO1 PO2 PO4
PSO 4	Design and create innovative ideas that meet the requirements of an entrepreneur and software industry.	PO1 PO2 PO4 PO5
PSO 5	Explore the ethical values, sustainability and productivity.	PO3 PO4 PO5

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

DEPARTMENT OF COMPUTER APPLICATIONS

BCA

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (CBCS – LOCF)

(For the Candidates admitted from the Academic year 2022-2023 and onwards)

Semester	Part	Course	Course Title	Course Code	Inst. Hrs. / week	Credits	Exam			Total
							Hrs.	Marks		
								Int	Ext	
I	I	Language Course - I (LC)	Ikkala Ilakiyam – I	22ULT1	6	3	3	25	75	100
			Hindi Literature & Grammar – I	22ULH1						
			History of Popular Tales, Literature and Sanskrit Story	22ULS1						
			Basic French – I	22ULF1						
	II	English Language Course - I (ELC)	Functional English for Effective Communication – I	22UE1	6	3	3	25	75	100
	III	Core Course – I (CC)	Programming in C	22UCA1CC1	5	5	3	25	75	100
		Core Practical - I (CP)	C Programming (P)	22UCA1CC1P	3	3	3	40	60	100
		First Allied Course - I (AC)	Essential Mathematics	22UCA1AC1	4	3	3	25	75	100
		First Allied Course - II (AC)	Numerical Analysis and Statistics	22UCA1AC2	4	3	3	25	75	100
	IV	Ability Enhancement Compulsory Course -I (AECC)	UGC Jeevan Kaushal-Universal Human Values	22UGVE	2	2	-	100	-	100
	Total				**30**	**22**				**700**
II	I	Language Course – II (LC)	Idaikaala llakiyamum Pudhinamum	22ULT2	5	3	3	25	75	100
			Hindi Literature & Grammar – II	22ULH2						
			Poetry, Textual Grammar and Alankara	22ULS2						
			Basic French–II	22ULF2						
	II	English Language Course - II (ELC)	Functional English for Effective Communication – II	22UE2	6	3	3	25	75	100
	III	Core Course – II (CC)	Programming in Java	22UCA2CC2	5	5	3	25	75	100
		Core Practical - II (CP)	JAVA Programming (P)	22UCA2CC2P	3	3	3	40	60	100
		Core Course -III (CC)	Data Structures	22UCA2CC3	3	3	3	25	75	100
		First Allied Course – III (AC)	Operations Research	22UCA2AC3	4	3	3	25	75	100
	IV	Ability Enhancement Compulsory Course - II (AECC)	Environmental Studies	22UGEVS	2	2	-	100	-	100
		Ability Enhancement Compulsory Course - III (AECC)	Innovation and Entrepreneurship	22UGIE	2	1	-	100	-	100
	Extra Credit Course		SWAYAM		As per UGC Recommendation					
	Total				**30**	**23**				**800**

III	I	Language Course - III (LC)	Kaapiyamum Nadagamum	22ULT3	5	3	3	25	75	100
			Hindi Literature & Grammar - III	22ULH3						
			Prose,Textual Grammara and Vakyarachana	22ULS3						
			Intermediate French-I	22ULF3						
	II	English Language Course - III (ELC)	Learning Grammar Through Literature – I	22UE3	6	3	3	25	75	100
	III	Core Course – IV (CC)	Database Management Systems	22UCA3CC4	6	6	3	25	75	100
		Core Practical – III (CP)	Database Management Systems (P)	22UCA3CC3P	3	3	3	40	60	100
		Second Allied Course - I (AC)	Financial Accounting	22UCA3AC4	4	3	3	25	75	100
		Second Allied Course - II (AP)	Computer Applications in Business (P)	22UCA3AC5P	4	3	3	40	60	100
	IV	Generic Elective Course - I (GEC)	Animation Tools I (P)	22UCA3GEC1P	2	2	3	40	60	100
			Basic Tamil - I	22ULC3BT1				25	75	
			Special Tamil - I	22ULC3ST1						
		Extra Credit Course	SWAYAM	As per UGC Recommendation						
		Total			**30**	**23**				**700**

15 Days INTERNSHIP during Semester Holidays

IV	I	Language Course - IV (LC)	Pandaiya Illakiyamum Urainadaiyum	22ULT4	6	3	3	25	75	100
			Hindi Literature & Functional Hindi	22ULH4						
			Drama, History of Drama Literature	22ULS4						
			Intermediate French – II	22ULF4						
	II	English Language Course – IV (ELC)	Learning Grammar Through Literature - II	22UE4	6	3	3	25	75	100
	III	Core Course – V(CC)	Programming in Python	22UCA4CC5	6	6	3	25	75	100
		Core Practical – IV (CP)	Python Programming (P)	22UCA4CC4P	4	4	3	40	60	100
		Second Allied Course- III (AC)	Business Communication	22UCA4AC6	4	3	3	25	75	100
		Internship	Internship	22UCA4INT	-	2	-	100	-	100
	IV	Generic Elective Course - II (GEC)	Animation Tools II (P)	22UCA4GEC2P	2	2	3	40	60	100
			Basic Tamil - II	22ULC4BT2				25	75	
			Special Tamil - II	22ULC4ST2						
		Skill Enhancement Course – I(SEC)	Documentation and Presentation Tools (P)	22UCA4SEC1P	2	2	3	40	60	100
		Extra Credit Course	SWAYAM	As per UGC Recommendation						
		Total			**30**	**25**				**800**

