DON BOSCO ARTS & SCIENCE COLLEGE
ANGADIKADAVU
(Affiliated to Kannur University Approved by Government of Kerala)
ANGADIKADAVU P.O., IRITTY, KANNUR – 670706

COURSE PLAN

(BCA)

(2020 – 23)

SEMESTER – IV

ACADEMIC YEAR - (2021-22)

IV Semester BCA (2020 - 23)			
SL. No.	Name of Subjects with Code	Name of the Teacher	Duty Hours per week
1.	4B08 BCA SOFTWARE ENGINEERING	HEBIN LAYOLA	4
2.	4B09BCA COMPUTER ORGANIZATION	FINCY CYRIAC	4
3.	4B10BCA LINUX PROGRAMING	SRUTHI N	5
4.	4A14 BCA DISCRETE MATHEMATICAL STRUCTURES	RAMYA RAJ	4
5.	4C04 AMT-BCA MATHEMATICS FOR BCA IV	NAJUMUNEEZA	4

TIME TABLE

Day	09.50 Am - 10.45 Am	10.45 Am -11.40 Am	11.55 Am -12.50 Pm	01.40 Pm - 02.35 Pm	02.35 Pm - 03.30 Pm
1	4B08 BCA SOFTWARE ENGINEERING	4B09BCA COMPUTER ORGANIZATION	4C04 AMT-BCA MATHEMATICS FOR BCA IV	4B10BCA LINUX PROGRAMING	4C04 AMT-BCA MATHEMATICS FOR BCA IV
2	4B09BCA COMPUTER ORGANIZATION	4B08 BCA SOFTWARE ENGINEERING	4C04 AMT-BCA MATHEMATICS FOR BCA IV	4C04 AMT-BCA MATHEMATICS FOR BCA IV	4B10BCA LINUX PROGRAMING
3	4B10BCA LINUX PROGRAMING	4B08 BCA SOFTWARE ENGINEERING	4B09BCA COMPUTER ORGANIZATIO N	4C04 AMT-BCA MATHEMATICS FOR BCA IV	4C04 AMT-BCA MATHEMATICS FOR BCA IV
4	4C04 AMT-BCA MATHEMATICS FOR BCA IV	4B08 BCA SOFTWARE ENGINEERING	4B10BCA LINUX PROGRAMING	4B09BCA COMPUTER ORGANIZATION	4C04 AMT-BCA MATHEMATICS FOR BCA IV
5	4C04 AMT-BCA MATHEMATICS FOR BCA IV	4C04 AMT-BCA MATHEMATICS FOR BCA IV	4B08 BCA SOFTWARE ENGINEERING	4B10BCA LINUX PROGRAMING	4B10BCA LINUX PROGRAMING

Subject Code:	**4B08 BCA**
Subject Name:	**SOFTWARE ENGINEERING**
No. of Credits:	**4**
No. of Contact Hours:	**72**
Hours per Week:	**4**
Name of the Teacher:	**Hebin Layola**

Objective:

1. Understand the basic processes in software Development life cycle.
2. Familiarize with different models and their significance.
3. Approach software development in a systematic way.
4. To familiarize students with requirement engineering and classical software design techniques .
5. To introduce objected oriented design concepts.
6. To familiarize with various Software

SYLLABUS

Module 1: Introduction to software engineering-Definition, program versus software, software process, software characteristics, brief introduction about product and process, software process and product matrices; Software life cycle models – Definition, waterfall model, increment process model, evolutionary process model, selection of the life cycle model.

Module 2: Software Requirement Analysis and Specification – Requirements engineering, types of requirements, feasibility studies, requirement elicitation, various steps of requirement analysis, requirement documentation, requirement validation. ** [An example which illustrate various stages in requirement analysis.]

Module 3: Software design – definition, various types, objectives and importance of design phase, modularity, strategy of design, function oriented design, IEEE recommended practice for software design descriptions.

Module 4: Objected Oriented Design – Analysis, design concept, design notations and specifications, design methodology. **[case study based on Objected Oriented Design]

Module 5: Software Testing – What is testing, Why should we test, who should do testing? Test case and Test suit, verification and validation, alpha beta and acceptance testing, functional testing , techniques to design test cases , Boundary value analysis, equivalence class testing, decision table based testing , cause effect graphing techniques ; structural testing , path testing , cyclomatic complexity , Graph matrices , Data flow testing , mutation testing , levels of testing , unit testing , integration testing , system testing , validation testing , a brief introduction about debugging and various testing tools.

