



**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 Program)  
as per NEP 2020**

**Batch: - 2024-2027 and onwards**

## **FOREWORD**

This is to certify that this booklet contains the entire Curriculum and Scheme of Examination of Bachelor of Computer Applications being offered at Manav Rachna Centre for distance and online education, BCA program of this University. This has been duly vetted and finally approved by the Academic Council of the University and changes, if any deemed appropriate, shall be duly incorporated after the necessary approval by the Academic Council.

This Curriculum and Scheme of Examination of Bachelor of Computer Applications shall be implemented w.e.f. AY 2024-27.

## 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 updating 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**

(Deemed to be University under section 3 of the UGC Act1956)

### **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 facilitate 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 Education|| 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 diverged 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 as 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 successfully implementation of online programs.

### **PROGRAMME EDUCATION OBJECTIVES (PEOs)**

The objective of the programme is to develop students to work in 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 graduate's ability and competence to work as an IT professional upon graduation. These Outcomes are statements that

describe what students are expected to now 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 economical, 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**

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



<b>PO12</b>	Innovation and Entrepreneurship: Identify opportunities,	<b>1,3</b>
	entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.	
<b>PSO1</b>	Explore technical comprehension in varied areas of Computer Applications and experience a conducive environment in cultivating skills for thriving career and higher studies.	<b>2,4</b>
<b>PSO2</b>	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.	<b>1</b>

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## **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, student 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 Award of Degree of a programme Bachelor of Computer Applications, he/she has to earn 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 83 credits required to be earned under —Compulsory Courses Basket|| and 37 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 wise Study Scheme with contact hours, assigned credits & distribution of marks**

Semester-1							
Course Type	Course Code	Name of Course	Internal / Continuous Evaluation	End term evaluation	Duration of Exam	Total Marks	Credits
Foundation	O4.5CA100C00	Elements of Mathematics	30	70	3	100	4
Core	O4.5CA100C01	Introduction to IT & Programming in C	30	70	3	100	3
Core	O4.5CA101C01	Web Technologies	30	70	3	100	3
Core	O4.5CA102C01	Database Management System	30	70	3	100	3
Core	O4.5CA151C01	C Programming Lab	30	70	3	100	2
Core	O4.5CA152C01	Web Technologies Lab	30	70	3	100	1
Core	O4.5CA153C01	Database Management System Lab	30	70	3	100	1
AEC	O4.5SBSS100C04	Indian Knowledge System	30	70	3	100	2
SEC	O4.5CDC196C05	Placement Competency Enhancement - I	30	70	3	100	1
		<b>Total Credits</b>					<b>20</b>

## Semester-2

Course Type	Course Code	Name	Internal Evaluation	External Evaluation	Duration of Exam	Total Marks	Credits
Foundation	O4.5CA200C00	Mathematical Foundation of Computer Science	30	70	3	100	4
Core	O4.5CA200C01	Data Structures using C	30	70	3	100	3
Core	O4.5CA201C01	Object Oriented Programming using Java	30	70	3	100	3
Core	O4.5CA251C01	Data Structures Lab	30	70	3	100	2
Core	O4.5CA252C01	Object Oriented Programming using Java Lab	30	70	3	100	1
AEC	O4.5SET100C04	Environmental Studies	30	70	3	100	4
SEC	O4.5CA200C05	Digital Editing & Motion Graphics	30	70	3	100	2
SEC	O4.5CDC296C05	Placement Competency Enhancement-II	30	70	3	100	1
		<b>Total Credits</b>					<b>20</b>

### Semester-3

Course Type	Course Code	Name	Internal Evaluation	External Evaluation	Duration of Exam	Total Marks	Credits
Core	O5.0CA100C01	Digital Logic and Computer System Architecture	30	70	3	100	3
Core	O5.0CA101C01	Python Programming	30	70	3	100	3
Core	O5.0CA102C01	Software Engineering	30	70	3	100	3
Core	O5.0CA151C01	Python Programming Lab	30	70	3	100	1
Core	O5.0CA152C01	Minor Project-I	30	70	3	100	2
Internship	O5.0CA100C06	Internship			3	100	1
AEC	O5.0SBSS100C04	Universal Human Values	30	70	3	100	2
SEC	O5.0FLFR100E03 /O5.0FLGR100E03/ O5.0FLSP100E03	Foreign Language	30	70	3	100	2
SEC	O5.0CA100C05	Research Innovation Catalyst I	30	70	3	100	1
SEC	O5.0CDC196C05	Placement Competency Enhancement-III	30	70	3	100	1
		<b>Total Credits</b>					<b>19</b>