V	III	Core Course – VI (CC)	Programming in PHP	22UCA5CC6	6	6	3	25	75	100
		Core Practical – V (CP)	PHP with MYSQL (P)	22UCA5CC5P	4	4	3	40	60	100
		Core Course – VII (CC)	Software Engineering	22UCA5CC7	6	6	3	25	75	100
		Core Course – VIII (CC)	Cloud Computing	22UCA5CC8	5	5	3	25	75	100
		Discipline Specific Elective – I (DSE)	A. MATLAB (P)	22UCA5DSE1AP	5	4	3	40	60	100
			B. Web Development (P)	22UCA5DSE1BP						
			C. R Programming (P)	22UCA5DSE1CP						
	IV	Ability Enhancement Compulsory Course – IV (AECC)	UGC Jeevan Kaushal - Professional Skills	22UGPS	2	2	-	100	-	100
		Skill Enhancement Course – II (SEC)	Data Analytics using Excel (P)	22UCA5SEC2P	2	2	3	40	60	100
	Extra Credit Course		SWAYAM		As per UGC Recommendation					
	Total				**30**	**29**				**700**
VI	III	Core Course – IX (CC)	Computer Networks	22UCA6CC9	6	6	3	25	75	100
		Core Course – X (CC)	Operating Systems	22UCA6CC10	5	5	3	25	75	100
		Core Practical– VI (CP)	Web Applications (P)	22UCA6CC6P	3	3	3	40	60	100
		Core Course – XI (CC)	Cyber Security	22UGCS	5	4	3	25	75	100
		Discipline Specific Elective – II (DSE)	A. Internet of Things	22UCA6DSE2A	5	4	3	25	75	100
			B. Web Technology	22UCA6DSE2B						
			C. Data Mining	22UCA6DSE2C						
		Project	Project Work	22UCA6PW	5	4	-	-	100	100
	V	Gender Studies	Gender Studies	22UGGS	1	1	-	100	-	100
		Extension Activity		22UGEA	0	1	0	-	-	-
				Total	**30**	**28**				**700**
				Grand Total	**180**	**150**				**4400**

COURSES & CREDITS FOR BCA PROGRAMME

Part	Course	No. of Courses	Credits	Total Credits
I	Tamil / Other Language	4	12	12
II	English	4	12	12
III	Core (Theory & Practical)	17	77	109
	Project Work	1	4	
	Internship	1	2	
	First Allied	3	9	
	Second Allied	3	9	
	DSE	2	8	
IV	GEC	2	4	15
	SEC	2	4	
	AECC-I -Universal Human Values	1	2	
	AECC-II-Environmental Studies	1	2	
	AECC-III-Innovation and Entrepreneurship	1	1	
	AECC-IV Professional Skills	1	2	
V	Gender Studies	1	1	02
	Extension Activities	-	1	
		4400		**150**

Semester I

Semester I	Internal Mark: 25		External Mark: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
22UCS1CC1/ 22UCA1CC1/ 22UIT1CC1	**PROGRAMMING IN C**	**CORE**	**5**	**5**

Course Objectives

- To understand the basics of C language
- To get the deep knowledge of programming using C language
- To develop logics which will help them to create programs and applications in C
- Enhance skill on problem solving by constructing algorithms

Course Outcomes and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Define the basic concepts of C Programming	K1
CO2	Illustrate the components of C programming	K2
CO3	Build algorithms and data structures swiftly and faster computation using programs	K3
CO4	Apply the knowledge of programming concepts to develop programs	K4
CO5	Solve real time problems using C	K5

Mapping of CO with PO and PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	**2**	**2**	**2**	**1**	**1**	**2**	**2**	**2**	**3**	**2**
CO2	**3**	**2**	**3**	**1**	**1**	**3**	**3**	**2**	**3**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**3**
CO5	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**3**

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Developing a program in C:** Algorithm-Pseudocode-Flowchart-Planning a C program- Writing a C program- Compile and Run a C Program- **Overview of C:** – Structure of C program – Character set-Tokens – Data types – Variables – Declaration of variables - symbolic constant – Operators and Expressions	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Managing Input and Output Operations:** Reading and Writing a character -Formatted Input and Output. **Decision Making and Branching:** If, Switch, The ?: operator - The GoTo Instruction – **Decision Making and Looping:** Introduction – While, DO, For Statements –Jumps in Loops.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Array:** One dimensional array – Two and multidimensional array – Character array – String functions – **User-Defined Functions:** Need for User -Defined Functions –A Multi-Function Program-Elements of User-Defined Functions-Definition of Functions –Return values and Their Types-Function Calls- Function Declaration- Category of Functions – Nesting of Functions - Recursion - Storage Class-The scope and lifetime of variables in functions.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Structures and Unions:** Structure definition – Structure Initialization – Array of structure – Array within structure –Structure within Structure-Union– **Pointers:** Understanding pointers - Accessing the address of a variable - Declaring and Initializing pointers - Accessing a variable through its pointers - Pointer Expressions - Pointers and Arrays - Pointers and Character strings.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**File Management:** Defining and Opening File –Closing a File – I/O operations on Files – error handling during I/O operations – Random Access to Files- Command Line Arguments.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**UNIT VI - Self Study for Enrichment** **(Not included for End Semester Examinations)** Develop algorithms for real time scenario, Area calculations, Conversion programs, swapping numbers (with and without using temporary variable). Programs for checking eligibility, Triangle formation, Sum of numbers, sum of series, Array manipulations (Sorting, searching, insert, delete and merging), String handling programs, Dynamic memory management using pointers, Employee pay bill preparation using Files.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Textbook

