



MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
(Deemed to be University under section 3 of the UGC Act, 1956)

CENTRE FOR DISTANCE AND ONLINE EDUCATION

CURRICULUM
AND
SCHEME OF EXAMINATION

(BACHELOR OF COMPUTER APPLICATIONS)
(ONLINE DEGREE PROGRAMME)

BATCH: July 2026 Onwards

Preamble

The programme BCA is adapted to an outcome-based education system which would enable the students to acquire the capabilities to meet the demands of society and industry at regional, national and global level. The Programme Education Objectives (PEOs) of BCA are consistent with the Vision and Mission of the Department as well as the University, and aim to produce globally successful IT professionals who are empowered to contribute to nation building through sound knowledge, technical skills and research aptitude. The POs and PSOs address the PEOs and aim to produce innovators, IT professionals, entrepreneurs and technocrats with high professional and social ethics.

The curriculum exhibits the requisite balance among the fundamental, core and elective subjects. This is to create a BCA student talent pool that can serve the IT technological needs of the national and global software industry. Many courses are meant to meet the IT technological needs such as Data Warehousing, Python Programming, RDBMS using Oracle , Programming in .NET using C#, Introduction to Cloud Computing etc. Also subjects like Elements of Mathematics And Mathematical Foundations of Computer Science are offered to enhance the basic mathematical skills of regional students.

The curriculum includes courses focusing on employability, entrepreneurship and skill development which map strongly with the POs defining demonstration of technical knowledge and engagement in independent and life-long learning. Examples of such courses are Employability Augmentation, Employability Skills, Entrepreneurship Development and various lab courses based on numerous dimensions of computer applications.

Certain courses are meant to create awareness about the environment and sustainability and inculcate professional ethics, like Environmental Studies, Social Media Norms & Etiquette. Also, various activities are organized to inculcate human values and respect for the other genders.

The design of curriculum is done in accordance with the predetermined Programme Education Objectives. The syllabus content of each course is meticulously created to develop thorough understanding and gain in-depth knowledge. A number of theory courses are accompanied with laboratory courses to inculcate the practical skills. In order to ensure the effectiveness of teaching-learning process and true implementation of the curriculum, the course outcomes of each course are developed to meet the programme outcomes and programme specific outcomes, which are also reflected in the Course Articulation Matrix. Course outcome and program outcome attainment is measured through direct and indirect tools including internal assessments, assignments, end semester examinations, dissertations, projects etc.

Although the curriculum has been designed after thorough deliberations involving experts from academia and industry, and considering the feedbacks obtained from various stakeholders, there is always a scope of regular revision and updation of the syllabus keeping in view the changing needs of the industry and society. Thus, a well-articulated process is followed to revise the curriculum from time to time. The process begins with obtaining feedbacks from various stakeholders i.e. students, faculty, alumni, parents and industry experts. The feedbacks are analyzed and relevant suggestions are incorporated in the curriculum through a curriculum revision workshop under the supervision of Departmental Academic Committee (DAC). The revised curriculum is scrutinized by the Board of Studies (BOS) and suggestions of the BOS are also incorporated. The revised curriculum is then placed before the Board of Faculty for consideration which is further reviewed and approved by the Academic Council.

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MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES

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CENTRE FOR DISTANCE AND ONLINE EDUCATION

VISION AND MISSION OF THE DEPARTMENT

VISION

Through online education, Manav Rachna stands tall to bring the most efficacious environment for providing higher quality academic and research-oriented education to the aspirants. Manav Rachna Online Education facilitates the goal of increasing access to enduring learning prospects to students and providing opportunities to make efficient use of scarce resources in light of the new economic realities of higher education.

MISSION

To provide an exclusive learning environment to students with flexible and meticulous online learning opportunities that will guide students to acquire the knowledge and skills as per the requirements of society at large. The aim of Manav Rachna Online Education is:

- To develop emerging skills through online learning methodologies to pursue their Academic and Professional goals.
- To impart profound knowledge and understanding of conceptual aspects of multidisciplinary learning.

ABOUT THE DEPARTMENT

The ultimate touchstone of quality education is the quality culture permeating in any education Institution. In today's world of digitization, technical education stands at the crossroads of keeping pace with the emerging needs of humankind along with fast changing trends in governance and scientific development. The global transformation, trend of learning by doing, relevance to people and nation development – Manav Rachna International Institute of Research and Studies is the right place to gear up with a world class competitive edge. We are trusted to nurture juvenile minds and prepare them to deal with challenges of their future endeavors. Continuing the Legacy of our Founder Dr. O.P Bhalla, Manav Rachna has launched —Manav Rachna Centre for Distance and Online Educationl to provide quality programmes to those students who are not able to draw benefits from conventional systems of Education. Seven programmes in different streams namely Computer Applications, Management, Commerce, Business Administration and Economics will be offered by university in online mode with specialization in different domains. In Today's opportunistic world specialized education is essential for successful professional life. Manav Rachna Centre for Distance and Online Education has collaboration with prominent industry partners to provide global career opportunities to the students and prepare the students to acquire the increased technology intensive needs of today. In addition, Manav Rachna Centre for Distance and Online Education provides a multidisciplinary approach for the students to shape their career inside and outside their domain of education and to meet the evolving needs of the society. The commitment of multidisciplinary education is to broaden the participation of students in higher education and leads to a more diverse community. In a multidisciplinary approach, students are inspired to select divergent courses from different disciplines to expand their knowledge, discover themselves through creative thinking and learn the skills of collaboration. The online programmes will help the students to achieve an academic degree along with flexibility and relaxation. These online programs hold equal academic value to an on-campus degree and help students in developing themselves into an industry ready as equivalent to a conventional degree. Students can perfectly reshape their career and

future through impeccably designed online programmes. The renowned faculty, cutting –edge advanced curriculum, technology driven and a remarkable content delivery will be helpful in the successful implementation of online programs.

PROGRAMME EDUCATION OBJECTIVES (PEOs)

The objective of the programme is to develop students to work in the field of computer applications in various sectors. The BCA programme is focused on exposing students to business application areas. The programme provides a strong foundation with an integrated understanding of information technology-based applications. The programme is designed to impart the concepts, values, challenges, opportunities and latest trends in the field of Computer Science to develop a broad practical understanding of its context, purpose and underlying functional areas. The BCA programme tends more towards software application development and exposure to the latest software tools and techniques to develop the applications.

1. To prepare graduates who will be successful professionals in industry, government, academia, research, entrepreneurial pursuit and consulting firms in the field of computer applications.
2. To provide students a solid foundation in computing fundamentals and techniques required to solve related problems and also to pursue higher studies and research.
3. To inculcate students in professional and ethical attitude, effective communication skills, multidisciplinary approach and an ability to relate computing issues to broader social context.
4. To provide students an academic environment for excellence, leadership and continuous learning, on technology and trends needed for a successful career.

When the above objectives are achieved, the graduates will be:

- a. Well-prepared for successful careers in industry / consultancy / research & development / teaching and allied areas related to the subjects of computer applications.
- b. Academically prepared to lead organizations they join or start.
- c. Engage in professional and extension activities in the field of computer applications & its allied areas and contribute to the profession and society at large by pushing the frontiers in technology.
- d. Successful in higher education in allied areas and in management, if pursued, leading to masters and research programmes.
- e. Groomed as software developers, enabling them to contribute effectively to the growth and development of the knowledge body.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1. Explore technical comprehension in varied areas of computer applications and experience a conducive environment in cultivating skills for thriving career and higher studies.

PSO2. Comprehend, explore and build up computer programs in the allied areas like Algorithms, System Software, Multimedia, Web Design and Data Analytics for efficient design of computer-based systems of varying complexity.

PROGRAMME OUTCOMES (POs)

Programme outcomes are attributes of the graduates from the programme that are indicative of the graduates 'ability and competence to work as an IT professional upon graduation. These Outcomes are statements that

describe what students are expected to know or do by the time of graduation. They must relate to knowledge and skills that the students acquire from the programme. The achievement of all outcomes indicates that the student is well prepared to achieve the program educational objectives down the road.

The programme outcomes are the following:

PO1. Computational Knowledge: Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.

PO2. Problem Analysis: Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.

PO3. Design / Development of Solutions: Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies.

PO4. Conduct Investigations of Complex Computing Problems: Ability to devise and conduct experiments, interpret data and provide well informed conclusions.

PO5. Modern Tool Usage: Ability to select modern computing tools, skills and techniques necessary for innovative software solutions

PO6. Professional Ethics: Ability to apply and commit professional ethics and cyber regulations in a global economic environment.

PO7. Life-long Learning: Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.

PO8. Project Management: Ability to understand management and computing principles with computing knowledge to manage projects in multidisciplinary environments.