**Semester-4**

<b>Course Type</b>	<b>Course Code</b>	<b>Name</b>	<b>Internal Evaluation</b>	<b>External Evaluation</b>	<b>Duration of Exam</b>	<b>Total Marks</b>	<b>Credits</b>
Core	O5.0CA200C01	Numerical Analysis and Statistical Techniques	30	70	3	100	4
Core	O5.0CA201C01	Operating System	30	70	3	100	3
Core	O5.0CA251C01	Operating System Lab	30	70	3	100	1
Discipline Elective	O5.0CA200E02	Introduction to Data Science	30	70	3	100	3
	O5.0CA201E02	Fundamentals of Artificial Intelligence & Machine Learning	30	70	3	100	
	O5.0CA202E02	Introduction to Cyber Security, Cyber laws & Act	30	70	3	100	
SEC	O5.0FLFR200E03 / O5.0FLGR200E03 / O5.0FLSP200E03	Foreign Language	30	70	3	100	2
SEC	O5.0CA200C05	Research Innovation Catalyst II	30	70	3	100	1
SEC	O5.0CDC296C05	Placement Competency Enhancement-IV	30	70	3	100	1
Audit Pass	O5.0SAHS100C09	Sports & Yoga	30	70	3	100	0
		<b>Total</b>					<b>15</b>

**Semester-5**

<b>Course Type</b>	<b>Course Code</b>	<b>Name</b>	<b>Internal Evaluation</b>	<b>External Evaluation</b>	<b>Duration of Exam</b>	<b>Total Marks</b>	<b>Credits</b>
Core	O5.5CA100C01	Computer Networks	30	70	3	100	3
Core	O5.5CA101C01	Computer Graphics	30	70	3	100	3
Core	O5.5CA151C01	Computer Networks Lab	30	70	3	100	1
Core	O5.5CA152C01	Computer Graphics Lab	30	70	3	100	1
Discipline Elective	O5.5CA100E02	Data Visualization Using Python	30	70	3	100	3
	O5.5CA101E02	Introduction to Block Chain	30	70	3	100	
	O5.5CA102E02	Full Stack Development	30	70	3	100	
Discipline Elective	O5.5CA103E02	Data Warehousing & Data Mining	30	70	3	100	3
	O5.5CA104E02	Fundamentals of Open-Source Software	30	70	3	100	
	O5.5CA105E02	System Programming	30	70	3	100	
Internship	O5.5CA100C06	Summer Internship			100	3	2
SEC	O5.5CA100C05	Research Innovation Catalyst III	30	70	100	3	1
		<b>Total Credits</b>					<b>17</b>

**Semester 6**

<b>Course Type</b>	<b>Course Code</b>	<b>Name</b>	<b>Internal Evaluation</b>	<b>External Evaluation</b>	<b>Duration of Exam</b>	<b>Total Marks</b>	<b>Credits</b>
Discipline Elective	O5.5CA200E02	Cloud Computing	30	70	3	100	3
	O5.5CA201E02	Soft Computing	30	70	3	100	
Discipline Elective	O5.5CA202E02	Mobile Application Development	30	70	3	100	3
	O5.5CA203E02	Advanced Web Technologies	30	70	3	100	
Discipline Elective	O5.5CA204E02	Digital Image Processing	30	70	3	100	3
	O5.5CA205E02	Mobile Computing	30	70	3	100	
	O5.5CA206E02	Ethical Hacking	30	70	3	100	
Discipline Elective	O5.5CA251C02	Cloud Computing Lab	30	70	3	100	1
	O5.5CA252C02	Soft Computing Lab	30	70	3	100	
Discipline Elective	O5.5CA251E02	Digital Image Processing Lab	30	70	3	100	1
	O5.5CA252E02	Mobile Computing Lab	30	70	3	100	
	O5.5CA253E02	Ethical Hacking Lab	30	70	3	100	
Dissertation	O5.5CA200C07	Major Project	30	70	100	3	6
		<b>Total Credits</b>					<b>17</b>