Text Book: 1. Software Engineering (Third Edition), K K Aggarwal, Yogesh singh, New age International Publication (For unit 1,2,3,5 and case study of unit 4)

2. An integrated approach to software Engineering (Second Edition), Pankaj Jalote , Narosa Publishing House - (For Unit 4)

References: 1. Software Engineering (Seventh edition), Ian Sommerville – Addison Wesley

2. Software Engineering A practitioners approach (Sixth Edition), Roger S Pressman - Mc Graw Hill.

3. Fundamentals of Software Engineering (Second Edition), Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli - Pearson Education.

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	03-01-2022 To 08-01-2022	1	Introduction to Software Engineering-Definition
		2	Program versus software
		3	Software characteristics, Software Process
		4	Brief introduction about product and process
		5	Software process and product matrices
		08 January	Second Saturday
2	10-01-2022 To 15-01-2022	6	Software life cycle models-definition
		7	Waterfall model
		8	Increment process model
		9	Iterative Enhancement model
3	17-01-2022 To 22-01-2022	10	Increment process model
		11	Rapid application development model
		12	Evolutionary process model
		13	prototyping model
4	24-01-2022 To 29-01-2022	14	Spiral model
		15	Selection of a life cycle
		16	Class Test-Module 1
		26 January	Republic Day
		17	Module-2-Software Requirement Analysis and Specification
		18	Requirements engineering
5	31-01-2022	31 January	Don Bosco
		19	Types of requirements

No of Weeks	Dates	Session	Topic
	To 05-02-2022	20	Feasibility studies
		21	Requirement elicitation
6	07-02-2022 To 12-02-2022	22	Various steps of requirement analysis
		23	Requirement documentation
		24	Requirement validation
		25	An example which illustrate various stages in requirement analysis
		26	Class Test-Module 2
		12 February	Second Saturday
7	14-02-2022 To 19-02-2022	27	Module-3-Software design – definition
		28	various types
		29	Objectives and importance of design phase
		30	Modularity
8	21-02-2022 To 26-02-2022	31	I Internal Examination
		32	I Internal Examination
		33	I Internal Examination
		34	I Internal Examination
		35	I Internal Examination
		36	I Internal Examination
9	28-02-2022 To 05-03-2022	37	Strategy of design
		01 March	Maha Sivarathri
		38	Function oriented design
		39	IEEE recommended practice for software design descriptions
		40	Class Test-Module 3
10	07-03-2022 To 12-03-2022	41	Module -4-Objected Oriented Design – Analysis
		42	Design concept
		43	Design notations and specifications
		44	Case study based on Objected Oriented Design
		12 March	**Second Saturday**
11	14-03-2022 To 19-03-2022	45	Class Test-Module 4
		46	Software Testing – What is testing, Why should we test
		47	Who should do testing? Test case and Test suit
		48	Functional testing ,
12	21-03-2022 To	49	Verification and validation, alpha beta and acceptance testing
		50	Boundary value analysis

No of Weeks	Dates	Session	Topic
	26-03-2022	51	Equivalence class testing
		52	Decision table based testing
		53	Cause effect graphing techniques
13	28-03-2022 To 02-04-2022	54	Structural testing
		55	Techniques to design test cases
		56	Path testing
		57	Cyclomatic complexity , Graph matrices
14	04-04-2022 To 09-04-2022	58	Data flow testing , mutation testing
		59	Levels of testing
		60	Unit testing
		61	Integration testing
		09 April	Second Saturday
15	11-04-2022 To 16-04-2022	62	System testing
		63	Validation testing
		13 April	Easter Holidays
		14 April	Easter Holidays
		15 April	Easter Holidays
		16 April	Easter Holidays
16	18-04-2022 To 23-04-2022	18 April	Easter Holidays
		64	Revision-Module 5
		65	Class Test-Module 5
		66	Previous Year Question Paper Discussion
17	25-04-2022 To 30-04-2022	67	II Internal Examination
		68	II Internal Examination
		69	II Internal Examination
		70	II Internal Examination
		71	II Internal Examination
		72	II Internal Examination