1. Balagurusamy.E. (2017). Programming in ANSI C, 7th Edition, Mc Graw Hill Education New Delhi.
2. Byron Gottfried. (2018). Programming with C, 4th Edition, Tata McGraw Hill.

References

1. Yashavant Kanetkar, (2020). Let Us C, 16th Edition, BPB Publications, New Delhi.
2. Ashok N. Kamthane, Amit Ashok Kamthane (2015). Programming in C, 3rd Edition, Pearson India Education Services Pvt. Ltd.

Web References

1. https://www.learn-c.org/
2. https://www.cprogramming.com/
3. https://www.tutorialspoint.com/cprogramming/index.htm

Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

Course Designers

1. Dr. M. Anandhi, Associate Professor, Department of Information Technology.
2. Ms. R. Sridevi, Assistant Professor, Department of Computer Applications.

Semester I	Internal Mark: 40		External Mark: 60	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
22UCA1CC1P	**C PROGRAMMING – PRACTICAL**	**CORE**	**3**	**3**

Course Objectives

- To introduce students to the basic knowledge of programming fundamentals of C language.
- To impart writing skill of C programming to the students and solving problems.
- To impart the concepts like looping, array, functions, pointers and structure.

Course Outcome and Cognitive Level Mapping

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

CO NUMBER	CO STATEMENT	COGNITIVE LEVEL
CO1	Identify the logic for a given problem	K1,K2
CO2	Recognize the syntax and construction of C programming code	K1,K2
CO3	Apply the steps involved in compiling, linking and debugging C code	K3,K4
CO4	Analyze the concepts of iteration or looping, branching, array, structure, union and pointers	K4
CO5	Create C programs using all the concepts that have been covered in the theory course	K4

Mapping of CO with PO and PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**
CO3	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**1**
CO4	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**1**
CO5	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**

"1" – Slight (Low) Correlation

"2" – Moderate (Medium) Correlation

"3" – Substantial (High) Correlation

"-" indicates there is no correlation.

List of Practicals

1. Simple Programs
    a. Create a C program to display "This is my first C Program"
    b. Create a C program to add two numbers and display its sum
    c. Create C program to evaluate each of the following equations.
        (i) $E = MC^2$. (ii) $S = ut+1/2a$
2. Selection Structures
    a. Create a C Program to Check Whether a Number is Prime or not
    b. Create a C program to swap values of two variables with and without using third variable
    c. Create a C program to compute grade of students using if else adder. The grades are assigned as followed:

Marks	**Grade**
marks<50	F
50≤marks< 60	C
60≤marks<70	B
70≤marks<80	B+
80≤marks<90	A
90≤mars≤ 100	A+

3. Iterative Structures
    a. Create a C program to print N Natural numbers
    b. Create a C program to reverse a given integer
4. Arrays
    a. Create a C program to find the largest and smallest element in Array
    b. Create a C program to find the addition of two matrices
5. Function
    a. Create a C program to calculate factorial of a number using recursion
    b. Create a C program to find power of a number using recursion
6. Pointers
    a. Create a C program to find the length of string using pointer
    b. Create a C program to copy one string to another using pointer
7. Structures
    a. Create a C program to read and print Student's Details using Structure
8. Files
    a. Create a C Program to print the strings using command Line Arguments

Web References

1. https://www.programiz.com/c-programming/examples
2. https://beginnersbook.com/2015/02/simple-c-programs/
3. https://www.tutorialgateway.org/c-programming-examples/
4. https://www.studytonight.com/c/programs/

Pedagogy

Power Point Presentations, Demonstrations, Seminars and Practical Sessions.

Course Designer

Ms. V.Infine Sinduja, Assistant Professor, Department of Computer Applications.