PO9. Communication Efficacy: Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.

PO10. Societal & Environmental Concern: Ability to recognize economic, environmental, social, health, legal, ethical issues involved in the use of computer technology and other consequential responsibilities relevant to professional practice.

PO11. Individual & Team Work: Ability to work as a member or leader in diverse teams in multidisciplinary environment.

PO12. Innovation and Entrepreneurship: Identify opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.

MAPPING OF PEOs WITH POs and PSOs

Programme Outcome (PO)/ Programme Specific Outcome (PSO)		PEOs that are attained through concerned PO
PO1	Computational Knowledge: Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.	1,2
PO2	Problem Analysis: Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.	1,2
PO3	Design / Development of Solutions: Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies.	1,2,3
PO4	Conduct Investigations of Complex Computing Problems: Ability to devise and conduct experiments, interpret data and provide well informed conclusions.	2,3
PO5	Modern Tool Usage: Ability to select modern computing tools, skills and techniques necessary for innovative software solutions	2
PO6	Professional Ethics: Ability to apply and commit professional ethics and cyber regulations in a global economic environment.	3
PO7	Life-long Learning: Recognize the need for and develop the ability to engage in continuous learning as a Computing professional	3,4
PO8	Project Management: Ability to understand management and computing principles with computing knowledge to manage projects in multidisciplinary environments.	2,3
PO9	Communication Efficacy: Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.	3,4
PO10	Societal & Environmental Concern: Ability to recognize economic, environmental, social, health, legal, ethical issues involved in the use of computer technology and other consequential responsibilities relevant to professional practice.	3,4
PO11	Individual & Team Work: Ability to work as a member or leader in diverse teams in multidisciplinary environment	3,4

PO12	Innovation and Entrepreneurship: Identify opportunities,	1,3
	entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.	
PSO1	Explore technical comprehension in varied areas of Computer Applications and experience a conducive environment in cultivating skills for thriving career and higher studies.	2,4
PSO2	Comprehend, explore and build up computer programs in the allied areas like Algorithms, System Software, Multimedia, Web Design and Data Analytics for efficient design of computer-based systems of varying complexity.	1

SEMESTER SYSTEM AND CHOICE BASED CREDIT SYSTEM

Credit based system of study and student's performance/progress is measured by the number of credits that he/she has earned, i.e. completed satisfactorily. Based on the course credits and grade obtained by the student, grade point average is calculated

(a) Course credits assignment

Each course has a certain number of credits assigned to it depending upon its duration in periods for lecture, tutorial and laboratory practice in a week.

(b) Earning of credits

At the end of every course, a letter — Grade shall be awarded in each course for which a student has registered. On obtaining a minimum Pass Grade, students shall accumulate the course credits as Earned Credits. A student's performance shall be measured by the number of credits that he/she has earned and by the weighted grade point average

For the Award of Degree of a programme Bachelor of Computer Applications, he/she has to earn a minimum 120 credits during the 3-year duration of the programme in 6 semesters.

The total credits required to be earned have been further classified under two baskets of courses: —Compulsory Courses Basket, and —Elective Courses Basket. The total 86 credits required to be earned under —Compulsory Courses Basket and 34 credits under —Elective Courses Basket.

All courses under —Compulsory Courses Basket, are required to be qualified and cleared/pass by each and every student enrolled under the programme and are semester-wise listed in the study scheme along with credits assigned to each course.

Under Elective Courses Basket, there will be three types of courses:

- Semester-wise courses offered by the department itself
- Open/Inter-disciplinary courses offered at the Institute/University level notified from the office of Dean Academics.
- Massive Open Online Courses (MOOCs) available on SWAYAM Platform or any other platform as recommended by UGC/AICTE and notified from the office of Dean-Academics.

Each course shall have credits assigned to it. Student shall be required to register courses every semester for as many courses/credits specified under —Elective Courses Basket depending upon his/her interest, capability/pace of learning and availability of time slot (without any clash in time table) so as to earn all required total credits under the —Elective Courses Basket during the entire programme duration.

However, for registration of courses [including courses under —Compulsory Courses Basket, —Elective Courses Basket and Previous Semester Courses (wherein he/she was declared in-eligible on the basis of attendance or he/she could not clear the course within permissible given chances)], if any, the maximum limit in a semester shall be 30 credits.

Semester Study Scheme with contact hours, assigned credits & distribution of marks:

BCA SEMESTER- I								
S.No.	Course Type	Course Code	Title of Course	Continuous Assessment	End Semester Exam	Total	Duration of Exam	Credits
1	Foundation	O4.5CA100C00A	Elements of Mathematics	30	70	100	3	4
2	Core	O4.5CA100C01AH	Introduction to IT & Programming in C	30	70	100	3	5
3	Core	O4.5CA101C01AH	Web Technologies	30	70	100	3	4
4	SEC	O4.5CA101C05	Digital Editing & Motion Graphics	30	70	100	3	1
5	AEC	O4.5SBSS100C04	Indian Knowledge System	30	70	100	3	2
6	SEC	O4.5CDC196C05	Placement Competency Enhancement – I	30	70	100	3	1
7	AEC	O4.5QA100C04	Introduction to Sustainable Development Goals	30	70	100	3	2
TOTAL								19

BCA SEMESTER- II									
S.No.	Course Type	Course Code	Title of Course	Continuous Assessment	End Semester Exam	Total	Duration of Exam	Credits	
1	Foundation	O4.5CA202C01H	Python Programming	30	70	100	3	2	
2	Core	O4.5CA203C01H	Data Base Management Systems	30	70	100	3	4	
3	Core	O4.5CA204C01H	Data Structures (Using C/C++/Python)	30	70	100	3	4	
4	Core	O4.5CA205C01	Computer Organization & Digital Logic	30	70	100	3	3	
5	SEC	O4.5CA206C01	Software Engineering Principles	30	70	100	3	3	
6	AEC	O4.5SET100C04	Environmental Studies	30	70	100	3	4	
7	SEC	O4.5CDC296C05	Placement Competency Enhancement-II	30	70	100	3	1	
	Total Credits								21
Elective Courses (Any 1)									
7	Open Elective	O4.5CACS200C02 H	Information Security Fundamentals and Ethical Hacking	30	70	100	3	4	
		O4.5CAAI200C02H	Cloud Fundamentals						
		O4.5CADS200C02 H	Statistics for Machine Learning						
TOTAL								25	

BCA SEMESTER- III									
S.No.	Course Type	Course Code	Title of Course	Continuous Assessment	End Semester Exam	Total	Duration of Exam	Credits	
1	Core	O5.0CA103C01H	Object Oriented Programming using Java	30	70	100	3	4	
2	Core	O5.0CA104C01H	AI Essentials	30	70	100	3	4	
3	Core	O5.0CA105C01	Mathematical Foundation of Computer Science	30	70	100	3	4	
4	Core	O5.0CA152C01A	Project-I	30	70	100	3	2	
5	Internship	O5.0CA100C06A	Internship-I	100	-	100	3	1	
6	AEC	O5.0SBSS100C04	Universal Human Values	30	70	100	3	2	
7	SEC	O5.0CA100C05	Research Innovation Catalyst I	100	-	100	3	1	
8	SEC	O5.0CDC196C05	Placement Competency Enhancement-III	30	70	100	3	1	
9	SEC	O5.0FLGR100E03	Foreign Language(German-I)	30	70	100	3	2	
	Total Credits								21
Elective Courses (Any 1)									
10	Open Elective	O5.0CAAI100C02H	Cloud Based AI Solutions	30	70	100	3	4	
		O5.0CACS100C02H	Network Monitoring, Assessment, Troubleshooting and Risk Management						
		O5.0CADS100C02H	Programming for Data Science						
TOTAL								25	

BCA SEMESTER- IV								
S.No.	Course Type	Course Code	Title of Course	Continuous Assessment	End Semester Exam	Total	Duration of Exam	Credits
1	CORE	O5.0CA202C01H	Computer Networks	30	70	100	3	4
2	CORE	O5.0CA203C01H	Applied Statistical Techniques	30	70	100	3	4
3	CORE	O5.0CA201C01H	Operating System	30	70	100	3	4
4	SEC	O5.0FLGR00E03	Foreign Language	30	70	100	3	2
5	SEC	O5.0CA200C05A	Research Innovation Catalyst II	100	-	100	3	1
6	SEC	O5.0CDC296C05	Placement Competency Enhancement-IV	30	70	100	3	1
7	Audit Pass	O4.5PT100C09	Sports & Yoga	30	70	100	3	0
Elective Courses (Any 1)								
7	Discipline Electives	O5.0CA203C02	Data Science Essentials	30	70	100	3	3
		O5.0CA204C02	Machine Learning					
		O5.0CA205C02	Network Security and Cryptography					
		O5.0CA206C02	Cloud Computing					
Elective (Any 1)								
8	Discipline Electives	O5.0CAAI200C02H	Cloud Based ML Solutions	30	70	100	3	4
		O5.0CACs201C02H	Cyber Security Operations					
		O5.0CADS200C02H	Data Management Techniques					
TOTAL								23

