Kurukshetra University, Kurukshetra
(Established by the State Legislature Act XII of 1956)
('A+' Grade, NAAC Accredited)

|| योगस्थ: कुरु कर्माणि ||
समबुद्धि व योग युक्त होकर कर्म करो
(Perform Actions while Stead fasting in the State of Yoga)

Scheme of Examination for Under-Graduate Programmes
Bachelor of Science (Artificial Intelligence)
B.Sc. (AI): SCHEME - D
according to
Curriculum Framework for Under-Graduate Programmes
As per NEP-2020 (Multiple Entry-Exit, Internships and Choice Based
Credit System)
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
(For the Batches Admitted From 2023-2024)

Kurukshetra University Kurukshetra

ELIGIBILITY of Examination for Undergraduate programmes

Subject: B.Sc. (Artificial Intelligence)

ELIGIBILITY OF B.Sc. (ARTIFICIAL INTELLIGENCE) WILL BE AS UNDER

"CANDIDATE MUST PASS 10+2 LEVEL WITH MATHEMATICS/ COMPUTER SCIENCE AS ONE OF THE MAJOR SUBJECT"

Kurukshetra University Kurukshetra
Scheme of Examination for Undergraduate programmes
Subject: B.Sc. (Artificial Intelligence)
According to
Curriculum Framework for Undergraduate Programmes
as per NEP 2020 (Multiple Entry-Exit, Internships and Choice Based Credit System)

Sem	Course Type	Course Code	Nomenclature of paper	Credits	Contact hours	Internal marks	End term Marks	Total Marks	Duration of exam (Hrs) T + P
1	CC-A1	B23-CAI-101	Problem Solving through C	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-B1	B23-CAI-102	Foundations of Computer Science	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-C1	B23-CAI-103	Logical Organization of Computer	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-M1	B23-CAI-104	Mathematical Foundations for Computer Science-I	1	1	10	20	30	3
			Practical	1	2	5	15	20	3
	MDC1	To be taken from other department							
	SEC1	To be taken from SEC Pool							
	VAC1	To be taken from VAC Pool							
	AEC1	To be taken from AEC Pool							
2	CC-A2	B23-CAI-201	Object Oriented	3	3	20	50	70	3

			Programming using C++						
			Practical	1	2	10	20	30	3
	CC-B2	B23-CAI-202	Introduction to Web Technologies	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-C2	B23-CAI-203	Concepts of Operating Systems	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-M2	B23-CAI-204	Mathematical Foundations for Computer Science-II	1	1	10	20	30	3
			Practical	1	2	5	15	20	3
	MDC-2	To be taken from other department							
	SEC-2	To be taken from SEC Pool							
	VAC-2	To be taken from VAC Pool							
	AEC-2	To be taken from AEC Pool							
3	CC-A3	B23-CAI-301	Java OOP Foundations	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-B3	B23-CAI-302	Linux and Shell programming	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-C3	B23-CAI-303	Data Base Technologies	3	3	20	50	70	3
			Practical	1	2	10	20	30	3

	CC-M3	B23-CAI-304	Quantitative Foundations of Computer Science	3	3	20	50	70	3
			Practical	1	3	10	20	30	3
	MDC-3	To be taken from other department							
	SEC-3	To be taken from SEC Pool							
	AEC-3	To be taken from AEC Pool							
4	CC-A4	B23-CAI-401	Data Structures and Applications	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-B4	B23-CAI-402	Front-end Development	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-C4	B23-CAI-403	Computer Graphics	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	AEC-4	To be taken from AEC Pool							
	VAC-3	To be taken from VAC Pool							
	CC-M4(V)	B23-CAI-404	Introduction to Data Science & Data Analytics	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
5	CC-A5	B23-CAI-501	Software Engineering	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-B5	B23-CAI-502	Back-end Development	3	3	20	50	70	3

Sem		Code	Course						
			Practical	1	2	10	20	30	3
	CC-C5	B23-CAI-503	Network Infrastructure and Data Communication Technologies	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-M5(V)	B23-CAI-504	Introduction to Internet of Things	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	SEC-4	Internship @ 4 Credits							
6	CC-A6	B23-CAI-601	Programming using Python	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-B6	B23-CAI-602	Advanced Web Development	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-C7	B23-CAI-603	Artificial Intelligence	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-M6	B23-CAI-604	Data Analytics and Visualization using Python	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC-M7(V)	B23-CAI-605	Machine Learning	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
7	CC-H1	B23-CAI-701	Cloud Computing	4	4	30	70	100	3
	CC-H2	B23-CAI-702	Data Mining & Warehousing	4	4	30	70	100	3
	CC-H3	B23-CAI-703	Digital Image Processing	4	4	30	70	100	3
	DSE-H1	B23-CAI-704	Natural Language Processing	4	4	30	70	100	3
		Or							