FIRST ALLIED COURSE –I (AC)
ESSENTIAL MATHEMATICS
(For B.Sc Computer Science , B.Sc Information Technology & BCA)
(2022-2023 and Onwards)

Semester I	Internal Marks:25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
22UCS1AC1/ 22UCA1AC1/ 22UIT1AC1	**ESSENTIAL MATHEMATICS**	**ALLIED**	**4**	**3**

Course Objective

- **Apply** the basic concepts of Differentiation, Integration and their applications.
- **Compute** mathematical quantities using ordinary and partial differential equations.
- **Explore** fundamental concepts in graph theory.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Remember and recall the basic concept of essential mathematics.	**K1**
CO2	Illustrate the various notions in the respective streams .	**K2**
CO3	Apply the different terminologies of essential mathematics.	**K3**
CO4	Classify the solution of mathematical problems using various techniques.	**K4**
CO5	Examine the solution of mathematical problems.	**K4**

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	3	3	3	3	2	3
CO2	3	3	3	3	3	3	3	3	3	2
CO3	3	2	3	3	3	3	3	3	2	2
CO4	3	2	2	3	3	3	3	3	3	2
CO5	3	2	3	3	3	3	3	3	2	2

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬
"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Matrices** Matrix – Special types of matrices – Scalar multiplication of a matrix – Equality of matrices – Addition of matrices – Subtraction – Multiplication of Matrices – Inverse matrix– Relation between adjoint and inverse matrices – Solution of simultaneous equations – Rank of a matrix – A system of *m* homogeneous linear equations in *n* unknowns – System of non-homogeneous linear equations – Eigen values and Eigenvectors – Similar matrices – Cayley-Hamilton Theorem (proof not needed) – Simple applications only	12	CO1, CO2, CO3, CO4, CO5	K1,K2,K3, K4
II	**Differentiation** Maxima and Minima (Problems Only) –Points of inflexion. **Partial differentiation** Functions of function rule – Total Differential Coefficient – A Special case – Implicit Functions – Homogeneous functions – Euler's Theorem (proof not needed) – Simple problems only.	12	CO1, CO2, CO3, CO4, CO5	K1,K2,K3, K4
III	**Integration** Integration of Rational algebraic functions – Rule (a) – Rule (b): Type i:$\int \frac{dx}{ax^2+bx+c}$, Type ii: $\int \frac{lx+m}{ax^2+bx+c}\,dx$ – Integration of Irrational functions : Case (ii) Integration of the form $\int \frac{px+q}{\sqrt{ax^2+bx+c}}$ – Type $\int \frac{dx}{a+bcosx}$ – Properties of definite integrals.	12	CO1, CO2, CO3, CO4, CO5	K1,K2,K3, K4
IV	**Differential Equations** Linear Differential Equation with constant coefficients – The Operators D and D^{-1} – Particular Integral – Special methods of finding P.I.: X is of the form (a) $e^{\alpha x}$ (b) $cos\alpha x$ or $sin\alpha x$, where α is a constant (c) x^m (a power of x), m being a positive integer *(d)* $e^{ax}V$, where V is any function of x.	12	CO1, CO2, CO3, CO4, CO5	K1,K2,K3, K4
V	**Graph Theory** Introduction – Definition of Graphs – Applications of Graphs – Finite and infinite graphs – Incidence and Degree – Isolated Vertex, Pendant Vertex and Null Graph. **Path and Circuits** Isomorphism – Subgraphs – Walks, Paths and Circuits – Connected Graphs, Disconnected Graphs and Components – Euler graphs.	12	CO1, CO2, CO3, CO4, CO5	K1,K2,K3, K4
VI	**Self-Study for Enrichment** **(Not included for End Semester Examination)** Symmetric matrix – Skew symmetric matrix – Hermitian and skew Hermitian matrices Concavity and Convexity– Integration by parts – Linear equation – Hamiltonian Paths and Circuits.	-	CO1, CO2, CO3, CO4, CO5	K1,K2,K3, K4

Text Books

1. T.K.Manicavachagom Pillay, T.Natarajan, K.S.Ganapathy.(2015). *Algebra, Volume II.* S. Viswanathan (Printers & Publishers) Pvt., Ltd.
2. S.Narayanan, T.K.Manicavachagom Pillay.(2015*).Calculus,Volume I*. S. Viswanathan (Printers & Publishers) Pvt., Ltd.
3. S.Narayanan, T.K.Manicavachagom Pillay.(2015*).Calculus,Volume II*. S. Viswanathan (Printers & Publishers) Pvt., Ltd.
4. S.Narayanan, T.K.Manicavachagom Pillay.(2015*).Calculus,Volume III*. S. Viswanathan (Printers & Publishers) Pvt., Ltd.
5. Narsingh Deo. (2003). *Graph Theory with applications to Engineering and Computer*. Prentice Hall of India Private Limited

UNIT-I	Chapter 2: Section 1 to 5, 7, 8, 10 to 16[1]
UNIT-II	Chapter V: Section 1.1 to 1.5[2]
	Chapter VIII: Section 1.2 to 1.6[2]
UNIT-III	Chapter 1: Section 7.1 to 7.3, 8 (CASE II), 9, 11[3]
UNIT-IV	Chapter 2: Section 1 to 4[4]
UNIT-V	Chapter 1: Section 1.1 to 1.5[5]
	Chapter 2: Section 2.1, 2.2, 2.4 to 2.6[5]

Reference Books

1. A.Singaravelu. (2003). *Allied Mathematics*. A.R.Publications
2. P.R.Vittal. (2014). *Allied Mathematics*. Margham Publications, Chennai.
3. S.Arumugam and S.Ramachandran.(2006*). Invitation to Graph Theory*. Sci Tech Publications (India) Pvt Ltd., Chennai

Weblinks

1. **https://youtu.be/rowWM-MjjXU**
2. **https://youtu.be/TOvxWaOnrqI**
3. **https://youtu.be/pvLj1s7SOtk**
4. **https://youtu.be/Gxr3AT4NY_Q**
5. **https://youtu.be/xlbbefbYLzg**
6. **https://youtu.be/b0RJkIBhfEM**
7. **https://youtu.be/s5KZw1EpBEo**

Pedagogy

Assignment, Seminar, Lecture, Quiz, Group discussion, Brain storming, e-content.