Subject Code:	**4B09BCA**
Subject Name:	**COMPUTER ORGANIZATION**
No. of Credits:	**4**
No. of Contact Hours:	**72**
Hours per Week:	**4**
Name of the Teacher:	**Fincy Cyriac**

Objective:

1. Understand the basic operation of a computer system.
2. Understand the organization and design of basic digital computer
3. Introduce the concepts of microprogramming and design simple combinational digital systems.
4. Understand the organization of memory and techniques that computers use tocommunicate with I/O devices

SYLLABUS

Unit I

Functional Units and Basic operational Concepts of a digital computer (Textbook 2). Register Transfer and Micro operations: Register Transfer Language-Register Transfer- Bus and memory Transfer. Basic Computer Organization and Design: Instruction Codes – Computer Registers-Computer Instructions-Timing and Control-Instruction cycle- Memory Reference Instructions-I/O and Interrupt-Complete Computer Description- Design of Basic Computer. **(18 Hrs)**

Unit II

Micro Programmed Control: Control Memory – Address sequencing – Microprogram Example -Design of Control Unit. Central Processing Unit – General Register Organization – Stack Organization - Instruction Formats – Addressing modes – Data Transfer and Manipulations- Program Control – Reduced Instruction set computer(RISC). **(18 Hrs)**

Unit III

Input Output Organization: Peripheral Devices – Input/output Interfaces – Asynchronous Data Transfer – Modes of transfer –Priority Interrupt – Direct Memory Access (DMA) - Input Output Processor - Serial Communications. **(12 Hrs)**

Unit IV

Memory Organization: Memory Hierarchy – Main memory – Auxiliary Memory – Associative Memory – Cache memory – Virtual Memory. **(12 Hrs)**

Unit V

Pipelining: Parallel processing – Pipelining – Instruction pipeline. Multiprocessors: Characteristics of multiprocessors – Inter connection structures – Inter Processor Arbitration. **(12 Hrs)**

Books for Study:

1. M. Morris Mano, Computer System Architecture, 3rd Ed, Pearson
2. Carl Hamacher,Zvonko Vranesic and Safwat Zaky, Computer Organization,5th Ed, TMH

Books for Reference:

1. William Stallings, Computer Organization and Architecture. 10th Ed, Pearson
2. John P. Hayes, Computer Architecture And Organization, 3rd Ed, TMH

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	03-01-2022 To 08-01-2022	1	Functional Units of a digital computer
		2	Basic operational Concepts of a digital computer
		3	Register Transfer Language
		4	Register Transfer
		5	Bus Transfer
		08 January	Second Saturday
2	10-01-2022 To 15-01-2022	6	Memory Transfer
		7	Basic Computer Organization and Design
		8	Instruction Codes
		9	Computer Registers
3	17-01-2022 To 22-01-2022	10	Computer Instructions
		11	Timing and Control
		12	Instruction cycle
		13	Memory Reference Instructions
4	24-01-2022 To 29-01-2022	14	I/O and Interrupt
		15	Complete Computer Description-
		16	Design of Basic Computer
		26 January	Republic Day
		17	Module 1 class test
		18	Micro Programmed Control
5	31-01-2022 To 05-02-2022	31 January	Don Bosco
		19	Control Memory
		20	Address sequencing
		21	Microprogram Example
6	07-02-2022 To 12-02-2022	22	Design of Control Unit
		23	Central Processing Unit
		24	General Register Organization
		25	Stack Organization
		26	Instruction Formats
		12 February	Second Saturday
7	14-02-2022 To 19-02-2022	27	Addressing modes
		28	Data Transfer and Manipulations
		29	Data Transfer and Manipulations
		30	Program Control
8	21-02-2022	31	I Internal Examination