BCA SEMESTER- V								
S.No.	Course Type	Course Code	Title of Course	Continuous Assessment	End Semester Exam	Total	Duration of Exam	Credits
1	Core	O5.5CA102C01H	Internet of Things	30	70	100	3	3
2	Core	O5.5CA103C01	Cyber Security	30	70	100	3	2
3	Core	O5.5CA104C01H	Full Stack Development	30	70	100	3	4
4	Core	O5.5CA105C01H	Data Engineering & Data Warehousing	30	70	100	3	3
5	SEC	O5.5CA101C05	Intellectual Property Rights (IPR) & Entrepreneurship	100	-	100	3	1
6	Internship	O5.5CA100C06A	Internship-II	30	70	100	3	2
Elective Courses								
7	Discipline Elective	O5.5CA101C02H	Data Analytics using Python	30	70	100	3	3
		O5.5CA102C02H	AI-powered Web Applications					
		O5.5CA103C02H	Ethical Hacking					
		O5.5CA104C02H	Open Source Technologies					
	TOTAL CREDITS							18
Elective (Any 1)								
8	Discipline Elective	O5.5CAAI100C02H	Advanced Cloud Based ML Solutions	30	70	100	3	4
		O5.5CACs100C02H	Security of cloud-based platforms					
		O5.5CADS100C02H	Visual Statistics and Model Building					
TOTAL CREDITS								22

BCA SEMESTER- VI								
S.No.	Course Type	Course Code	Title of Course	Continuous Assessment	End Semester Exam	Total	Duration of Exam	Credits
1	Dissertation	O5.5CA200C06	Major Project	30	70	100	3	4
Elective Courses								
2	Discipline Elective	O5.5CA211E02	Soft Computing	30	70	100	3	3
		O5.5CA212E02	Wireless Sensor Networks					
		O5.5CA213E02	Distributed Database					
3	Discipline Elective	O5.5CA214E02H	Gaming Technology	30	70	100	3	4
		O5.5CA215E02H	Computer Graphics and Visualisation					
		O5.5CA216E02H	Mobile Application Development					
4	Discipline Elective	O5.5CA217E02H	Business Intelligence	30	70	100	3	4
		O5.5CA218E02H	Image Processing using AI					
		O5.5CA219E02H	Web3 Technologies					
		O5.5CA220E02H	Serverless Computing					
TOTAL ELECTIVES								11
TOTAL CREDITS								15

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O4.5CA100C00A : Elements of Mathematics

Credits:4

Max. Marks:100

Duration of Examination: 3 Hrs

Continuous Evaluation: 30
End Semester Examination: 70

Pre-Requisites: Basic Mathematics and Logical Reasoning
Course Type: Foundation

Course Outcomes: At the end of the course, the students will be able to:

- O4.5CA100C00A.1: Define the fundamental concepts and terminology of mathematical foundations for computing.
O4.5CA100C00A.2: Explain the principles and techniques used in algebraic, trigonometric, calculus, and geometric problem solving.
O4.5CA100C00A.3: Apply appropriate mathematical methods to solve computational and analytical problems.
O4.5CA100C00A.4: Analyze mathematical problems by selecting and applying suitable techniques and computational approaches.
O4.5CA100C00A.5: Evaluate mathematical solutions based on their correctness, efficiency, and applicability to computational and real-world problems.

PART- A

UNIT 1: Matrix Operations

- 1.1 Introduction to Matrices
- 1.2 Types of Matrices
- 1.3 Matrix Operations
- 1.4 Determinant
- 1.5 Inverse of matrices
- 1.6 Rank of matrix
- 1.7 Solution of Linear Equations (Crammer's Rule)

UNIT 2: Indices and Surds

- 2.1 Basics of indices
- 2.2 Applications of indices
- 2.3 Basics of Surds
- 2.4 Applications of Surds
- 2.5 Concept of Logarithm
- 2.6 Applications of Logarithm

UNIT 3: Binomial Expansion and Counting Techniques

- 3.1 Basics of Binomial theorem
- 3.2 Applications of binomial theorem (positive index)
- 3.4 Permutations
- 3.5 Combinations

PART - B

UNIT 4: Trigonometric Concepts and Applications

- 4.1 Systems of Measuring Angles and Trigonometric Functions
- 4.2 Trigonometric Identities and Signs of Trigonometric Functions
- 4.3 Standard Values of Trigonometric Ratios
- 4.4 Trigonometric Ratios of Allied Angles
- 4.5 Addition and Subtraction Formulae
- 4.6 Transformation of Products into Sum or Difference of Trigonometric Ratios

UNIT 5: Differential Calculus

- 5.1 Basics of Differentiation
- 5.2 Product Rule and Quotient Rule
- 5.3 Derivatives of composite functions
- 5.4 Chain Rule
- 5.5 Differentiation of implicit functions

Unit 6: Analytical Geometry

- 6.1 Coordinate System
- 6.2 Distance Formula and Section Formula
- 6.3 Straight Line: Slope, Equation, and Angle Between Two Lines
- 6.4 Different Forms of Equation of a Straight Line
- 6.5 Parallel and Perpendicular Lines

Suggested Readings:

1. Erwin Kreyszig, Advanced Engineering Mathematics (2025) Wiley, (latest edition).
2. Discrete Mathematics and Its Applications — Kenneth H. Rosen, 9th Edition (2023), McGraw-Hill.
3. Higher Algebra — S. Hall and S. R. Knight, Revised Edition (2023 Reprint), Arihant Publications.
4. Advanced Engineering Mathematics — Erwin Kreyszig, 11th Edition (2019),

Note: Only the latest editions of the books are recommended.

Web links:

1. <https://www.khanacademy.org/math/linear-algebra>
2. <https://www.mathsisfun.com>
3. <https://nptel.ac.in/courses>
4. <https://ocw.mit.edu/search/?d=Mathematics>
5. <https://tutorial.math.lamar.edu>
6. <https://mathworld.wolfram.com>

Instructions for paper setting: Seven questions are to be set in total. First question will be multiple choice covering entire syllabus and will be compulsory to attempt and will be of 18 marks. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 13 marks.

Evaluation Policy:

The evaluation will include two types of assessments:

(i) Continuous or formative assessments (in the form of end semester examination or term examination. Weightage of assessments are as follows:

For continuous or Formative assessment (in semester): Maximum 30 percent. The categorization for the same is:

- MCQs 30%
- Subjective (Short/Long) 40%
- Discussion/Presentation 15%
- Projects/Group Activities etc. 15%

(ii) For Summative assessment (End Semester Examination or End-Term Examination): Minimum: 70 percent.

Categorization for the same is:

Objective Type Questions: 30% Short/Long Questions: 70%

Assessment Tools:

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

Term end examination

COURSE ARTICULATION MATRIX:

CO-PO Statement	PO 1	PO 2	PO 3	PO4	PO 5	PO6	PO 7	PO 8	PO9	PO1 0	PO1 1	PSO 1	PSO 2
O4.5CA10 0C00A.1	1	1		2			2	3					
O4.5CA10 0C00A.2	1	1		2			3	3					
O4.5CA10 0C00A.3	1	1	1		2		3	3				2	1
O4.5CA10 0C00A.4	1	1	1	2	2		2	3				1	
O4.5CA10 0C00A.5	1	1		2			3	3					

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O4.5CA100C01AH : Introduction to IT & Programming in C

Credits :5

Max. Marks: 100

Duration of Examination: 3 Hrs

Continuous Evaluation:30

End Semester Examination: 70

Pre-Requisite: NA

Course Type: Core

Course Outcomes: At the end of the course, the student will be able to:

04.5CA100C01AH.1: Explain the fundamentals of problem solving, computational thinking, algorithms, and program development approaches.

04.5CA100C01AH.2: Analyse problems and represent solutions using flowcharts, pseudocode, and decision tables.

04.5CA100C01AH.3: Understand the basic concepts and building blocks of C programming.

04.5CA100C01AH.4: Design and implement programs using C language constructs, including decision-making structures, loops, and dynamic memory management

04.5CA100C01AH.5: Compare different algorithmic approaches and evaluate their correctness and efficiency for solving computational problems.

04.5CA100C01AH.6:Design and build simple programs to solve real-life or mathematical problems using structured programming.