Course Designers

1. Dr. V. Geetha
2. Dr. S. Sasikala

FIRST ALLIED COURSE-II (AC)

NUMERICAL ANALYSIS AND STATISTICS

(For B.Sc Computer Science , B.Sc Information Technology & BCA)

(2022-2023 and Onwards)

Semester I	**Internal Marks: 25**			**External Marks:75**
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs / Week**	**CREDITS**
22UCS1AC2/ 22UCA1AC2/ 22UIT1AC2	**NUMERICAL ANALYSIS AND STATISTICS**	**ALLIED**	**4**	**3**

Course Objective

- **Understand** the implementation of various methods of Numerical Analysis.
- **Organize** and **summarize** the statistical data.
- **Analyze** and **evaluate** the strengths of the conclusions based on data.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	**CO Statement** On the successful completion of the course, students will be able to	**Cognitive Level**
CO1	Understand the list of basic ideas of Numerical Methods and Statistics.	K1, K2
CO2	Solve the problems using various methods and also classify the given datas.	K2, K3
CO3	Identify the conceptual collection and classification of variables.	K3
CO4	Analyze the accuracy and graphical representation of statistical datas.	K4
CO5	Support the implementation of numerical methods and statistical datas.	K4

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	2	3	2
CO2	3	3	2	2	2	3	2	3	2	3
CO3	2	3	3	2	2	2	3	3	2	3
CO4	3	2	3	2	2	3	3	2	3	2
CO5	3	3	2	3	3	3	2	2	3	3

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation¬
"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Solution of Algebraic & Transcendental Equations:** Introduction – The Bisection Method – The Iteration Method – Newton-Raphson Method (Problems Only) **Interpolation:** Finite Differences: Forward Differences, Backward Differences – Newton's Formulae for Interpolation – Interpolation with unevenly spaced Points: Lagrange's Interpolation formula	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	**Numerical Integration:** Numerical Integration: Simpson's 1/3-Rule – Simpson's 3/8-Rule (proof not needed). **Linear Systems of Equations:** Solution of Linear Systems–Direct Methods: Gaussian Elimination Method – Solutions of Linear Systems – Iterative Methods (Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	**Numerical solution of Ordinary Differential Equations:** Introduction – Euler's Method – Modified Euler's Method – Runge-Kutta Methods – Predictor - Corrector Methods : Adams-Moulton Method	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	**Measures of Central Tendency:** Arithmetic Mean – Median – Mode – Geometric Mean – Harmonic Mean. **Measures of Dispersion:** Mean Deviation – Standard Deviation (Simple Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

V	**Correlation:** Introduction – Meaning of Correlation – Scatter Diagram – Karl Pearson's co-efficient of Correlation – Rank Correlation: Spearman's Rank Correlation Coefficient (Derivation not needed and Simple Problems Only). **Linear Regression:** Introduction – Linear Regression (Derivation not needed and Simple Problems Only)	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
VI	**Self Study for Enrichment:** **(Not included for End Semester Examination)** The method of False Position & Central Differences - Trapezoidal rule - Solution by Taylor's Series and Milne's Method - Range – Quartile Deviation - Rank Correlation (Repeated Ranks).	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Books

1. Sastry S. S. (1998). Introductory methods of Numerical Analysis, Third Edition. Prentice Hall of India Private Limited.

2. Gupta. S.C & Kapoor, V.K (2007). Fundamentals of Mathematical Statistics. Sultan Chand & sons, New Delhi.

UNIT – I Chapter 2: Sections 2.1 - 2.3(Omit 2.3.1), 2.5(Omit 2.5.1) [1]
Chapter 3: Sections 3.3 (Omit 3.3.4), 3.6, 3.9(3.9.1only) [1]

UNIT – II Chapter 5: Sections 5.4(5.4.2 & 5.4.3 only) [1]
Chapter 6: Sections 6.3(6.3.2 only) & 6.4 [1]

UNIT – III Chapter 7: Sections 7.1, 7.4- 7.6 (Omit 7.4.1 & 7.6.2) [1]

UNIT – IV Chapter 2: Sections 2.5 - 2.9, 2.13 (Omit 2.13.1 & 2.13.2) [2]

UNIT –V Chapter 10: Sections 10.1 - 10.4, 10.7(10.7.1 Only) [2]
Chapter 11: Sections 11.1 & 11.2 [2]

Reference Books

1. Jain M. K, Iyengar S. R.K. and Jain R.K. (1999). Numerical Analysis Numerical Methods for Scientific and Engineering Computations. New Age International Private Limited.