**Under Elective Courses, beside the mentioned Domain Specific Elective Courses, other Inter-disciplinary, Generic, on-line Courses (MOOCs etc) and other approved courses shall be offered, which shall be notified well before start of the semester. The student shall be required and allowed to opt the courses out of offered courses as per maximum limit for maximum credits and for the category of Elective Courses under University Rules.**

**For Successful completion of the three-year degree, the students need to earn 88 credits of compulsory courses, 20 credits of Discipline Electives and at least 12 credits of Open Elective/MOOC/Coursera Courses**

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**FIRST SEMESTER**

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES**

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**O4.5CA100C00: ELEMENTS OF MATHEMATICS**

Periods/week Credits: 4

Max. Marks: 100

Continuous Evaluation: 30

Duration of Examination: 3 Hrs.

End Semester Examination: 70

**Pre-Requisite:** NA

**Course Type:** Foundation

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

O4.5CA100C00.1 Understand the concept of matrices along with its operations

O4.5CA100C00.2. Analyze the concept of power and exponent.

O4.5CA100C00.3. Compute word problems using permutation and combination.

O4.5CA100C00.4. Demonstrate the rules of continuity and differentiation to evaluate elementary functions.

O4.5CA100C00.5. Apply the concept of power series to find the expansion of any given function.

**UNIT 1: Matrices and Determinants**

1.1 Matrices

1.2 Types of matrices

1.3 Operation on matrices

1.4 Scalar multiplication and multiplication of matrices

1.5 Determinant

1.6 Inverse of matrices

1.7 Cramer's Rule

1.8 Rank of matrix

**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 and Permutations, Combinations**

3.1 Definition and basics of binomial theorem

3.2 Positive index

3.3 Applications of binomial theorem (Only positive index)

3.4 Basics of Permutations and Combinations

## **UNIT 4: Trigonometry**

- 4.1 Systems of measuring angles
- 4.2 Trigonometric functions
- 4.3 Identities and signs
- 4.4 Values of t-ratios
- 4.5 t-ratios of allied angles
- 4.6 Addition and subtraction formulae
- 4.7 Transformation of products into sum or difference of t-ratios

## **UNIT 5: Continuity and Differentiation**

- 5.1 Elementary results on limits
- 5.2 Continuity
- 5.3 Differentiation
- 5.4 Derivatives of composite functions
- 5.5 Differentiation of implicit functions
- 5.6 Differentiation of parametric forms

## **UNIT 6: Taylor's & Maclaurin's Theorems**

- 6.1 Definition of Taylor's theorem
- 6.2 Application of Taylor's theorem
- 6.3 Definition of Maclaurin's Theorems
- 6.4 Applications of Maclaurin's Theorems
- 6.5 Applications to expansion of functions.

### **Suggested Readings:**

1. Dr. Babu Ram, 2012, Engineering Mathematics, Pearson Education
2. D. C. Sancheti, V K Kapoor, 2014, Business Mathematics, Sultan Chand
3. Birkhauser, 2009, 103 Trigonometry Problems, Universities Press
4. Shanti Narayan, 2005, Differential Calculus, S.Chand

Note: Only latest editions of the books are recommended.

### **Web links:**

- [http://www.hec.ca/en/cam/help/topics/Matrix\\_determinants.pdf](http://www.hec.ca/en/cam/help/topics/Matrix_determinants.pdf)
- <http://www.kkuniyuk.com/PrecalcBook/Precalc08.pdf>
- [https://www.oup.com.au/data/assets/pdf\\_file/0028/58276/IM9\\_5.2-5.3\\_ch11\\_Surds\\_and\\_indices.pdf](https://www.oup.com.au/data/assets/pdf_file/0028/58276/IM9_5.2-5.3_ch11_Surds_and_indices.pdf)
- [http://www.schurzhs.org/ourpages/auto/2015/9/6/44741179/Chapter%20Indices%20and%20Surds%20pg\\_%2096%20-%20135.pdf](http://www.schurzhs.org/ourpages/auto/2015/9/6/44741179/Chapter%20Indices%20and%20Surds%20pg_%2096%20-%20135.pdf)
- <https://www.vedantu.com/ncert-solutions/ncert-solutions-class-10-maths-chapter-8-introduction-to-trigonometry>