		B23-CAI-705	Computer Vision	4	4	30	70	100	3
	PC-H1	B23-CAI-706	Practical	4	8	30	70	100	6
	CC-HM1	B23-CAI-707	NoSQL Databases	4	4	30	70	100	3
8	CC-H4	B23-CAI-801	Artificial Neural Networks and Deep Learning	4	4	30	70	100	3
	CC-H5	B23-CAI-802	Human-Computer Interface	4	4	30	70	100	3
	CC-H6	B23-CAI-803	Big Data Analytics	4	4	30	70	100	3
	DSE-H2	B23-CAI-804	Block Chain Technologies	4	4	30	70	100	3
		Or							
		B23-CAI-805	Robotics	4	4	30	70	100	3
	PC-H2	B23-CAI-806	Practical	4	8	30	70	100	6
	CC-HM2	B23-CAI-807	Hadoop and Spark	4	4	30	70	100	3
	OR								
	CC-H4	B23-CAI-801	Artificial Neural Networks and Deep Learning	4	4	30	70	100	3
	CC-H5	B23-CAI-802	Human-Computer Interface	4	4	30	70	100	3
	CC-HM2	B23-CAI-807	Hadoop and Spark	4	4	30	70	100	3
	Research	B23-CAI-808	Project/ Dissertation	12				300	

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समबुद्धि व योग युक्त होकर कर्म करो
(Perform Actions while Stead fasting in the State of Yoga)

Syllabus of Examination (1st Semester) for Under-Graduate Programmes
Bachelor of Science (Artificial Intelligence)
B.Sc. (AI)
according to
Curriculum Framework for Under-Graduate Programmes
As per NEP-2020 (Multiple Entry-Exit, Internships and Choice Based
Credit System)
DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
(For the Batches Admitted From 2023-2024)

Session: 2023-24	
Part A - Introduction	
Subject	B.Sc. (AI)
Semester	I
Name of the Course	Problem Solving through C
Course Code	B23-CAI-101 (Common with B23-CAP-101, B23-CTS-101, B23-CSD-101)
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC
Level of the course (As per Annexure-I	100-199
Pre-requisite for the course (if any)	

Course Learning Outcomes(CLO):	After completing this course, the learner will be able to:
	  1. learn the basics of C program, data types and input/output statements.
	  2. understand different types of operators, their hierarchies and also control statements of C.
	  3. implement programs using arrays and strings.
	  4. get familiar with advanced concepts like structures, union etc. in C language.
	
	  5*. to implement the programs based on various concepts of C.

Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5

Max. Marks:100(70(T)+30(P)) **Internal Assessment Marks:30(20(T)+10(P))** **End Term Exam Marks: 70(50(T)+20(P))**	**Time: 3 Hrs.(T), 3Hrs.(P)**
Part B- Contents of the Course	

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
I	Overview of C: History, Importance, Structure of C Program, Character Set, Constants and Variables, Identifiers and Keywords, Data Types, Assignment Statement, Symbolic Constant. Input/output: Formatted I/O Function-, Input Functions viz. scanf(), getch(), getche(), getchar(), gets(), output functions viz. printf(), putch(), putchar(), puts().	10
II	Operators & Expression: Arithmetic, Relational, Logical, Bitwise, Unary, Assignment, Conditional Operators and Special Operators Operator Hierarchy; Arithmetic Expressions, Evaluation of Arithmetic Expression, Type Casting and Conversion. Decision making with if statement, if-else statement, nested if statement, else-if ladder, switch and break statement, goto statement, Looping Statements: for, while, and do-while loop, jumps in loops.	10
III	Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays -Declaration, Initialization and Memory representation. Functions: definition, prototype, function call, passing arguments to a function: call by value; call by reference, recursive functions. Strings: Declaration and Initialization, String I/O, Array of Strings, String Manipulation Functions: String Length, Copy, Compare, Concatenate etc., Search for a Substring.	10
IV	Pointers in C: Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays. User defined data types: Structures - Definition, Advantages of Structure, declaring structure variables, accessing structure members, Structure members initialization, Array of Structures; Unions - Union definition; difference between Structure and Union.	10
V*	Practicum: Students are advised to do laboratory/practical practice not limited	25