No of Weeks	Dates	Session	Topic
	To 26-02-2022	32	I Internal Examination
		33	I Internal Examination
		34	I Internal Examination
		35	I Internal Examination
		36	I Internal Examination
9	28-02-2022 To 05-03-2022	37	Reduced Instruction set computer(RISC)
		01 March	Maha Sivarathri
		38	Module 2 class test
		39	Input Output Organization:
		40	Peripheral Devices
10	07-03-2022 To 12-03-2022	41	Input/output Interfaces
		42	Asynchronous Data Transfer
		43	Modes of transfer
		44	Modes of transfer
		12 March	**Second Saturday**
11	14-03-2022 To 19-03-2022	45	Priority Interrupt
		46	Direct Memory Access (DMA)
		47	Input Output Processor
		48	Serial Communications
12	21-03-2022 To 26-03-2022	49	Module 3 class test
		50	Memory Organization
		51	Memory Hierarchy
		52	Main memory
		53	Auxiliary Memory
13	28-03-2022 To 02-04-2022	54	Associative Memory
		55	Cache memory
		56	Virtual Memory
		57	Module 4 class test
14	04-04-2022 To 09-04-2022	58	Parallel processing
		59	Pipelining
		60	Instruction pipeline
		61	Multiprocessors- Characteristics of multiprocessors
		09 April	Second Saturday
15	11-04-2022 To 16-04-2022	62	Inter connection structures –
		63	Inter Processor Arbitration
		13 April	Easter Holidays
		14 April	Easter Holidays
		15 April	Easter Holidays
		16 April	Easter Holidays

No of Weeks	Dates	Session	Topic
16	18-04-2022 To 23-04-2022	18 April	Easter Holidays
		64	Inter Processor Arbitration
		65	Module 5 class test
		66	Previous year question paper discussion
17	25-04-2022 To 30-04-2022	67	II Internal Examination
		68	II Internal Examination
		69	II Internal Examination
		70	II Internal Examination
		71	II Internal Examination
		72	II Internal Examination

Subject Code:	4B10BCA
Subject Name:	LINUX PROGRAMMING
No. of Credits:	3
No. of Contact Hours:	72
Hours per Week:	4
Name of the Teacher:	Sruthi N

SYLLABUS

Unit I

Linux OS: History, Features and benefits of Linux, basic concepts of multi user system, open source, free Software concepts, Types of users in Linux, Types of files. **BASICS** : login, password, creating an account, shell and commands, logout, changing password, files and directories, relative and absolute pathnames, directory tree, current working directory, referring home directory, creating new directories, copying files, moving files, deleting files and directories , wild cards, hidden files, cat command **(18Hrs)**

Unit II

Vi editor: different modes-command mode, insert mode, last line mode, vi Editing commands – moving within a file, deleting, editing,Copy and Paste Commands, Saving and Closing the file, redirecting input/output-filter, pipes. **File permissions:** user, group, ls command (long listing),changing file permission.
(15Hrs)

Unit III

Shell Scripting: Types of shell, Basic shell configuration for bourne and bash shell: /etc/profile, /etc/bashrc, ~/.bash_profile, ~/.bash_login, ~/.profile, ~/.bashrc, ~/.bash_logout, ~/.bash_history. Bourne shell scripts, script execution, variables and parameters, Control structures - Shell if then else, Shell if then elif, Shell for loop, Shell while loop, Shell until loop , Shell case, Shell function. **(15Hrs)**

Unit IV

Linux Boot process: LILO - boot process, /edc/lilo.conf file, GRUB - /etc/grub.conf file runlevels, rc files, startup scripts. **Mounting: mounting** file systems, structure of /etc/fstab. **Linux Administration** : Major services in Linux system - init, /etc/inittab file, login from terminal, syslog and its configuration file /etc/syslog.conf, periodic command execution: at and cron, crontab file , GUI, X windows. Starting and stopping different services – service command.
(12Hrs)

Unit V: System Maintenance: tmpwatch command, logrotate utility. **Backup and Restore**: types of backup - full, differential, incremental, cp, tar commands. **Linux Installation: Partitioning**, MBR, SWAP, file system mount points, rpm utility - installation of packages **(12Hrs)**

Books for Study:

1. YashavantKanetkar, UNIX Shell Programming, BPB

2. Æleen Frisch, Essential System Administration, 3rd Edition, O'Reilly Media

Books for Reference:

1. Arnold Robbins, Unix in a Nutshell, 4th Edition, O'Reilly Media 2. Evi Nemeth, Garth Snyder and Trent R. Hein, Linux Administration Handbook, 2nd Ed, Prentice Hall
3. Christopher Negus, Red Hat Linux Bible, John Wiley & Sons