2. Froberg C.E. (1979). Introduction to Numerical Analysis. II Edition. Addison Wesley

Web Links

1. https://youtu.be/qCzUXav5Nk

2. https://youtu.be/r6MTvrI8SQ4
3. https://youtu.be/s05dONL4xAs
4. https://youtu.be/XaHFNhHfXwQ
5. https://youtu.be/zPG4NjIkCjc

Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

Course Designers

1. Dr.R.Buvaneswari
2. Ms.A.Gowri Shankari

Semester II

Semester II	Internal Mark: 25		External Mark: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
22UCA2CC2	**PROGRAMMING IN JAVA**	**CORE**	**5**	**5**

Course Objectives

- To develop logics which will help them to create programs
- To get a deep knowledge of programming using JAVA language
- To understand the basics of OOPs concepts
- Enhance problem solving skill

Course Outcomes and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, the students will be able to	Cognitive Level
CO1	Recite the basic programming skills	K1
CO2	Understand the Java features	K2
CO3	Analyze OOPs concepts	K4
CO4	Apply the programming skills in various domains	K3
CO5	Solve real time problems using Java	K5

Mapping of CO with PO and PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	**2**	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**2**
CO2	**3**	**2**	**3**	**1**	**1**	**3**	**3**	**2**	**3**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**2**
CO4	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**2**
CO5	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**3**

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Fundamentals of Object-Oriented Programming:** Basic Concepts of Object-Oriented Programming - Benefits and Applications of OOP. **Java Evolution:** Java Features - Java Environment - **Overview of Java Language:** Java Program Structures, Statements – Implementing A Java Program – Java Virtual Machine –. **Constants, Variables and Data Types:** Constants- Variables – Data Types – Declaration of Variables – Giving Values to Variables – Scope of Variables – Symbolic Constants- Type Casting- Getting Values of Variables.	15	CO1, CO2, CO3	K1, K2, K3, K4
II	**Operators and Expressions:** Introduction - Arithmetic Operators- Relational Operator - Logical Operator - Assignment Operator-increment and decrement Operator-Conditional Operator - Bitwise Operator- Special Operator - **Decision Making and Branching:** Introduction - Decision making with if statement-Simple if statement -The if ..else Statement- Nesting of if …else statements- The switch statement - The Conditional Operator(?:Operator) -**Decision Making and Looping :** While, Do, For Statement, Jump In Loops, Return Statement.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Classes, Objects and Methods**: Defining A Class – Fields and Methods Declaration - Creating Objects – Accessing Class Members – Constructors – Method Overloading – Static Members – Nesting of Methods – Inheritance**:** Extending A Class – Overriding Methods – Final Variables, Methods and Classes – Abstract Methods and Classes – Visibility Control. **Arrays, Strings and Vectors**: Creating Arrays – One and two Dimensional Arrays Strings – Vectors. **Interfaces: Multiple Inheritance:** Introduction - Defining Interfaces - Extending Interfaces- Implementation Interfaces - Accessing Interfaces Variables.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Packages**: Introduction - Java Packages - Using System Packages- Naming conventions - Creating packages - Accessing a package - Using a Package - Adding a class to a package - **Multithreaded Programming:** Creating Threads – Extending the Thread Class – Thread- Life Cycle of Thread-Using Thread Method-Thread Priority – Synchronization – **Managing Errors and Exceptions:** Introduction - Types of Errors - Exceptions-Syntax of Exception Handling code-Multiple Catch Statements.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Graphics Programming using AWT, Swing and Layout Manager:** The Graphics Class- Lines and Rectangles- Circles and Ellipses-Drawing Arcs - Drawing Polygons – Introduction to AWT Package – Window Fundamentals – Layout Managers – Introduction to Swing Package – Components and Containers – AWT versus Swing - **Database Connectivity**: Introduction – JDBC Architecture – Discussion with Example – Overview of JDBC Components.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**UNIT VI - Self Study for Enrichment** **(Not to be included for External Examination)** Comment Line Arguments – Enumerated Types - Finalizer Methods - **Applet Programming:** Building Applet Code - Applet Life Cycle - Creating and Executable Applet – Designing a Web Page using Applet – **Managing Input/Output Files in Java:** Stream Classes **–** Byte Stream Classes – Character Stream Classes – Creation of Files – Reading/Writing Characters – Reading/Writing bytes.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Textbook

E. Balagurusamy,(2019). ”Programming with JAVA”, 6th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi.

References

1. S.Sagayaraj, R.Denis, P.Karthik and D.Gajalakshmi,(2017).“Java programming”,Universities Press.
2. Schildt Herbert,(2011).“Java :The Complete Reference”, 8th Edition Tata McGraw-Hill.
3. C.Muthu, (2008).”Programming with JAVA”, Second Edition, McGraw HillEducation
4. Ken Arnold gosling and Davis Holmen,(2005). ”The JAVA Programming Language”,4th Edition, Addision Wesley Pearson Education Publication.

Web References

1. https://www.javatpoint.com/java-tutorial
2. https://www.guru99.com/java-tutorial.html
3. https://www.w3schools.com/java/

Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz and Seminar.