UNIT 1: Problem Solving Fundamentals

1.1 Introduction to Problem Solving: Problem identification, analysis, decomposition, abstraction and computational thinking

1.2 Program Development Approaches: Top-down and bottom-up design, modular programming

1.3 Techniques of Problem Solving: Flowcharts, pseudocode, Algorithms

1.4 Introduction to Programming Languages: Machine language, assembly language, and high-level languages

1.5 Language Translators: Assemblers, compilers, interpreters and linkers

UNIT 2: Basics of C Language and its Preprocessor

2.1 Structure of a C Program: Header files, main() function, comments, and program execution

2.2 Preprocessor: various preprocessor directives.

2.3 Tokens, identifiers and keywords; constants and variables

2.4 Data Types

2.5 Operators: Arithmetic; Relational; Logical; Bitwise; Increment; Decrement; Assignment, Conditional operators

2.6 Compilation and execution of C program

UNIT 3: I/O Functions and Control Statements

3.1 Console-based formatted I/O: printf() and scanf()

3.2 Character-based I/O functions: getchar(), putchar(), getch(), getche(), and putch()

3.3 Decision Making: if, if-else, nested if, and else-if ladder

3.4 Iterative Statements: for, while, and do-while loops

3.5 Branching and Jump Statements: switch statement; break; continue; goto; exit() function

UNIT 4: Arrays and String

- 4.1 Arrays: Single and two dimensional arrays
- 4.2 Accessing, Initialising and Traversing Array
- 4.3 Applications of Arrays
- 4.5 Concept of Strings and String Representation in C
- 4.6 String I/O functions: gets() ,puts(),getchar() and putchar().
- 4.7 String Manipulation Functions

UNIT 5: Functions

- 5.1 Functions: Declaration, Definition and Calling
- 5.2 Function Prototype and Return Values
- 5.3 Passing parameters: Call by value and call by reference
- 5.4 Scope and Lifetime of Variables: Local and global variables
- 5.5 Sharing variables between functions
- 5.6 Introduction to recursion

UNIT 6: Structure, Union and Pointers

- 6.1 Structure and Union: Declaration, initialisation, and accessing members
- 6.2 Array of structure and union
- 6.4 Pointers: Basics of pointers
- 6.5 Pointer operator
- 6.6 Application of a pointer
- 6.7 Array and Pointers
- 6.8 Dynamic memory allocation (malloc (), calloc () realloc())
- 6.9 Applications of Pointers
- 6.10 Precedence of & and * Operators

Suggested Readings:

- 1. Byron Gottorfried, 2018, Schaum's Outline of Programming with C, Tata McGraw- Hill.
- 2. E. Balaguruswami, 2024, Programming in ANSI 'C', Tata McGraw- Hill.
- 3. Yashwant Kanetkar, 2025, Let Us C ,BPB Publications
- 4. Ashok Kamthane, 2023, Programming with ANSI and TURBO C, Pearson Publications

Note: Only the latest editions of the books are recommended.

List of Experiments:

BEGINNER LEVEL(NSQF LEVEL: 1-3)

S. No.	Name of the Program	Bloom Level with Cognitive Process
1	Write a Program to perform arithmetic operations (Addition, Subtraction, Multiplication, Division) on two numbers.	Apply (Performing arithmetic operations) / L3
2	Write a Program to calculate gross salary of an employee [using formula: gross_sal = basic_sal+hra+da].	Apply (Using arithmetic expressions) / L3
3	Write a Program to find sum and reverse of a three-digit number.	Apply (Manipulating digits using basic operations) / L3

4	Write a Program to swap two numbers without using a third variable.	Apply (Using arithmetic logic) / L3
5	Write a Program to print a table of any number.	Apply (Using loops for repeated operations) / L3
6	Write a Program to find greatest among three numbers.	Apply (Using conditional statements) / L3
7	Write a Program to check whether entered year is a leap year or not.	Apply (Using conditional branching) / L3
8	Write a Program to find whether a given number is even or odd.	Apply (Using modulus operator and conditional statements) / L3
9	Write a Program to find the roots of a Quadratic Equation.	Apply (Applying quadratic formula) / L3
10	Write a Program to use switch statement to display Monday to Sunday.	Apply (Using control structures - switch case) / L3
11	Write a Program to calculate power of a number using #DEFINE.	Apply (Using macros and mathematical operations) / L3

INTERMEDIATE LEVEL(NSQF LEVEL: 4-6)

S. No.	Name of the Program	Bloom Level with Cognitive Process
12	Write a program to display the first 10 natural numbers and calculate their sum.	Apply (Using loops and arithmetic operations) / L3
13	Write a program to calculate the factorial of a given number.	Apply (Using loops and recursive logic) / L3
14	Write a program to generate the Fibonacci series up to 'n' terms.	Apply (Using iterative or recursive methods) / L3
15	Write a program to print a pattern of stars in increasing sequence.	Apply (Nested loops for pattern generation) / L3
16	Write a program to check whether a given number is a palindrome or not.	Apply (Using loops and conditional checking) / L3
17	Write a program to find the maximum number in an array.	Apply (Array traversal and comparison operations) / L3
18	Write a program to search an element in an array.	Apply (Using linear search technique) / L3
19	Write a program to calculate the sum of two matrices.	Apply (Matrix manipulation and arithmetic operations) / L3
20	Write a program to perform subtraction of two matrices.	Apply (Matrix operations using arrays) / L3
21	Write a program to perform multiplication of two matrices.	Apply (Nested loops and matrix multiplication logic) / L3
22	Write a program to find the transpose of a matrix.	Apply (Matrix manipulation using nested loops) / L3
23	Write a program to concatenate two strings without using the built-in strcat function.	Apply (String manipulation using loops) / L3

24	Write a program using functions to check whether a number is Prime and/or Armstrong.	Apply (Modular programming and mathematical operations) / L3
25	Write a program to convert a binary number to decimal and vice-versa.	Apply (Number system conversion techniques) / L3
26	Write a program to create, initialize, assign, and access a pointer variable.	Apply (Understanding and using pointers) / L3
27	Write a function that reverses the elements of an array in-place, accepting a pointer and returning void.	Apply (Pointer manipulation and array operations) / L3
28	Write a program to create a structure Student containing Roll No., Name, Class, Year, and Total Marks.	Apply (Using structures for data organization) / L3
29	Write a program to add two distances (in feet and inches) using structures.	Apply (Using structures and arithmetic operations) / L3
30	Write a program to add two complex numbers by passing structures to a function.	Apply (Passing structures to functions for computation) / L3

ADVANCED LEVEL(NSQF LEVEL: 7-10)

S. No.	Program Statement	Bloom's Level with Cognitive Process	Programs Mapped with Ability Enhancement Courses (IKS / SDG / EVS / FinTech)
31	Write a C program to calculate the Air Quality Index (AQI) for PM2.5 pollutant based on CPCB NAQI standards. Input PM2.5 concentration and display the AQI category (Good, Satisfactory, Moderate, Poor, Very Poor, Severe).	Apply (Using conditional logic and CPCB standard mapping) / L3	EVS
32	Write a C program to calculate the Body Mass Index (BMI) using weight and height inputs. Display BMI value and corresponding health status (Underweight, Normal, Overweight, Obese).	Apply (Mathematical computation and conditional display) / L3	SDG
33	Write a C program to recommend the ideal daily water intake based on weight, using the formula Water Intake = weight $\times$ 0.033. Display result with hydration tips.	Apply (Simple arithmetic formula application) / L3	SDG
34	Write a C program to calculate the Life Path Number from a date of birth (DD- MM-YYYY) by summing all digits until a single-digit number is obtained.	Apply (Digit extraction and iterative sum) / L3	IKS
35	Write a C program to calculate the day of the week for a given Gregorian date using Zeller's Congruence and display its Sanskrit weekday name (e.g., Somvar, Mangalvar).	Analyze (Algorithm application and traditional mapping) / L4	IKS
36	Write a C program to take the speed of a vehicle as input and determine if a fine needs to be charged	Apply (Conditional branching and decision making) / L3	SDG

	based on predefined over-speeding rules. Calculate and display the fine amount.		
37	Write a C program to calculate the approximate positions of the Moon, Sun, and Earth based on a Gregorian date using simplified astronomical formulas. Display celestial positions or phases.	Analyze (Use of scientific approximations and computation) / L4	IKS
38	Write a C program to simulate a simple FinTech transaction: Take user input for account balance and transaction amount; check for sufficient funds, perform a transaction, and print the updated balance or a decline message.	Apply (Financial transactions and validations) / L3	FinTech

Suggested Readings:

1. E.Balaguruswami, 2024, Programming in ANSI 'C' , Tata McGraw- Hill.
2. Ashok Kamthane, 2023, Programming with ANSI and TURBO C , Pearson Education.
3. K R. Venugopal, 2019, Mastering C ,Tata McGraw Hill.
4. Herbert Schildt, 2017, The Complete Reference , Tata McGraw Hill.