to, but including the following types of problems:
- To read radius of a circle and to find area and circumference
- To read three numbers and find the biggest of three
- To check whether the number is prime or not
- To read a number, find the sum of the digits, reverse the number and check it for palindrome
- To read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers
- To read percentage of marks and to display appropriate message (Demonstration of else-if ladder)
- To find the roots of quadratic equation
- To read marks scored by n students and find the average of marks (Demonstration of single dimensional array)
- To remove Duplicate Element in a single dimensional Array
- To perform addition and subtraction of Matrices
- To find factorial of a number
- To generate Fibonacci series
- To remove Duplicate Element in a single dimensional Array
- To find the length of a string without using built in function
- To demonstrate string functions
- To read, display and add two m x n matrices using functions
- To read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters
- To Swap Two Numbers using Pointers
- To demonstrate student structure to read & display records of n students
- To demonstrate the difference between structure & union.

Suggested Evaluation Methods

Internal Assessment:
➢ **Theory**
- Class Participation: 5
- Seminar/presentation/assignment/quiz/class test etc.: 5
- Mid-Term Exam: 10

➢ **Practicum**
- Class Participation: 5
- Seminar/Demonstration/Viva-voce/Lab records etc.: 5
- Mid-Term Exam: NA

End Term Examination: A three hour exam for both theory and practicum.

Part C-Learning Resources

Recommended Books/e-resources/LMS:
- Gottfried, Byron S., Programming with C, Tata McGraw Hill.
- Balagurusamy, E., Programming in ANSI C, Tata McGraw-Hill.
- Jeri R. Hanly & Elliot P. Koffman, Problem Solving and Program Design in C, Addison

Wesley.
- Yashwant Kanetker, Let us C, BPB.
- Rajaraman, V., Computer Programming in C, PHI.
- Yashwant Kanetker, Working with C, BPB.

*Applicable for courses having practical component.

Session: 2023-24			
Part A - Introduction			
Subject	B.Sc.(AI)		
Semester	I		
Name of the Course	Foundations of Computer Science		
Course Code	B23-CAI-102 (Common with B23-CAP-102, B23-CTS-102, B23-CSD-102)		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. understand the basics of computer 2. learn about I/O devices and operating systems 3. understand internet and its services 4. learn about the threats and security concepts on computers 5*. to understand the working of operating system, internet and security related concepts.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) **Internal Assessment Marks:30(20(T)+10(P))** **End Term Exam Marks: 70(50(T)+20(P))**	**Time: 3 Hrs.(T), 3Hrs.(P)**		
Part B- Contents of the Course			
Instructions for Paper- Setter Examiner will set a total of nine questions. Out of which first question will be compulsory.			

Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
I	Computer Fundamentals: Evolution of Computers through generations, Characteristics of Computers, Strengths and Limitations of Computers, Classification of Computers, Functional Components of a Computer System, Applications of computers in Various Fields. Types of Software: System software, Application software, Utility Software, Shareware, Freeware, Firmware, Free Software. Memory Systems: Concept of bit, byte, word, nibble, storage locations and addresses, measuring units of storage capacity, access time, concept of memory hierarchy. Primary Memory - RAM, ROM, PROM, EPROM. Secondary Memory - Types of storage devices, Magnetic Tape, Hard Disk, Optical Disk, Flash Memory.	10
II	I/O Devices: I/O Ports of a Desk Top Computer, Device Controller, Device Driver. Input Devices: classification and use, keyboard, pointing devices - mouse, touch pad and track ball, joystick, magnetic stripes, scanner, digital camera, and microphone Output Devices: speaker, monitor, printers: classification, laser, ink jet, dot-matrix. Plotter. Introduction to Operating System: Definition, Functions, Features of Operating System, Icon, Folder, File, Start Button, Task Bar, Status Buttons, Folders, Shortcuts, Recycle Bin, Desktop, My Computer, My Documents, Windows Explorer, Control Panel.	10
III	The Internet: Introduction to networks and internet, history, Internet, Intranet & Extranet, Working of Internet, Modes of Connecting to Internet. Electronic Mail: Introduction, advantages and disadvantages, User Ids, Passwords, e-mail addresses, message components, message composition, mailer features. Browsers and search engines.	10
IV	Threats: Physical & non-physical threats, Virus, Worm, Trojan, Spyware, Keylogers, Rootkits, Adware, Cookies, Phishing, Hacking, Cracking. Computer Security Fundamentals: Confidentiality, Integrity, Authentication, Non-Repudiation, Security Mechanisms, Security Awareness, Security Policy, anti-virus software & Firewalls, backup	10