Course Designer

Ms. A. Jabeen, Assistant Professor, Department of Computer Applications.

Semester II	Internal Mark: 25		External Mark: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
22UCA2CC2P	**JAVA PROGRAMMING – (P)**	**CORE**	**3**	**3**

Course Objective

- To impart practical training on Java Programming

Course Outcomes and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, the students will be able to	Cognitive Level
CO1	Ability to write the programs using Classes and Objects	K3
CO2	Understand use of Inheritance and Interfaces	K2
CO3	Recognize Package concepts, String and File Handling functions	K2
CO4	Apply Multithreading and Exception Handling concepts.	K3
CO5	Create Swing programs and JDBC connection	K5

Mapping of CO with PO and PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	**2**	**2**	**2**	**1**	**1**	**2**	**2**	**3**	**3**	**2**
CO2	**3**	**2**	**3**	**1**	**1**	**3**	**3**	**3**	**3**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**3**	**3**	**3**
CO5	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**3**

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation "-" indicates there is no correlation.

List of Practical

1. Classes and Objects
2. Inheritances
3. Interfaces
4. Packages
5. String Handling
6. File Handling
7. Multithreading
8. Menu and Dialog Box
9. Swing Components
10. GUI Application with JDBC

Web References

1. https://www.programiz.com/java-programming/examples
2. https://www.geeksforgeeks.org/java-programming-examples/
3. https://www.w3schools.com/java/java_examples.asp
4. https://www.w3schools.com/java/

Pedagogy

Demo and Discussion.

Course Designer

Ms. A. Anandhavalli, Assistant Professor, Department of Computer Applications.

Semester II	Internal Mark: 25		External Mark: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
22UCA2CC3	**DATA STRUCTURES**	**CORE**	**3**	**3**

Course Objectives

- To understand the basic concepts of various data structures
- To demonstrate a familiarity with data structures
- To articulate the essential components and operations of the data structures

Course Outcomes and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, the students will be able to	Cognitive Level
CO1	Define the basic concepts of Data Structure	K1
CO2	Demonstrate the operations of Linear and Non-Linear Structure	K2
CO3	Examine the Data Structure operations	K3
CO4	Analyse the various types of Data Structure	K4
CO5	Solve the problem using Different Structures	K5

Mapping of CO with PO and PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	**2**	**2**	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**2**
CO2	**3**	**2**	**2**	**2**	**1**	**2**	**2**	**2**	**2**	**2**
CO3	**3**	**3**	**3**	**2**	**2**	**2**	**3**	**2**	**3**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**	**3**	**2**	**3**	**2**
CO5	**3**	**3**	**3**	**2**	**2**	**2**	**3**	**2**	**2**	**3**

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation

"3" – Substantial (High) Correlation "-" indicates there is no Correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Basic Terminology: Introduction and Overview:** Definition-Concept of Data Structures- Overview of Data Structures-Implementation of Data Structures. **Arrays:** Definition-Terminology-One-dimensional Array – Two-dimensional Arrays.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3
II	**Stack & Queue** : Overview of Stacks and Queues-Operations on Stack-ADD and DELETE Procedure-Operations on Queue- ADD and DELETE Procedure - Circular Queue – Evaluation of Expressions	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Linked Lists** : Overview of Linked list – Representation of Linked List in Memory –Operations: Creating a Linked List-Insertion into a Linked List – Deletion from a Linked List-Polynomial addition – Linked Stacks and Queues.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Trees & Graphs :**Trees Terminology – Binary tree representations – Tree Traversal –Graph Terminology – Memory Representations of Graphs – Traversals.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Sorting & Searching** : Searching : Sequential Search – Binary Search. Sorting : Insertion Sort- Heap Sort-Quick Sort.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment : (Not to be included for End Semester Examination)** Multiple Stacks and Queues - Threaded Binary Trees – Connected Components and Spanning Trees.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Textbook

1. Debasis Samanta (2018). Classic Data Structures, Second Edition, PHI Learning Private Limited, New Delhi. (Unit I)
2. Ellis Horowitz, Sartaj Sahni (2008). Fundamentals of Data Structure, Golgotia Publications, New Delhi.(Unit II,III,IV, V)

References

1. Seymour Lipschutz (2011). Data Structures with C, McGraw Hill Education, New York.
2. Ashok N. Kamthane (2011).Introduction to Data Structure in C, Pearson Education, Singapore.

Web References

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.tutorialspoint.com/data_structures_algorithms/index.htm

Pedagogy

Chalk and Talk, PowerPoint Presentation, Discussion, Assignment, Demo, Quiz and Seminar.