Note: Only the latest editions of the books are recommended.

Software required/Web links:

- GCC Compiler, Dev C++
- <https://sourceforge.net/projects/orwelldevcpp/> (Last accessed: April 28, 2025).
- <http://www.codeblocks.org/>(Last accessed: April 28, 2025)

Instructions for paper setting: Seven questions are to be set in total. First question will be multiple choice covering entire syllabus and will be compulsory to attempt and will be of 18 marks. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 13 marks.

Evaluation Policy:

The evaluation will include two types of assessments:

(iii) Continuous or formative assessments (in the form of end semester examination or term examination. Weightage of assessments are as follows:

For continuous or Formative assessment (in semester): Maximum 30 percent. The categorization for the same is:

MCQs 30%
Subjective (Short/Long) 40%
Discussion/Presentation 15%
Projects/Group Activities etc. 15%

(iv) For Summative assessment (End Semester Examination or End-Term Examination): Minimum: 70 percent.

Categorization for the same is:
 Objective Type Questions: 30%
 Short/Long Questions: 70%

Assessment Tools:

Assignment/Tutorials Sessional tests
 Surprise questions during lectures/Class Performance
 Term end examination

COURSE ARTICULATION MATRIX:

CO-PO/ Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
O4.5CA100 C01AH.1	3	2					2					3	3
O4.5CA100 C01AH.2	2	3	2	2			2					3	3
O4.5CA100 C01AH.3	3	2					2					3	3
O4.5CA100 C01AH.4	2	3	3	2	3		2				2	3	3
O4.5CA100 C01AH.5	2	3	3	2	2		2				2	3	3
O4.5CA100 C01AH.6	2	2	3	2	3		2				2	3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

O4.5CA101C01AH: WEB TECHNOLOGIES

Credit:4

Max. Marks: 100

Continuous Evaluation: 30

Duration of Examination: 3 Hrs

End Semester Examination: 70

PreRequisites: NA

Course Type: Core

Course Outcomes: At the end of the course, the students will be able to:

O4.5CA101C01AH.1: Understand the fundamentals of Web Technologies, web architecture, HTML5, CSS, JavaScript, and server-side scripting concepts.

O4.5CA101C01AH.2: Apply HTML5 and CSS techniques to create structured, responsive, and visually appealing web pages.

O4.5CA101C01AH.3: Analyse web page structures and implement JavaScript-based DOM manipulation, event handling, and form validation to enhance user interaction.

O4.5CA101C01AH.4: Assess front-end design practices, responsive layouts, and web development techniques to improve website usability and user experience.

O4.5CA101C01AH.5: Design basic dynamic web applications by integrating server-side scripting, databases, and deployment concepts.

UNIT 1: Introduction to Web Technologies

- 1.1 Evolution of the World Wide Web
- 1.2 Internet and Web Applications
- 1.3 Web Architecture and Components
- 1.4 Static and Dynamic Websites
- 1.5 Web Standards and W3C
- 1.6 Web Browsers and Developer Tools
- 1.7 Website Hosting and Domain Names
- 1.8 Modern Web Development Environment

UNIT 2: User Interface Design using HTML

- 2.1 Introduction to HTML5
- 2.2 HTML Document Structure
- 2.3 Text Formatting and Semantic Elements
- 2.4 Hyperlinks and Navigation
- 2.5 Images and Multimedia
- 2.6 Lists and Tables
- 2.7 Forms and Input Controls
- 2.8 HTML5 Form Elements

UNIT 3: HTML Forms and CSS Fundamentals

- 3.1 CSS Introduction
- 3.2 CSS Selectors and Properties
- 3.3 Colors, Fonts and Backgrounds
- 3.4 Box Model
- 3.5 CSS Layout Techniques
- 3.6 Flexbox Layout
- 3.7 CSS Grid Layout
- 3.8 Responsive Web Design

UNIT 4: Cascading Style Sheets

- 4.1 Types of CSS
- 4.2 Text and Font Styling
- 4.3 Borders, Margins and Padding
- 4.4 Positioning and Navigation Bars
- 4.5 CSS Transitions
- 4.6 CSS Transformations
- 4.7 CSS Animations

UNIT 5: JavaScript Basics

- 5.1 Introduction to JavaScript
- 5.2 Variables and Data Types
- 5.3 Operators and Control Statements
- 5.4 Functions and Arrays
- 5.5 DOM Manipulation
- 5.6 Events and Event Handling
- 5.7 Form Validation
- 5.8 Error Handling and Debugging

UNIT 6: Server-Side Scripting and Database Basics

- 6.1 Introduction to Server-Side Technologies
- 6.2 Node.js and Express.js
- 6.3 Routing and Middleware
- 6.4 RESTful APIs
- 6.5 Introduction to Databases
- 6.6 SQL and CRUD Operations
- 6.7 MongoDB Basics
- 6.8 Website Deployment Basics

Suggested Readings:

1. Ivan Bayross,2005, HTML, DHTML, PERL, CGI, BPB Publications.
2. Behrouz A. Forouzan,2013, Data Communication and Networking, McGraw Hill.
3. Stuart Langridge, 2005, DHTML Utopia - Modern Web Design Using JavaScript &DOM,Sitepoint.
4. Elizabeth Castro,2013, HTML 4 for World Wide Web: Visual Quick Start Guide,Peachpit Press.

Note: Only the latest editions of the books are recommended. Software required/ Weblinks:

1. W3schools.com (Last visited date: 17 May 2024)
2. <https://www.tutorialspoint.com/html/> (Last visited date:17 May 2024)
3. <https://www.csstutorial.net/> (Last visited date:17 May 2024)
4. <https://javascript.info/> (Last visited date:17 May 2024)

List of Experiments:

BEGINNER LEVEL (NSQF LEVEL: 1-3)

S. No.	Program	Bloom Level with Cognitive Process
1	Create a simple HTML page using basic tags.	Apply (Using basic HTML tags) / L3
2	Create a web page that displays your name to the screen.	Apply (Using HTML to display content) / L3
3	Create a web page and show the output from 1 to 10 in separate lines.	Apply (Using HTML to display multiple lines) / L3
4	Create a web page and show the output from 1 to 10 in separate lines, each number being in different colour.	Apply (Using HTML and CSS for color styling) / L3
5	How do I make a picture as a background on my web pages?	Understand (Using CSS for background image) / L2
6	Create a web page to print a paragraph with 4-5 sentences, each sentence shall have a different font.	Apply (Using HTML and CSS for different fonts) / L3
7	Write HTML code to print a paragraph that is a description of a book, it shall include the title of the book, its author name; name and title should be underlined and all adjectives shall be bold and Italics.	Apply (Using HTML for text formatting and structure) / L3
8	Write HTML code to print your name using Heading tag, every letter shall be of different heading size.	Apply (Using HTML heading tags and size attributes) / L3
9	Write HTML code to print the sequence of numbers 1-20. Each number shall be in a different line with number 2 next to it as subscript, an equal sign and the result.	Apply (Using HTML, subscript, and mathematical operations) / L3
10	Write HTML code to display an image with a border of size 200x200 pixels, leaving Hspace and Vspace of your choice with the image hanging on the right side of the screen.	Apply (Using HTML and CSS for image formatting and positioning) / L3

INTERMEDIATE LEVEL (NSQF LEVEL: 4-6)

S. No.	Program	Bloom Level with Cognitive Process
11	Write HTML code to create a web page with a heading at the top-center and an image below it, centered on the page using basic HTML and CSS.	Apply (Using HTML and CSS for basic page layout) / L3
12	Write HTML code to use multimedia tags like <audio> and <video> for including audio and video on a webpage.	Apply (Using HTML multimedia tags) / L3
13	Create a table in HTML using rowspan and colspan to organize student records, displaying name, roll number, and marks.	Apply (Using HTML table with rowspan and colspan) / L3