4. Rebecca Thomas,Jean Yates, A User Guide to the Unix System, McGraw Hill

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	03-01-2022 To 08-01-2022	1	History, Features and benefits of Linux
		2	Basic concepts of multi user system
		3	Open source, free Software concepts
		4	Types of users in Linux,Types of files
		5	**BASICS** : login, password, creating an account
		08 January	Second Saturday
2	10-01-2022 To 15-01-2022	6	Files and directories
		7	Relative and absolute pathnames, directory tree
		8	Current working directory, referring home directory
		9	Copying files, moving files, deleting files and directories
3	17-01-2022 To 22-01-2022	10	Wild cards, hidden files, cat command
		11	Revision Module 1
		12	Class test Module1
		13	**Vi editor**: different modes
4	24-01-2022 To 29-01-2022	14	VI Editing commands
		15	Copy and Paste Commands
		16	Saving and Closing the file
		26 January	Republic Day
		17	Redirecting input/output-filter, pipes
		18	**File permissions:** user, group
5	31-01-2022 To 05-02-2022	31 January	Don Bosco
		19	ls command
		20	Changing file permissions
		21	Revision Module 2
6	07-02-2022 To 12-02-2022	22	Class test Module2
		23	**Shell Scripting**: Types of shell
		24	Basic shell configuration for bourne and bash shell: /etc/profile.
		25	/etc/bashrc, ~/.bash_profile
		26	~/.bash_login, ~/.profile
		12 February	Second Saturday
7	14-02-2022	27	~/.bash_logout, ~/.bash_history

No of Weeks	Dates	Session	Topic
	To 19-02-2022	28	Bourne shell scripts, script execution
		29	Variables and parameters
		30	~/.bash_logout, ~/.bash_history
8	21-02-2022 To 26-02-2022	31	I Internal Examination
		32	I Internal Examination
		33	I Internal Examination
		34	I Internal Examination
		35	I Internal Examination
		36	I Internal Examination
9	28-02-2022 To 05-03-2022	37	Variables and parameters
		01 March	Maha Sivarathri
		38	Control structures
		39	Control structures
		40	Control structures
10	07-03-2022 To 12-03-2022	41	Shell case, Shell function
		42	Shell case, Shell function
		43	Shell case, Shell function
		44	Shell case, Shell function
		12 March	**Second Saturday**
11	14-03-2022 To 19-03-2022	45	Revision Module 3
		46	Class test Module 3
		47	**Linux Boot process**: LILO - boot process, /edc/lilo.conf file
		48	**Linux Boot process**: LILO - boot process, /edc/lilo.conf file
12	21-03-2022 To 26-03-2022	49	**Linux Boot process**: LILO - boot process, /edc/lilo.conf file
		50	GRUB - /etc/grub.conf file
		51	GRUB - /etc/grub.conf file
		52	Runlevels, rc files, startup scripts
		53	Runlevels, rc files, startup scripts
13	28-03-2022 To 02-04-2022	54	**Mounting** file systems
		55	Major services in Linux system - init, /etc/inittab file
		56	Syslog and its configuration file /etc/syslog.conf
		57	Periodic command execution: at and cron
14	04-04-2022 To	58	GUI, X windows
		59	Starting and stopping different services – service command

No of Weeks	Dates	Session	Topic
	09-04-2022	60	Revision Module 4
		61	Class test Module 4
		09 April	Second Saturday
15	11-04-2022 To 16-04-2022	62	**System Maintenance**: tmpwatch command
		63	Logrotate command
		13 April	Easter Holidays
		14 April	Easter Holidays
		15 April	Easter Holidays
		16 April	Easter Holidays
16	18-04-2022 To 23-04-2022	18 April	Easter Holidays
		64	**Backup and Restore**: types of backup
		65	**Linux Installation: Partitioning**
		66	Class test Module 5
17	25-04-2022 To 30-04-2022	67	II Internal Examination
		68	II Internal Examination
		69	II Internal Examination
		70	II Internal Examination
		71	II Internal Examination
		72	II Internal Examination

Subject Code:	4C04 AMT-BCA
Subject Name:	Mathematics for BCA IV
No. of Credits:	4
No. of Contact Hours:	72
Hours per Week:	4
Name of the Teacher:	**Najumunnisa.K**

4C04 AMT-BCA: Mathematics for BCA IV

Unit I- Probability (18 hours)
Text: Higher Engineering Mathematics (41st edition), B.S. Grewal,Khanna Pub.