- [http://www.ctr.maths.lu.se/media/MATA14/2014ht2014/Taylor\\_series.pdf](http://www.ctr.maths.lu.se/media/MATA14/2014ht2014/Taylor_series.pdf)
- <https://eis.uow.edu.au/content/groups/public/@web/@eis/@maas/documents/mm/uow168693.pdf>

**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:

1. 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%

2. 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 1	PO 2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
O4.5CA100C00.1	1	1		2			2	3						
O4.5CA100C00.2	1	1		2			3	3						
O4.5CA100C00.3	1	1	1		2		3	3					2	1
O4.5CA100C00.4	1	1	1	2	2		2	3					1	
O4.5CA100C00.5	1	1		2			3	3						

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES**

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

**O4.5CA100C01: INTRODUCTION TO IT & PROGRAMMING IN C**

Periods/week Credits: 3

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, students will be able to**

O4.5CA100C01.1. Identify and analyses top-down and bottom-up strategies of programming.

O4.5CA100C01.2. Understand the key hardware components in a modern computer system and how

software is mapped to the hardware.

O4.5CA100C01.3. Examine the relationships and interactions between the different parts of a complex problem.

O4.5CA100C01.4. Design flowcharts, pseudo-code and decision tables for solving real-time problems.

O4.5CA100C01.5. Compare and contrast the various algorithmic solutions to solve a particular problem.

**UNIT 1: Information Technology Fundamentals**

1.1 Introduction to Computers: Basics of computer, Characteristics of computers, Limitations of computers, Number System, System Components, Input devices, Output devices, Computer Memory

1.2 Introduction to Assemblers

1.3 Introduction to Compilers, Interpreters, Linkers

1.4 Techniques of Problem-Solving: Flowcharting, Algorithm, Pseudocode

1.5 Browser and Internet basics.

1.6 Email and Social Media Tools

**UNIT 2: Basics of C Language and its Preprocessor**

2.1 Preprocessor: various preprocessor directives.

2.2 Tokens, identifiers and keywords; constants and variables

2.3 Program structure

2.4 Data Types

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

operators

2.6 Compilation and execution of C program in DOS

### **UNIT 3: I/O Functions and Control Statements**

3.1 Built in I/O functions: getch(); getche(); getchar(); putch(); putchar()

3.2 Console based formatted I/O: printf(); scanf()

3.3 Selection: if; nested if; If-else-if

3.4 Iteration: for; while and do-while loopPART-B

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

### **UNIT 4: Arrays and String**

4.1 Arrays: Single- and two-dimensional arrays

4.2 Accessing and Initializing an Array

4.3 Advantages and Disadvantages of Arrays

4.4 Applications of Arrays

4.5 Concept of Strings

4.6 String Manipulation Functions

4.7 String I/O functions: gets() ,puts(),getchar() and putchar().

### **UNIT 5: Functions**

5.1 Functions: Declaration and definition

5.2 Function Prototype

5.3 Passing parameters to Functions

5.4 Sharing variables between functions

5.5 Variable scope: local and global variables

5.6 Call by reference and call by value

5.7 Introduction to recursion

### **UNIT 6: Structure and Union, Pointers**

6.1 Structure and Union: Declaration and initializing

6.2 Accessing members

6.3 Array of structure and union

6.4 Pointers: Basics of pointer

6.5 Pointer operator

6.6 Application of pointer

6.7 Precedence of &, \* operators.

6.8 Array and Pointers; Dynamic memory allocation (malloc (), calloc () realloc())

### **Suggested Readings:**

1. Byron Gottorfried, 2010, Schaum's Outline of Programming with C, Tata McGraw- Hill.
2. E. Balaguruswami, 2010, Programming in ANSI 'C', Tata McGraw- Hill.
3. YashwantKanetkar,2017, Let Us C, BPB Publications
4. AshokKamthane, 2006, Programming with ANSI and TURBO C, Pearson Publications

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

**Software required/ Web links:**

<https://sourceforge.net/projects/orwelldevcpp/> (Last visited date:21 May 2024)

<http://www.codeblocks.org/> (Last visited date:21 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:

- 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%

- (i) 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:**

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1 1	PO1 2	PSO 1	PSO 2
O4.5CA100C01.1.	3	2	3	1	2	3	2				2	2	2	2
O4.5CA100C01.2.	3	1	2	2	1	2	2							
O4.5CA100C01.3.	3	3	1	1	2	2	2							
O4.5CA100C01.4.	3	3	2	2	3									
O4.5CA100C01.5.	2	2	3	3	3	2	2	2			2	3		



**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

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**O4.5CA101C01 WEB TECHNOLOGIES**

Periods/week Credits:3

Max. Marks: 100

Internal / Continuous Assessments:30

Duration of Examination: 3 Hrs.