14	Write HTML code to create a table using <table> tag and set the cellpadding and cellspacing attributes to control spacing within and around the table cells.	Apply (Using HTML table attributes) / L3
15	Create unordered, ordered, and definition lists for your subjects in MCA 1st, 2nd, and 3rd semesters using HTML , , and <dl> tags.	Apply (Using HTML list tags) / L3
16	Write HTML code using <frameset> and <frame> tags to display multiple sections of a webpage with scrollable frames.	Apply (Using frames for webpage layout) / L3
17	Write HTML code to design a simple form with controls like textbox, textarea, password, submit button, browse button, and a drop-down menu.	Apply (Creating a form with HTML form elements) / L3
18	Design a basic registration form using HTML with controls like textboxes, radio buttons, and a submit button.	Apply (Designing a form with HTML controls) / L3
19	Write HTML code to create a student admission form with fields like name, roll number, course, etc., and a submit button.	Apply (Creating a student admission form using HTML) / L3
20	Create a simple home page for yourself using HTML components like headings, paragraphs, images, and links, and apply styles.	Apply (Designing a basic home page) / L3
21	Write HTML code to create a local hyperlink that links to another page or section within the same webpage using anchor <a> tags.	Apply (Creating a local hyperlink) / L3
22	Write HTML code to create an inter hyperlink that links to another webpage or section within a different page using anchor <a> tags.	Apply (Creating an inter hyperlink) / L3
23	Write HTML code to create an external hyperlink that links to a completely different website using anchor <a> tags.	Apply (Creating an external hyperlink) / L3
24	Write HTML code to link an external CSS file to your HTML page using the <link> tag.	Apply (Linking external CSS file) / L3
25	Write HTML code to include internal CSS within a <style> tag inside the <head> section of the webpage.	Apply (Using internal CSS) / L3
26	Write HTML code to use inline CSS styles within an element using the style attribute.	Apply (Using inline CSS) / L3
27	Write a JavaScript program to add two numbers using an HTML form and display the result.	Apply (Using HTML form and JavaScript to perform a calculation) / L3
28	Write a JavaScript program to swap two images on mouseover using the onmouseover event.	Apply (Using JavaScript to manipulate DOM with events) / L3
29	Write a simple JavaScript program to sort an array of numbers in ascending order and display the result.	Apply (Using JavaScript to sort arrays) / L3
30	Write a JavaScript program to take three numbers from the user, find the minimum and maximum, and display them in bold text in the specified format: MINIMUM = [value], MAXIMUM = [value].	Apply (Using JavaScript for user input, logic, and DOM manipulation) / L3

ADVANCED LEVEL (NSQF LEVEL: 7-10)

S. No.	Name of the Program	Bloom level with Cognitive process	Programs mapped with Ability Enhancement Courses
1	Create a personal blog webpage where you can showcase posts about various topics, such as technology, lifestyle, travel, etc. Each blog post will include a title, an image, and a short description. This webpage will have a navigation bar at the top with links to different categories, allowing the user to navigate between different blog sections.	Create (Web Design) / L3	IKS
2	Design a contact form webpage that allows visitors to send messages to the site owner. The form will include fields for the user's name, email, subject, and message. It will also include a button to submit the form. This program will practice handling form inputs and basic form submission concepts.	Apply (Form Handling) / L3	IKS
3	Design a webpage for an online store that displays products for sale. Each product will have an image, description, and price. The page will be divided into sections for different product categories (e.g., Electronics, Clothing, Accessories). Use CSS to style the layout, ensuring it looks visually appealing.	Create (eCommerce Design) / L3	FinTech
4	Create a web page to help individuals and organizations estimate the amount of CO2 they could potentially save by transitioning from traditional fossil fuel-based energy sources (such as coal or natural gas) to renewable energy sources, specifically solar power. By entering their monthly energy consumption (in kWh), users can calculate the estimated reduction in CO2 emissions they would achieve by using solar energy instead of coal or natural gas. The program provides output that shows the amount of CO2 saved per month, making it a useful tool for individuals and businesses looking to understand the environmental impact of their energy choices and promote sustainable practices.	Analyze (Energy Calculations) / L4	EVS
5	Develop a web application where users can input their daily water usage for activities like showering, toilet flushing, dishwashing, and washing clothes, and the application will calculate total water consumption, compare it with sustainable standards, and provide personalized tips for reducing water usage to	Evaluate (Sustainability Analysis) / L5	SDG

	promote water conservation and sustainability.		
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Suggested Readings:

1. Ivan Bayross, HTML, DHTML, PERL, CGI, BPB Publications.
2. Behrouz A. Forouzan, Data Communication and Networking, McGraw Hill.
3. Stuart Langridge, DHTML Utopia - Modern Web Design Using JavaScript & DOM, Sitepoint.
4. Elizabeth Castro, HTML 4 for World Wide Web: Visual Quick Start Guide, Peachpit Press.

Software required/Weblinks :

- Notepad / Notepad++ / Visual Studio Code / Sublime Text Web Browser (Google Chrome / Mozilla Firefox)
- <https://www.tutorialspoint.com/java/index.htm> (Last visited Date: 28 April 2025)
- <https://www.javatpoint.com/java-tutorial> (Last visited Date: 28 April 2025)
- <https://archive.nptel.ac.in/courses/106/105/106105191/> (Last visited Date: 16 April 2025)

Instructions for paper setting: Seven questions are to be set in total. First question will be multiple choice covering entire syllabus and will be compulsory to attempt and will be of 18 marks. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 13 marks.

Evaluation Policy:

The evaluation will include two types of assessments:

(v) Continuous or formative assessments (in the form of end semester examination or term examination. Weightage of assessments are as follows:

For continuous or Formative assessment (in semester): Maximum 30 percent. The categorization for the same is:

MCQs 30%
 Subjective (Short/Long) 40%
 Discussion/Presentation 15%
 Projects/Group Activities etc. 15%

(vi) For Summative assessment (End Semester Examination or End-Term Examination): Minimum: 70 percent.

Categorization for the same is:
 Objective Type Questions: 30% Short/Long Questions: 70%

Assessment Tools:

Assignment/Tutorials
 Sessional tests
 Surprise questions during lectures/Class
 Performance Term end examination

COURSE ARTICULATION MATRIX:

CO-PO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
O4.5CA101C01A H.1	3	2										2	
O4.5CA101C01A H.2	3	2	3		3							3	2
O4.5CA101C01A H.3	3	2	3		3							3	3
O4.5CA101C01A H.4	3	3	3	2	3				2			3	3
O4.5CA101C01A H.5	3	3	3	3	3				2			3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

O4.5CA101C05 : DIGITAL EDITING AND MOTION GRAPHICS

Credits: 1

Max. Marks: 100

Duration of Exam: 3Hrs

Continuous Evaluation:30

End Semester Examination:70

Pre-Requisite: NA

Course Type: SEC

Course Type: The students will be able to:

O4.5CA101C05.1: Understand the fundamental concepts, principles, tools, and workflows of digital editing, motion graphics, and AI in digital media.

O4.5CA101C05.2: Apply digital editing, motion graphics, and AI-assisted techniques to create and enhance multimedia content.

O4.5CA101C05.3: Analyze multimedia projects by selecting and integrating appropriate editing, animation, audio, and visual effects techniques.

O4.5CA101C05.4: Evaluate multimedia solutions based on technical quality, creativity, efficiency, and ethical considerations.

O4.5CA101C05.5: Develop professional-quality multimedia projects by applying digital editing, motion graphics, AI-assisted tools, and responsible media practices.

Unit 1- Introduction to Digital Editing

- 1.1. Overview of digital editing principles
- 1.2. Introduction to Adobe Premiere Pro
- 1.3. Importing, organizing, and
- 1.4. Editing video clips

Unit-2: Basic Editing Techniques

- 2.1 Cutting, trimming
- 2.2 Arranging clips
- 2.3 Adding transitions
- 2.4 Adding Other Effects

Unit-3: Advanced Editing Techniques

- 3.1 Working with audio: editing soundtracks and adding music
- 3.2 Color correction and grading
- 3.3 Creating titles and lower thirds
- 3.4 Key framing and animation basics

Unit-4: Introduction to Motion Graphics

- 4.1 Understanding Motion Graphics Principles
- 4.2 Introduction to Adobe After Effects
- 4.3 Creating basic animations and motion graphics

4.4 Working with text animations

4.5 Using shape layers and masks

Unit-5: Advanced Motion Graphics Techniques

5.1 Advanced animation techniques: expressions and scripting

5.2 Working with 3D layers and cameras

5.3 Integrating graphics with video footage

5.4 Creating visual effects and compositing

Unit-6: Project Development & AI for Digital Editing

6.1 Planning and developing a digital editing and motion graphics project

6.2 Storyboarding and pre-production

6.3 Usage of AI in Video Editing

6.4 Generative AI for Creative Media

6.5 Ethical Issues in AI-generated Media

6.6 Copyright, Deepfakes, and Responsible AI

Textbooks/Reference Books:

1. "Digital Editing and Motion Graphics Handbook"

2. Adobe Creative Cloud handbook

3. Online tutorials:

Software required/Web links:

1. griffinpictures.in/blog/motion-graphics-and-video-editing-whats-the-difference/ last update 30th May 2024

2. Motion Graphics Notes - Akshansh Chaudhary | PDF (slideshare.net) last update 30th May 2024

Instructions for paper setting: Seven questions are to be set in total. First question will be multiple choice covering entire syllabus and will be compulsory to attempt and will be of 18 marks. Three questions will be set from each Part A and Part B (one from each unit). Student needs to attempt two questions out of three from each part. Each question will be of 13 marks.