Course Designer

1. Dr. R. Brendha, Associate Professor, Department of Computer Applications.

FIRST ALLIED COURSE –III (AC)

OPERATIONS RESEARCH

(For B.Sc Computer Science, Computer Science with Cognitive Systems, BCA &B.Sc Information Technology)

(2022-2023 and Onwards)

Semester II	Internal Marks:25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs/Week**	**CREDITS**
22UCS2AC3/ 22UCG2AC3/ 22UCA2AC3/ 22UIT2AC3/	**OPERATIONS RESEARCH**	**ALLIED**	**4**	**3**

Course Objective

- **Understand** the various features of Operations research.
- **Analyze** the optimum solutions using Operations research.
- **Explore** the concepts of Operations research in real life problems.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Define the various techniques of Operations research.	**K1**
CO2	Illustrate the various notions in the respective streams.	**K2**
CO3	Identify the different terminologies of Operations research	**K3**
CO4	Analyze the solutions of mathematical problem using specific techniques.	**K4**
CO5	Simplify the optimum solutions of a mathematical problem.	**K4**

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	2	3	3	3	2	3
CO2	3	2	3	3	2	3	3	3	3	2
CO3	3	2	3	3	2	3	2	3	2	2
CO4	3	2	2	2	2	3	3	2	3	2
CO5	3	2	3	2	2	3	3	3	2	2

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬

"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Operations Research** Introduction-Origin and Development of O.R.- Nature and Features of O.R.- Scientific Method in O.R.- Modelling in Operations Research - Advantage and Limitation of Models- General Solution Methods for O.R. Models- Methodology of Operations Research- Operations Research and Decision Making **Linear Programming Problem- Mathematical Formulation** Introduction-Linear programming Problem- Mathematical Formulation of the problem -Illustrations on Mathematical Formulation of LPPs.(simple problems only) **Linear programming problem-graphical Solution and Extension** Introduction- Graphical Solution Method- General Linear Programming Problem- Canonical and Standard Forms of LPP.	12	CO1,CO2, CO3,CO4, CO5	K1,K2,K3, K4
II	**Linear Programming Problem-Simplex Method** Introduction-Fundamental Properties of Solutions- The computational Procedure- The Simplex Algorithm-Use of Artificial Variables-Big M method.(simple problems only).	12	CO1,CO2, CO3,CO4, CO5	K1,K2,K3, K4
III	**Transportation problem** Introduction-LP Formulation of the Transportation Problem- Existence of Solution in T.P- TheTransportation Table-Loops in Transportation Table-Solution of a Transportation Problem-Finding an Initial Basic Feasible Solution-Test for Optimality-Economic interpretation of u_j's and v_j's - Degeneracy in Transportation Problem-Transportation Algorithm (MODI method), (simple problems only). **Assignment Problem** Introduction-Mathematical Formulation of the Problem- Solution Methods of Assignment Problem-Special Cases in Assignment Problems(simple problems only).	12	CO1,CO2, CO3,CO4, CO5	K1,K2,K3, K4
IV	**Sequencing problem** Introduction-Problem of Sequencing-Basic Terms Used in Sequencing- Processing *n* Jobs through Two Machines- Processing *n* Jobs through *k* Machines(problems only).	12	CO1,CO2, CO3,CO4, CO5	K1,K2,K3, K4
V	**Network Scheduling by PERT/CPM** Introduction- Network: Basic Components-Logical Sequencing- Rules of Network Construction-	12	CO1,CO2, CO3,CO4, CO5	K1,K2,K3, K4

	Concurrent Activities - Critical Path Analysis - Probability Considerations in PERT.			
VI	**Self-Study for Enrichment** **(Not included for End Semester Examination)** Application of Operations Research. – Two-Phase method – The Travelling Salesman problem – Processing 2 Jobs through *k* Machines –. Inventory Models(without shortage)	-	CO1,CO2, CO3,CO4, CO5	K1,K2,K3, K4

Text Books

1. Kanti Swarup, P.K. Gupta, Manmohan.(2019). *Operations research, Sultan Chand Publications.*

Chapters and Sections

UNIT–I Chapter 1: Sections 1:1 – 1:9

Chapter 2: Sections 2:1 – 2:4

Chapter 3: Sections 3:1 – 3:5

UNIT II Chapter 4: Sections 4:1 – 4:4

UNIT-III Chapter 10: Sections 10:1 – 10:3, 10:5, 10:6, 10:8 – 10:13

Chapter 11: Sections 11:1 – 11:4

UNIT-IV Chapter 12: Sections 12:1 – 12:5

UNIT-V Chapter 25: Sections 25:1 – 25:7

Reference Books

1. Hamdy A.Taha (2017),*Operations Research An Introduction,* Pearson India Education services PVT Ltd.
2. Premkumar Gupta, Hira D.S.(2004), *Operations Research,* S.Chand & Company Ltd, New Delhi.
3. Chandrasekhara Rao.K,Shanti Lata Mishra(2008), *Operations Research,* Narosa Publishing House PVT Ltd, New Delhi.

Web References

8. **https://www.britannica.com/topic/operations-research**
9. **https://byjus.com/maths/linear-programming/**
10. **https://www.gatexplore.com/transportation-problem-study-notes/**
11. **https://youtu.be/rowWM-MijXU**
12. **https://youtu.be/TQvxWaQnrqI**
13. **https://youtu.be/RTX-ik_8i-k**
14. **https://youtu.be/s5KZw1EpBEo**

Pedagogy

Power point presentation, Group discussion, Seminar, Assignment.

Course Designers

3. Dr. V. Geetha
4. Dr. S. Sasikala