Probabiliy – introduction, principle of counting, permutations, combinations,basic terminology, definition of probability, statistical definition of probability,probability and set notations, random experiment, sample space, event, axioms,
notations, addition law of probability or theorem of total probability (proof excluded), independent events, multiplication law of probability.
(Sections 26.1, 26.2, 26.3, 26.4, 26.5)

Unit II- Linear Programming (24 hours)Text: Operations Research (18th thoroughly revised edition), Kantiswaroop, P.K. Gupta and Manmohan, Sultan Chand & Sons.

Mathematical formulation of daily life situations – simple cases only *(Questions should be avoided for end semester examination from this section).* Canonical and standard form, Graphical solution method, Simplex method – computational procedure (Proof of theorems excluded)
(Sections 2.1, 2.2, 2.3, 2.4, 3.2, 4.3)

Unit III - Linear programming (14 hours) Text: Operations Research (18th thoroughly revised edition), Kantiswaroop, P.K. Gupta and Manmohan, Sultan Chand & Sons.

Network routing problems – introduction, network flow problem, minimal spanning tree problem, shortest route problems (algorithm omitted)
(Sections 24.1, 24.2, 24.3, 24.4)

Unit IV - Numerical Analysis (16 hours)

Text: Introductory Methods of Numerical Analysis (fifth edition), S.S. Sastri PHI Learning, 2015

Numerical Integration: Trapezoidal Rule, Simpson's 1/3- Rule (Sections 6.4, 6.4.1, 6.4.2)
Numerical Solutions of Ordinary Differential Equations: Introduction, Solution by Taylor's series, Euler's method, Modified Euler's method, Runge- Kutta methods.
(Sections 8.1, 8.2, 8.4, 8.4.2, 8.5)

References

1. Introduction to Probablity and Statistics, S. Lipschutz, J. Schiller, Schaum's Outline series
2. Linear Programming, G. Hadley, Oxford & IBH Publishing Company, New Delhi.
3. Operations Research, S. Kalavathy, Vikas Pub.
4. Mathematical methods, S. R. K. Iyengar and R. K. Jain, Narosa Pub
5. Advanced Engineering Mathematics (10th edition), E. Kreyszig, Wiley

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	03-01-2022 To 08-01-2022	1	Unit I- Probabiliy – introduction. Definitions.
		2	Examples.
		3	Exercise questions.
		4	Principle of counting, Definitions.
		08 January	Second Saturday
2	10-01-2022 To 15-01-2022	5	Examples.
		6	Permutations, Definitions.
		7	Combinations, Definitions.
		8	Exercise questions.
		9	basic terminology, Definitions, Exercise questions.
3	17-01-2022 To 22-01-2022	10	definition of probability
		11	Class test.
		12	statistical definition of probability, Examples, Exercise questions.
		13	probability and set notations
		14	Examples, Exercise questions.
4	24-01-2022 To 29-01-2022	15	random experiment, Examples, Exercise questions.
		16	sample space.
		26 January	RepublicDay
		17	Event, axioms, notations, Definitions.
		18	Examples, Exercise questions
		19	Examples, Exercise questions
5	31-01-2022 To 05-02-2022	31 January	Don Bosco
		20	addition law of probability or theorem of total probability
		21	independent events, multiplication law of probability
		22	Examples, Exercise questions.
		23	Class test.
6	07-02-2022 To 12-02-2022	24	Unit II-Mathematical formulation of daily life situations – simple cases only.
		25	Canonical form of LPP, Definitions. Examples, Exercise questions.
		26	Examples, Exercise questions.
		27	Discussion