Evaluation Policy:

The evaluation will include two types of assessments:

(vii) Continuous or formative assessments (in the form of end semester examination or term examination.

Weightage of assessments are as follows:

(viii) For continuous or Formative assessment (in semester): Maximum 30 percent. The categorization for the same is: MCQs 30%

Subjective (Short/Long) 40%

Discussion/Presentation 15%

Projects/Group Activities etc. 15%

(ix) For Summative assessment (End Semester Examination or End-Term Examination): Minimum: 70 percent.

Categorization for the same is:
Objective Type Questions: 30%
Short/Long Questions: 70%

Assessment Tools:

Assignment/Tutorials
Sessional tests
Surprise questions during lectures
Class Performance
Term end examination

COURSE ARTICULATION MATRIX:

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O4.5CA101C05.1	2	1	3	2	3		3					2	2
O4.5CA101C05.2	2	2	3	3	2		1		3			2	1
O4.5CA101C05.3	3	2	3	2	2	3				1		1	2
O4.5CA101C05.4	2	1	3	2	2		3				3	2	2
O4.5CA101C05.5	2	2	3	3	2		1		3			2	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES (MRIIRS)
(Deemed to be University under Section 3 of the UGC Act 1956)
NAAC 'A++' Grade University

O4.5SBSS100C04:Indian Knowledge System (IKS)

Credits:2

Maximum marks : 100

Continuous Assessment : 70

Duration of theory examination: 2hrs.

End Semester Examination: 30

Prerequisites: Nil

Course Type: AEC

Course Outcomes

After completion of this course, the students will be able to:

O4.5SBSS100C04.1 : Understanding the scientific value of the traditional knowledge of Bhārata.

O4.5SBSS100C04.2 : Understand the contribution of Indian minds in various fields.

O4.5SBSS100C04.3: Know the contributions made by ancient Indians in the field of knowledge.

O4.5SBSS100C04.4: Link ancient wisdom in the current context

O4.5SBSS100C04.5: Develop a comprehensive understanding of various schools of thoughts.

Module 1: Introduction to IKS

- 1.1 What is Indian Knowledge System
- 1.2 Indian Culture & Civilization
- 1.3 Indian Architecture
- 1.4 Indian Philosophical System

Module 2: Kalas and Vidyas of Ancient India

- 2.1 64 Kalas
- 2.2 14 Vidyas (Vedas, UpaVedas, Vedangas)

.

Module 3: Introduction to Health Regimen

- 3.1 Understanding Swastha vritta
- 3.2 Healthy regimen to maintain state of wellbeing Dinacharya
- 3.3 Daily regimen including Daily detoxification, exercise, Intake of Food, Water, Air and Sunlight, work and ergonomics, Rest and sleep hygiene
- 3.4 Ritu charya, the seasonal regimen
- 3.5 Sadvritta and the concept of social wellbeing
- 3.6 Concept of Shadrasa in choosing appropriate nourishment to the body and mind.

Module 4: Introduction to Indian Psychology

- 4.1 Concept of Manas in Ayurveda and understanding Mind Body harmony
- 4.2 Triguna based Psychology in Ayurveda and Yoga
- 4.3 Influence of Tri dosha on Mind, Mind body intellect and consciousness complex
- 4.4 Understanding Consciousness and solution to issues within Human Mind

Module 5: Engineering, Technology and Architecture

- 5.1: Pre-Harappan and Sindhu Valley Civilization
- 5.2: Laboratory and Apparatus, Juices, Dyes
- 5.3: Paints and Cements
- 5.4: Glass and Pottery

Text Books/ Reference Books:

1. Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavana R.N. (2022), "Introduction to Indian Knowledge System: Concepts and Applications", PHI Learning Private Ltd. Delhi.
2. Pride of India: A Glimpse into India's Scientific Heritage, Samskrita Bharati, New Delhi.
3. Sampad and Vijay (2011). "The Wonder that is Sanskrit", Sri Aurobindo Society, Puducherry.
4. Acarya, P.K. (1996). Indian Architecture, Munshiram Manoharlal Publishers, New Delhi.
5. Kapoor Kapil, Singh Avadhesh (2021). "Indian Knowledge Systems Vol – I & II", Indian Institute of Advanced Study, Shimla, H.P.
6. Dasgupta, S. (1975). A History of Indian Philosophy- Volume 1, Motilal Banarsidass, New Delhi.
7. P Lofker, K. (1963). Mathematics in India, Princeton University Press, New Jersey, USA"

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)

NAAC 'A++' Grade University

O4.5CDC196C05: Placement Competency Enhancement-I

Credits: 1

Max. Marks: 100

Internal Evaluation: 30

End Semester Examination: 70

Course type: SEC

Course Outcomes: The students will be able to:

O4.5CDC196C05.1: Develop an all-round personality by mastering interpersonal skills to function effectively in different circumstances.

O4.5CDC196C05.2: Demonstrate effective communication through grammatically correct language.

O4.5CDC196C05.3: Apply effective listening and speaking skills in real-life scenarios.

O4.5CDC196C05.4: Solve problems based on the number system, Average & Progression.

O4.5CDC196C05.5: Solve problems based on verbal reasoning & simplification.

Unit 1: Attitudinal Communication

1.1 Attitude and its Impact on Communication

1.2 Courtesy & Politeness in Communication

1.3 Diversity & Inclusion – Bullying, Cultural Sensitivity, Stereotypes, Sexual Harassment, LGBTQ, Respect, Chivalry, Racial & Gender Discrimination, Disability Harassment, Inclusion.

Unit 2: Syntactical Communication - I

2.1 Common errors in communication

2.2 Identification of word class

2.3 Errors & rectifications in

2.3.1 Article usage

2.3.2. Tenses usage - Present Perfect vs. Past Simple vs. Past Perfect

2.3.3 Subject Verb Agreement

Unit 3: Phonetics

3.1 Impact of First Language Influence

3.2 Tone

3.3 Intonation

3.4 Rate of Speech

3.5 Pronunciation: Vowels & Consonant sounds

Unit 4: Developing Communication Skills -I (Listening & Speaking)

- 4.1 Concept of LSRW: Importance of LSRW in communication.
- 4.2 Listening Skills: Real-Life challenges, Barriers to Listening
- 4.3 Speaking: Self Introduction, Interview, GD, Resume

Part B

Unit 5: Number System

- 5.1 Vedic Mathematics
 - 5.1.1 Basic mathematics
 - 5.1.2 Addition and subtraction using Vedic Mathematics
 - 5.1.3 Multiplication of two and three numbers.
- 5.2 Simplification
 - 5.2.1 BODMAS rule
 - 5.2.2 Fractions and recurring decimals
 - 5.2.3 Surds and indices
- 5.3. Numbers
 - 5.3.1 Types of numbers and number tree
 - 5.3.2 Divisibility Rule
 - 5.3.3 HCF & LCM
 - 5.3.4 Factors and Multiples
 - 5.3.5 Unit Digits & Cyclicity
 - 5.3.6 Remainders
 - 5.3.7 Factorials

Unit 6: Arithmetic 1

- 6.1 Averages
- 6.2 Progressions
- 6.3 Logarithm

Unit 7: Logical Reasoning 1

- 7.1 Direction Sense Test
- 7.2 Blood Relation Test
- 7.3 Ranking

Recommended Texts and Readings:

1. Abrams, D. A. (2019). Diversity and inclusion: The big six formula for success (1st ed.). Da Abrams Books.
2. Wren, P. C., & Martin, H. (2017). High school English grammar and composition (Revised ed.). S. Chand & Company Pvt. Ltd.
3. Lewis, N. (2015). Word power made easy (1st ed.). Penguin Random House Pvt. Ltd.
4. Estrada, C. (2021). Soft skills for the rigid worker: How to authentically lead, effectively manage, and master interpersonal relationships (1st ed.). Anti Fragile Media Group.
5. Vyner, J. (2018). Mastering soft skills (1st ed.). Matador.
6. <https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-diversity-equity-and-inclusion> (Last accessed: May 9, 2024)

Course Articulation Matrix:

[illegible]

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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O4.5QA100C04: INTRODUCTION TO SUSTAINABLE DEVELOPMENT GOALS

Credits: 2

Max. Marks: 100

Continuous Evaluation: 70

End Semester Exam: 30

Duration of Examination: 3Hrs

Course type: AEC

Course Outcomes:

The student will be able to:

O4.5QA100C04.1: Describe the UN 17 Sustainable Development Goals (SDGs) and their importance.