	& recovery.	
V*	Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: Operating System: • Starting with basics of Operating Systems and its functionalities Computer Basics: • Identify the various computer hardware • Understanding the working of computer • Understanding various types of software Internet and E-mail: • Using Internet for various tasks • Creating and using e-mail. Security: • Understanding various threats • How to be safe from virus threats • Various software to get safe from virus attacks.	25

<div align="center">Suggested Evaluation Methods</div>

Internal Assessment: ➢ **Theory** • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➢ **Practicum** • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA	**End Term Examination:** A three hour exam for both theory and practicum.

<div align="center">Part C-Learning Resources</div>

Recommended Books/e-resources/LMS:
- Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB.
- Dromey, R.G., How to Solve it By Computer, PHI.
- Norton, Peter, Introduction to Computer, McGraw-Hill.
- Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World.
- Rajaraman, V., Fundamentals of Computers, PHI.

*Applicable for courses having practical component.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

Session: 2023-24	
Part A - Introduction	
Subject	B.Sc.(AI)
Semester	I
Name of the Course	Logical Organization of Computer
Course Code	B23-CAI-103 (Common with B23-CAP-103, B23-CTS-103, B23-CSD-103)
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC
Level of the course (As per Annexure-I	100-199
Pre-requisite for the course (if any)	Basic Knowledge of Mathematics (10th Level)
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. understand number systems, error detecting correcting code and representations of numbers in a computer system. 2. understand computer arithmetic and Boolean algebra and simplification of Boolean expressions. 3. understand working of logic gates and design various combinational circuits using these logic gates. 4. understand working of different types of flip-flops and design different types of registers. 5*. to understand the practical aspects of logical organization of computer.

Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5

Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))

Time: 3 Hrs.(T), 3Hrs.(P)

Part B- Contents of the Course

Instructions for Paper- Setter

Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.

Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
I	Number Systems: Binary, Octal, Hexadecimal etc. Conversions from one number system to another, BCD Number System. BCD Codes: Natural Binary Code, Weighted Code, Self-Complimenting Code, Cyclic Code. Error Detecting and Correcting Codes. Character representations: ASCII, EBCDIC and Unicode. Number Representations: Integer numbers - sign-magnitude, 1's & 2's complement representation. Real Numbers normalized floating point representations.	10
II	Binary Arithmetic: Binary Addition, Binary Subtraction, Binary Multiplication, Binary Division using 1's and 2's Compliment representations, Addition and subtraction with BCD representations. Boolean Algebra: Boolean Algebra Postulates, basic Boolean Theorems, Boolean Expressions, Boolean Functions, Truth Tables, Canonical Representation of Boolean Expressions: SOP and POS, Simplification of Boolean Expressions using Boolean Postulates & Theorems, Kaurnaugh-Maps (upto four variables), Handling Don't Care conditions.	10
III	Logic Gates: Basic Logic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR etc. Their symbols, truth tables and Boolean expressions. Combinational Circuits: Design Procedures, Half Adder, Full Adder, Half Subtractor, Full Subtractor, Multiplexers, Demultiplexers, Decoder, Encoder, Comparators, Code Converters.	10
IV	Sequential Circuits: Basic Flip- Flops and their working. Synchronous and Asynchronous Flip –Flops, Triggering of Flip-Flops, Clocked RS, D Type, JK, T type and Master-Slave Flip-Flops. State Table, State Diagram and State Equations. Flip-flops characteristics & Excitation Tables.	10

	Sequential Circuits: Designing registers –Serial-In Serial-Out (SISO), Serial-In Parallel-Out (SIPO), Parallel-In Serial-Out (PISO) Parallel-In Parallel-Out (PIPO) and shift registers.	
V*	Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: Number System: • Problems based on Number System and their conversion. • Programs based on Number System conversion. Binary Arithmetic • Problems based on Binary Arithmetic. • Programs based on Binary Arithmetic. • Problems based on Boolean Expression and their simplification Logic Gates • Understanding working of logic Gates. Combinatorial Circuits: • Designing and understanding various combinational circuits. Sequential Circuits: • Designing and understanding various sequential circuits.	25

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory** • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➢ **Practicum** • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA	**End Term Examination:** A three hour exam for both theory and practicum.