No of Weeks	Dates	Session	Topic
		12 February	Second Saturday
7	14-02-2022 To 19-02-2022	28	standard form of LPP, Definitions.
		29	Class test.
		30	Graphical solution method.
		31	Examples, Exercise questions. Assignment.
		32	Examples, Exercise questions
8	21-02-2022 To 26-02-2022		I Internal Examination
			I Internal Examination
			I Internal Examination
			I Internal Examination
			I Internal Examination
			I Internal Examination
9	28-02-2022 To 05-03-2022	33	Simplex method – computational procedure.
		01 March	Maha Sivarathri
		34	Class test.
		35	Unit III-Network routing problems – introduction.
		36	network flow problem
10	07-03-2022 To 12-03-2022	37	**Problems**
		38	Examples, Exercise questions.
		39	Discussion
		40	Minimal spanning tree problem, Definitions. Examples.
		12 March	Second Saturday
		41	Seminar
11	14-03-2022 To 19-03-2022	42	Examples, Exercise questions.
		43	Examples, Exercise questions.
		44	Examples, Exercise questions.
		45	Class test.
12	21-03-2022 To 26-03-2022	46	shortest route problems, Definitions. Examples.
		47	Examples, Exercise questions.
		48	Examples, Exercise questions.
		49	Seminar.
		50	Seminar.
		51	Numerical Integration- Introduction ,Trapezoidal Rule.
13	28-03-2022 To 02-04-2022	52	Examples, Exercise questions.
		53	Examples, Exercise questions.
		54	Simpson's 1/3- Rule – Introduction.
		55	Examples, Exercise questions.
		56	Examples, Exercise questions.

No of Weeks	Dates	Session	Topic
		57	Numerical Solutions of Ordinary Differential Equations: Introduction
14	04-04-2022 To 09-04-2022	58	Examples, Exercise questions.
		59	Examples, Exercise questions.
		60	Solution by Taylor's series– Introduction.
		61	Runge-Kutta methods.
		09 April	Second Saturday
15	11-04-2022 To 16-04-2022	62	Examples
		13 April	Easter Holidays
		14 April	Easter Holidays
		15 April	Easter Holidays
		16 April	Easter Holidays
16	18-04-2022 To 23-04-2022	17 April	Easter Holidays
		63	Euler's method– Introduction.
		64	Examples, Exercise questions.
		65	Examples, Exercise questions.
		66	Modified Euler's method- Introduction.Problems
17	25-04-2022 To 30-04-2022	67	II Internal Examination
		68	II Internal Examination
		69	II Internal Examination
		70	II Internal Examination
		71	II Internal Examination
		72	II Internal Examination

Subject Code:	**4A14BCA**
Subject Name:	**DISCRETE MATHEMATICAL STRUCTURES**

No. of Credits:	**4**
No. of Contact Hours:	**72**
Hours per Week:	**4**
Name of the Teacher:	**REMYA RAJ**

Unit I

Sets and Mathematical Logic: Set Theory - Types of sets, Set operations, Principles of Inclusion and Exclusion. Mathematical Logic - Propositional Calculus - Statement, Connectives, Conditional and Biconditional, Equivalence of Formula, Well Formed Formula, Tautologies, Normal Forms, Theory of Inference for the Statement Calculus, Predicate Calculus, Theory of Inference for the Predicate Calculus. **(12 Hrs)**

Unit II

Functions and Relations: Functions – Types of Functions, Composition of Functions and Inverse Functions. Relations - Relations and Their Properties, Functions as relations, Closure of Relations, Composition of relations, Equivalence Relations and Partitions. Partial Ordering, Hasse Diagram.The Pigeonhole Principle. **(15 Hrs)**

Unit III

Lattices and Boolean Algebra - Lattices and Algebraic Systems, Principles of Duality, Basic Properties of Algebraic Systems Defined by Lattices, Distributive Lattices and Complemented Lattices. Boolean Lattices and Boolean Algebras.Boolean Functions and Boolean Expressions. **(15 Hrs)**

Unit IV

Group Theory – Definition and Elementary Properties - Permutation Groups, Cyclic Groups – Subgroups - Cosets,Semigroup and Monoid.Homomorphism and Isomorphism.Rings, Integral Domains and Fields. **(15 Hrs)**

Unit V

Graph Theory- Basic concepts- Introduction, Directed Graph, Undirected Graph, Connected and Disconnected Graphs, Bipartite Graph, Complete Bipartite Graph, Isomorphic Graphs, Subgraph. Paths and Circuits.Shortest Paths in Weighted Graphs Dijkstra's Algorithm.Eulerian Paths and Circuits, Hamiltonian Paths and Circuits.Storage representation and manipulation of graphs.Minimum Spanning Trees. **(15 Hrs)**