End Semester Examination: 70

**Pre-Requisite:** NA

**Course Type:** Core

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

O4.5CA101C01.1 Understand the concept of the World Wide Web and its applications

O4.5CA101C01.2 Learn the basics of HTML and its structure

O4.5CA101C01.3 Integrate CSS with HTML for designing interactive web pages.

O4.5CA101C01.4 Apply basic syntax and semantics of JavaScript to create a dynamic web page

O4.5CA101C01.5 Compare and explore server-side scripting and database integration for dynamic web applications.

**UNIT 1: Introduction to Networks, Protocols and Web Technologies**

1.1 History of Networks & Their Types

1.2 Internet and its applications

1.3 Internet Addressing

1.4 History and Evolution of the Web

1.5 Web Architecture and Components

1.6 Web Standards and the W3C

1.7 Different Web Browsers and their Characteristics

1.8 Search Engines and their Features

**UNIT 2: User Interface Design using HTML**

2.1 Introduction to HTML

2.2 Different HTML Documents

2.3 Basic Structure of HTML Document

2.4 Markup Tags used in HTML

2.5 Heading-Paragraphs and Line Breaks

2.6 Elements of HTML: Working with Text

2.7 Working with Hyperlinks

2.8 Images and Multimedia used in HTML

**UNIT 3: Lists, Tables and Forms in HTML**

3.1 Lists in HTML

3.2 Ordered and Unordered List

3.3 Definition List and Directory List

3.4 HTML table and its Structure

3.5 Table Formatting, Spanning of multiple rows and columns.

3.6 Forms in HTML

3.7 Creating Forms using <FORM> tag

3.8 Named Input Fields: Text Box; Radio Button; Check Box; List Box; Combo Box

3.9 Creating Submit, Reset Button, and Multiple Line Text Windows

#### **UNIT 4: Cascading Style Sheets (CSS)**

4.1 Introduction to Cascading Style Sheets

4.2 The Need for Style Sheets

4.3 Basic Syntax and Structure of Style Sheets

4.4 Inline Style sheets; Internal Style sheets; External Style sheets; Embedding Style sheets

4.5 Linking External Style sheets

4.6 Background; Manipulating Text; Margins and Padding

4.7 Positioning using CSS

#### **UNIT 5: JavaScript Basics**

5.1 Introduction to JavaScript

5.2 Variables, Data Types, and Operators

5.3 Control Structures: Conditionals and Loops

5.4 Functions and Scope

5.5 Events and Event Handling

5.6 Manipulating the DOM

5.7 Objects and Array

5.8 Asynchronous JavaScript: Callbacks, Promises, and Async/Await

5.9 Error Handling and Debugging

5.10 Using JavaScript Libraries (e.g., jQuery)

#### **UNIT 6: Server-Side Scripting and Introduction to Databases**

6.1 Introduction to Server-Side Technologies

6.2 Setting up a Server with Node.js and Express.js

6.3 Building RESTful APIs

6.4 Middleware and Routing

6.5 Overview of Other Server-Side Languages: PHP, ASP.NET

6.6 Introduction to Databases and Basics of SQL

6.7 Connecting to Databases from Server-Side Scripts

6.8 Performing CRUD Operations

6.9 Introduction to NoSQL Databases (e.g., MongoDB)

#### **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:**

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

- (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:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
O4.5CA101C01.1	2	2					2				1		2	1
O4.5CA101C01.2	2	1			2		1						1	1
O4.5CA101C01.3	2	3		2	2		1				2		3	2
O4.5CA101C01.4	1	2	2	2			2				2		2	2
O4.5CA101C01.5	3	3	3	2	1		2						1	1

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES**  
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**O4.5CA102C01: DATABASE MANAGEMENT SYSTEM**

Periods/week Credits: 3

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, students will be able to:

O4.5CA102C01.1. Learn the concept of databases.

O4.5CA102C01.2. Understand the three-schema architecture of database system  
O4.5CA102C01.3. Study various strategies of database security and recovery.