O4.5QA100C04.2: Identify major Sustainability Challenges by understanding the Environmental, Social and Economic dimensions of SDGs.

O4.5QA100C04.3: Demonstrate an ability to participate in building Sustainable Communities by applying the concepts of Sustainable Development.

O4.5QA100C04.4: Recognize the global implications of their actions by understanding their social, environmental, and economic responsibility as future professionals and citizens.

Unit 1: Introduction to Sustainable Development

- 1.1** Introduction to sustainable development, aspects of sustainability, developments vs sustainable development
- 1.2** Transition from Millenium Development Goals (MDPs) to Sustainable Development Goals (SDGs), Development and adoption of SDGs by the United Nations, India and SDGs: A vision for 2030
- 1.3** SDGs overview: Goals and targets, Status (Global and Indian), overview of key global sustainability challenges (inequality, climate change, poverty) including modern world social, environmental and economic structures and crises.

Sample Assignment/Case Study Topics: Short essay on the significance of sustainable development.
Summary of each of the 17 SDGs and their importance.

Unit 2: Overview of Goal 1: No Poverty, Goal 2: Zero Hunger and Goal 3: Good Health & Well Being

- 2.1** Understanding SDG 1 and its targets, understanding poverty: absolute, relative and multidimensional,

Causes of poverty, Key indicators of poverty, global and local perspectives: rural and urban poverty, eradication of poverty for access to basic services, role of community anti- poverty programmes and strategies for inclusive economic growth.

2.2 Understanding SDG 2 and its targets, types of hunger and malnutrition: global and local perspectives, the global hunger index, components of food security, food insecurity: barriers to food security, solutions to improve food access and support local farmers, emerging trends in sustainable agriculture and food security.

2.3 Understanding SDG 3 and its targets, means of implementation for the targets, sustainable health and lifestyle practices, global health trends, threats and challenges, public health strategies and systems for controlling communicable and non-communicable diseases, maternal and child health: reducing maternal and child mortality rates, mental health: awareness and access to care, occupational health: safety and work-life balance, reproductive health and rights, environmental

health and protection, health education and promotion, policies for inclusive and equitable health access.

Sample Assignment/Case Study Topics:

Case study analysis on a successful poverty or hunger alleviation initiative. Campus Rally on Zero Food Wastage

Analysis of Food Wastage across Campus: All Cafeterias, Hostels Analysis of Current Health Initiatives in India

Awareness programmes on Mental Health

Unit 3: Overview of Goal 4: Quality Education, Goal 5: Gender Equality and Goal 6: Clean Water & Sanitation

3.1 Understanding SDG 4 and its targets, importance of quality education for sustainable development, strategies for inclusive and equitable education, role of digital education and e-learning in today's scenario, importance of vocational training and skills development, research and innovation in quality education.

3.2 Understanding SDG 5 and its targets, gender equality and its impact on sustainable development, basic concepts of gender, gender identity and gender roles, international conventions and frameworks supporting gender equality, indicators and metrics for measuring gender equality progress, role of community engagement and awareness training for gender equality.

3.3 Understanding SDG 6 and its targets, importance of water and sanitation for sustainable development, strategies to improve access to safe drinking water, factors affecting water quality, importance of sanitation and hygiene for health, water conservation: wastewater management & water resource management, sustainable agriculture practices to conserve water, role of digital tools for water management.

Sample Assignment/Case Study Topics:

Research paper on impact of quality education initiatives in India

Essay on the challenges and strategies for achieving gender equality or reducing inequality Case studies on sustainable water and energy projects

Institution wide Pledge on Water Conservation

Unit 4: Overview of Goal 7: Affordable & Clean Energy, Goal 8: Decent Work & Economic Growth, Goal 9: Industry, Innovation & Infrastructure and Goal 11: Sustainable Cities & Communities

- 4.1** Understanding SDG 7 and its targets, types of energy sources & technologies, importance of clean energy and energy efficient technologies for sustainable development, sustainable energy management policies.
- 4.2** Understanding SDG 8 and its targets, economic growth & job creation for sustainable development, factors influencing economic growth, strategies for inclusive growth, global employment trends and challenges.
- 4.3** Understanding SDG 9 and its targets, role of innovation & infrastructure in sustainable development, strategies for sustainable industrialization, concept of industry 4.0, best practices for fostering innovation and technological advancements.
- 4.4** Understanding SDG 11 and its targets, trends & patterns of urbanization & sustainable city planning, social, economic & environmental challenges of urbanization, impact of rapid urbanization on infrastructure & services, importance of green & public spaces for urban quality of life.

Sample Assignment/Case Study Topics:

Analysis of ILO Reports on global employment trends

Examples of successful infrastructure and sustainable projects

Case study analysis on lessons learnt from successful urban initiatives Campus wide Awareness on Energy conservation

Unit 5: Overview of Goal 12: Responsible Consumption & Production, Goal 13: Climate Action, Goal 14: Life Below Water and Goal 15: Life on Land

- 5.1** Understanding SDG 12 and its targets, importance of sustainable consumption & production for overall sustainability, strategies to promote sustainable consumption, challenges & importance of effective waste management practices (reduce, reuse, recycle), concept of green procurement practices and its benefits, strategies for raising awareness in promoting sustainable consumption.
- 5.2** Understanding SDG 13 and its targets, importance of combating climate change for sustainable development, evidence & indicators of climate change, impact of climate change in public health, strategies for climate resilient agriculture, importance of education in promoting climate action.
- 5.3** Understanding SDG 14 and its targets, importance of oceans, seas & marine resources/ diversity for global sustainability, sources & types of marine pollution, its Impact on ecosystems & human health, strategies for reducing & managing marine pollution, balancing economic development with marine conservation, importance of education & awareness in marine conservation.
- 5.4** Understanding SDG 15 and its targets, importance of terrestrial ecosystems & biodiversity for sustainable development, sustainable forest management & biodiversity conservation practices, combating desertification, strategies for wildlife conservation, role of technology in monitoring & conserving terrestrial ecosystems.

Sample Assignment/Case Study Topics:

Examples of successful sustainable consumption and production initiatives Best practices followed by successful action initiatives

Examples of successful marine conservation and sustainable use initiatives

Case study analysis on successful conservation and sustainable land management initiatives

Unit 6: Overview of Goal 10: Reduced Inequalities, Goal 16: Peace, Justice & Strong Institutions, Goal 17: Partnership for the Goals

- 6.1** Understanding SDG 10 and its targets, importance of reducing inequality for sustainable development, types of inequality (Economics, Social, Political), role of education in reducing inequality, best practices for implementing & scaling effective inequality reduction strategies.
- 6.2** Understanding SDG 16 and its targets, importance of peace, justice & strong institutions for sustainable development, strategies for conflict prevention, resolution & peace building, strategies for promoting fair & effective justice systems, strategies for strengthening democratic & inclusive institutions.
- 6.3** Understanding SDG 17 and its targets, importance of global partnerships for sustainable development, strategies for building and maintain effective partnerships, strategies for integrating the SDGs into national & local development plans. Role of governments, NGOs, and private sector in achieving SDGs.

Sample Assignment/Case Study Topics:

Case study analysis on successful policies and programs for reducing inequality Examples of successful initiatives promoting peace, justice and strong institutions

Examples of successful global partnerships, successful initiatives & best practices in global partnerships

Group project on developing a partnership strategy for achieving a specific SDG

Suggested Readings:

1. The Sustainable Development Goals in Higher Education: A Transformative Agenda? 1st ed. 2021 Edition, by Wendy Steele (Author), Lauren Rickards (Author)
2. SDGs, Transformation, and Quality Growth: Insights from International Cooperation (Sustainable Development Goals Series) 1st ed. 2022 Edition, by Akio Hosono (Author)
3. United Nations document on the 2030 Agenda for Sustainable Development.
4. NPTEL course link: Education for Sustainable Development:
https://onlinecourses.nptel.ac.in/noc22_hs61/preview
5. Coursera Course: The Sustainable Development Goals – A global, transdisciplinary vision for the future: <https://www.coursera.org/learn/global-sustainable-development>
6. Coursera Course: The Age of Sustainable Development:
<https://www.coursera.org/learn/sustainable-development>
7. Coursera Course: The Great Sustainability Transition: Global challenges, Local actions:
<https://www.coursera.org/learn/sustainability-global-challenges-and-local-actions>
8. Coursera Course: Sustainable Development - Ideas and Imaginaries:
<https://www.coursera.org/learn/sustainable-development-ideas-and-imaginaries>