Books for Study:

1. Kenneth H. Rosen and Kamala Krithivasan, Discrete Mathematics And Its Applications with Combinatorics and Graph Theory, 7th Ed, TMH

Books for Reference:

1. J. K. Sharma, Discrete Mathematics, 2004, Macmillan Publishers India Limited 2. Alan Doerr, Kenneth Levasseur, Applied Discrete Structures for Computer Science, Galgotia

Publications Pvt Ltd
3. N Ch S N Iyengar, V. M. Chandrasekaran, K. A. Venkatesh and P. S. Arunachalam, Discrete Mathematics, Vikas Publishing
4. C. L. Liu and D. P. Mohapatra, Elements Of Discrete Mathematics (SIE), 4thEd, TMH

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	03-01-2022 To 08-01-2022	1	Set theory-basic concepts
		2	Venn diagram-examples
		3	Cartesian product-examples
		4	Functions -injective functions,examples
		5	Surjective functions-examples
		08 January	Second Saturday
2	10-01-2022 To 15-01-2022	6	Bijective functions-examples
		7	Mathematical logic-propositional calculus-statements,examples
		8	Connectives,negation-examples
		9	Conjuction,disjunction-examples
3	17-01-2022 To 22-01-2022	10	Biconditional statement,equivalence formula-examples
		11	Well formed formula
		12	Tautologies-examples
		13	Normal forms
4	24-01-2022 To 29-01-2022	14	Rules of inference
		15	Revision
		16	Class test
		26 January	Republic Day
		17	Functions -types of functions,examples
		18	examples
5	31-01-2022 To 05-02-2022	31 January	Don Bosco
		19	Composition of functions-examples
		20	Inverse functions-examples
		21	Relations and their properties

No of Weeks	Dates	Session	Topic
6	07-02-2022 To 12-02-2022	22	Functions as relations,examples
		23	Closure of relations,examples
		24	composition of relations,examples
		25	Equivalence relations,examples
		26	Partitions,examples
		12 February	Second Saturday
7	14-02-2022 To 19-02-2022	27	Partial ordering,examples
		28	Hasse diagram,examples
		29	The pigeonhole principle
		30	Revision
8	21-02-2022 To 26-02-2022	31	I Internal Examination
		32	I Internal Examination
		33	I Internal Examination
		34	I Internal Examination
		35	I Internal Examination
		36	I Internal Examination
9	28-02-2022 To 05-03-2022	37	Boolean algebra: definition, laws
		01 March	Maha Sivarathri
		38	Laws
		39	Boolean functions and expressions
		40	Boolean functions and expressions
10	07-03-2022 To 12-03-2022	41	Representation of Boolean expressions
		42	Representation of Boolean expressions
		43	Applications of Boolean algebra
		44	Revision
		12 March	**Second Saturday**
11	14-03-2022 To 19-03-2022	45	Class test
		46	Graph theory- basic concepts
		47	Paths ,circuits,examples
		48	Subgraph - examples
12	21-03-2022 To 26-03-2022	49	Bipartite graph ,complete bipartite graphs-examples
		50	Isomorphic graphs -examples
		51	Trees – definition,examples
		52	Spanning trees - examples
		53	Minimal spanning trees – examples
13	28-03-2022 To	54	BFS ,DFS
		55	Incidence matrix-examples
		56	Traveling salesman problem

No of Weeks	Dates	Session	Topic
	02-04-2022	57	Revision
14	04-04-2022 To 09-04-2022	58	Class test
		59	Planar graph,examples
		60	Shortest path in weighted graphs,examples
		61	Euler path and circuit,examples
		09 April	Second Saturday
15	11-04-2022 To 16-04-2022	62	Hamiltonian path and circuit,examples
		63	Storage representation of graphs,examples, Graph coloring,examples
		13 April	Easter Holidays
		14 April	Easter Holidays
		15 April	Easter Holidays
		16 April	Easter Holidays
16	18-04-2022 To 23-04-2022	18 April	Easter Holidays
		64	Revision
		65	Previous year question paper discussion
		66	Class test
17	25-04-2022 To 30-04-2022	67	II Internal Examination
		68	II Internal Examination
		69	II Internal Examination
		70	II Internal Examination
		71	II Internal Examination
		72	II Internal Examination