O4.5CA102C01.4. Apply the query-based data on given set of conditions.

O4.5CA102C01.5. Analyze the interface that works with a normalized database.

O4.5CA102C01.6. Develop a database schema from a problem statement to conceptualize the database design.

**PART A**

**UNIT 1: Introduction to Database**

- 1.1 Database: Definition
- 1.2 Characteristics of database approach
- 1.3 Components of a DBMS
- 1.4 Advantages and disadvantages of a DBMS
- 1.5 Applications of DBMS
- 1.6 Database system Vs file system
- 1.7 Three level architecture of a DBMS
- 1.8 DBMS architecture

**UNIT 2: Data Modeling using Entity Relationship Model**

- 2.1 Data Independence: physical independence; logical independence
- 2.2 Data Dictionary
- 2.3 Role of DBA
- 2.4 Data Models: Hierarchical, Network, Relational Data Models
- 2.5 Introduction: Entities; Entity types; Entity set; Attributes
- 2.6 E-R Diagram; Case Studies to represent E-R Diagram

### **UNIT 3: Domains, Keys and SQL**

- 3.1 Concept of Keys: Primary Key; Candidate Key; Composite Key; Alternate Key; Secondary Key; Foreign Key
- 3.2 Constraints: Relational Constraints, Domain Constraints, Key Constraints, Integrity Constraints
- 3.3 Relational Algebra: set operations; basic operations
- 3.4 R relational calculus
- 3.5 Introduction to SQL: History of SQL; Basic Structure
- 3.6 DDL Commands, DML Commands
- 3.7 SQL functions: Character functions, Aggregate functions, Date function

### **UNIT 4: Normalization**

- 4.1 Anomalies in databases and its solution
- 4.2 Functional dependencies: Full, Partial, Transitive, Multi-valued
- 4.3 Introduction to normalization
- 4.4 Advantages of Normalization
- 4.5 Normal Forms: 1NF, 2NF, 3NF, BCNF for Relational Databases
- 4.6 Case study to implement normalization on data

### **UNIT 5: Concurrency Control**

- 5.1 Transaction Management: Introduction; Transaction properties; Transaction states
- 5.2 Introduction to Concurrency Control
- 5.3 Problems of concurrent transaction
- 5.4 Locks: Introduction; types of locks
- 5.5 Algorithms of concurrency control

### **UNIT 6: Advanced Concepts in Databases**

- 6.1 Data base Security: Introduction; security risks
- 6.2 Techniques to implement data base security
- 6.3 Data base Recovery: Introduction; causes of failure
- 6.4 Recovery Methods: log-based recovery; checkpoints; shadow paging
- 6.5 Introduction to Distributed Databases

### **Suggested Readings:**

1. R.Elmasri, S.B. Navathe, 2016, Fundamentals of Database Systems , Pearson Education/Addison Wesley
2. Parteek Bhatia, Gurvinder Singh, 2016, Simplified approach to DBMS, Kalyani Publishers
3. Thomas Cannolly and Carolyn Begg, 2014, Database Systems: A Practical Approach to Design, Implementation and Management, Pearson Education

4. Henry F Korth, Abraham Silberschatz, 2011, Database System Concepts, McGraw Hill

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

**Software required/Weblinks:**

ORACLE 10g

<https://www.tutorialspoint.com/dbms>

<https://www.w3schools.in> › DBMS

**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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
O4.5CA102C01 .1	1				2			2					2	3
O4.5CA102C01 .2		3	2				1	1					2	3
O4.5CA102C01 .3	2			2			2	1	3					3
O4.5CA102C01 .4	2			2			2		3					3
O4.5CA102C01 .5		2	3		3		2							3
O4.5CA102C01 .6		3	2		3		2							



**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**  
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**O4.5CA151C01: C PROGRAMMING LAB**

Periods/week Credits

2

Duration of Examination: 3 Hrs.

Max. Marks:100

Continuous Evaluation: 30

End Semester Examination: 70

**Pre-Requisite:** NA

**Course Type:** Core

**Course Outcomes:** At the end of the course, students will be able to O4.5CA151C01.1. Explain the concepts of Procedural programming.

O4.5CA151C01.2. Solve basic programming problems using the building blocks of C language.

O4.5CA151C01.3. Design programs involving decision structures and loops.