Part C-Learning Resources

Recommended Books/e-resources/LMS:
- M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
- V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall.
- Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
- Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill.

*Applicable for courses having practical component.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

Session: 2023-24	
Part A - Introduction	
Subject	B.Sc.(AI)
Semester	I
Name of the Course	Mathematical Foundations for Computer Science-I
Course Code	B23-CAI-104 (Common with B23-CAP-104, B23-CTS-104, B23-CSD-104)
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-M
Level of the course (As per Annexure-I	100-199
Pre-requisite for the course (if any)	
Course Learning Outcomes (CLO):	After learning this course student will be able: 1. Gain the knowledge of set theory, types of sets and operations on sets. Understand various concepts of matrices and determinants, and acquire the cognitive skills to apply different operations on matrices and determinants. 2. Have the knowledge of the basic concepts of complex numbers and acquire skills to solve linear quadratic equations. 3. Gain the knowledge of the concepts of Arithmetic progression, Geometric progression and Harmonic progression, and find A.M., G.M. and H.M. of given numbers. 4. Understand the concept of differentiation 5. * Attain the skills to make use of the learnt concepts of Introductory Mathematics in multidisciplinary learning contexts and to know their applications

Credits	Theory	Practical	Total
	1	1	2
Contact Hours	1	2	3

Max. Marks:50(30(T)+20(P)) **Internal Assessment Marks:15(10(T)+5(P))** **End Term Exam Marks:35(20(T)+15(P))**	**Time: 3 Hrs.(T), 3Hrs.(P)**

	Part B-Contents of the Course	
	Instructions for Paper- Setter	
Unit	**Topics**	**Contact Hours**
I	Sets and their representations, Empty set, Finite and infinite sets, Subsets, Equal sets, Power sets, Universal set, Union and intersection of sets, Difference of two sets, Complement of a set, Venn diagram, De-Morgan's laws and their applications.	4
II	An introduction to matrices and their types, Operations on matrices, Symmetric and skew-symmetric matrices, Minors, Co-factors. Determinant of a square matrix, Adjoint and inverse of a square matrix, Solutions of a system of linear equations up to order 3.	4
III	Quadratic equations, Solution of quadratic equations. Arithmetic progression, Geometric progression, Harmonic progression, Arithmetic mean (A.M.), Geometric mean (G.M.), Harmonic mean (H.M.), Relation between A.M., G.M. and H.M.	4
IV	The concept of differentiation, differentiation of simple functions, Use of differentiation for solving problems related to real-life situations. Differentiation of simple algebraic, trigonometric and exponential functions.	4
V*	Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: **Problem Solving**- Questions related to the practical problems based on following topics will be worked out and record of those will be maintained in the Practical Note Book: • Problems related to union, intersection, difference and complement of sets. • Problems based on De Morgan's Laws. • Problems related to Venn diagrams. • Problems to find inverse of a matrix. • Problems to find determinant of a square matrix of order 3. • Problems to find nth term of A.P., G.P. and H.P. • Problems to find sum of n terms of A.P., G.P. and H.P.	25

	• Problems to find A.M., G.M. and H.M. of given numbers. • Problems involving formulation and solution of quadratic equations in one variable. • Problems to find first derivatives of functions.	
Suggested Evaluation Methods		
Internal Assessment: ➢ **Theory** • Class Participation: 4 • Seminar/presentation/assignment/quiz/class test etc.: NA • Mid-Term Exam: 6 ➢ **Practicum** • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA		**End Term Examination:** **A three hour exam for both theory and practicum.**
Part C-Learning Resources		
Text /Reference Books: • C. Y. Young (2021). *Algebra and Trigonometry*. Wiley. • S.L. Loney (2016). *The Elements of Coordinate Geometry (Cartesian Coordinates)* (2nd Edition). G.K. Publication Private Limited. • Seymour Lipschutz and Marc Lars Lipson (2013). *Linear Algebra.* (4th Edition) Schaum's Outline Series, McGraw-Hill. • C.C. Pinter (2014). *A Book of Set Theory*. Dover Publications. • J. V. Dyke, J. Rogers and H. Adams (2011). *Fundamentals of Mathematics* (10th Edition), Brooks/Cole. • A.Tussy, R. Gustafson and D. Koenig (2010). *Basic Mathematics for College Students* (4th Edition). Brooks Cole		

*Applicable for courses having practical component.