O4.5CA151C01.4. Create programs using the concept of dynamic memory management. O4.5CA151C01.5. Design an application to solve a simple real life or mathematical problem.

**List of Experiments:**

Every student is required to maintain Practical File and write the following steps in each practical: a) Problem statement

- b) Formula(s) used
- c) Algorithm
- d) Flow Chart
- e) Source codes in student's handwriting
- f) Program listing (print-out)
- g) Input & Output.

1. Write a Program to perform arithmetic operations (Addition, Subtraction, Multiplication, Division) on two numbers.
2. Write a Program to calculate gross salary of an employee [using formula: gross\_sal = basic\_sal + hra + da].
3. Write a program to find sum and reverse of three-digit number.
4. Write a Program to swap two numbers without using third variable.
5. Write a Program to print a table of any number.
6. Write a Program to find greatest in 3 numbers.
7. Write a Program to find that entered year is leap year or not.

8. Write a Program to find whether given no is even or odd.
9. Write a program to find the roots of a Quadratic Equation.
10. Write a Program to use switch statement. Display Monday to Sunday.
11. Write a Program to calculate power of a number using #DEFINE
12. Write a Program to display first 10 natural no & their sum.
13. Write a program to find the factorial of n number.
14. Write a program to generate the Fibonacci series up to n terms.
15. Write a Program to print stars Sequence1.

```
*  
**  
***  
****  
*****
```

16. Write a Program to check whether given number is palindrome or not.
17. Write a Program to find the maximum no in an array.
18. Write a Program to search a number in an array.
19. Write a Program to find sum of two matrices.
20. Write a Program to find subtraction of two matrices.
21. Write a Program to find multiplication of two matrices.
22. Write a Program to find transpose of a matrix.
23. Write a Program to concatenate two strings without using strcat function.
24. Write a Function to Check Prime and Armstrong Number by making function
25. Write a Function to Convert binary number to decimal and vice-versa
26. Write a Program to create, initialize, assign and access a pointer variable.
27. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.
28. Write a Program to Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks.
29. Write a Program to Add Two Distances (in inch-feet) System Using Structures
30. Write a Program to Add Two Complex Numbers by Passing Structure to a Function
31. Make a mini project based on above mentioned list of practical. Suggested mini projects are:
  - a) Puzzle Game
  - b) Hangman Game
  - c) Weather widget
  - d) Contacts Management

#### **Suggested Readings:**

1. E.Balaguruswami, 2010, Programming in ANSI `_C_` , Tata McGraw- Hill.
2. AshokKamthane,2006, Programming with ANSI and TURBO C , Pearson Education.

3. K R. Venugopal, 2016, Mastering C ,Tata McGraw Hill.
4. Herbert Schildt, 2017, The Complete Reference , Tata McGraw Hill.

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

**Software Required**

<https://sourceforge.net/projects/orwelldevcpp/>

<http://www.codeblocks.org/>

**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).  
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Projects/Group Activities etc	15%

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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:**

	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	PS O1	PS O2
O4.5CA151C01.1	2	2	2	3									3	3
O4.5CA151C01. 2	1	2	2										1	1
O4.5CA151C01. 3		1	2	2									1	1
O4.5CA151C01. 4	2	2	3	3	3								1	1
O4.5CA151C01. 5	1	2	3	3			2	1					2	2

## MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES

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

### O4.5CA152C01: WEB TECHNOLOGIES LAB

Periods/week Credits

Max. Marks: 100

1

Continuous Evaluation: 30

Duration of Examination: 3 Hrs.

End Semester Examination: 70

**Co-Requisite: NA**

**Course Type: Core**

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

O4.5CA152C01.1 Apply markup language elements in web pages.

O4.5CA152C01.2 Use Java scripting language to web pages.

O4.5CA152C01.3 Implement cascading style sheets on web pages.

O4.5CA152C01.4 Develop websites incorporating web technologies (HTML, CSS and Javascript)

#### **List of Experiments:**

Every student is required to maintain Practical File and write the following steps in each practical:

- a) Problem statement
- b) Formula(s) used
- c) Algorithm
- d) Flow Chart
- e) Source codes in student's handwriting
- f) Program listing (print-out)
- g) Input & Output.

#### **HTML**

1. Create a simple HTML page using basic tags.
2. Create a web page that displays your name to the screen.
3. Create a web page and show the output from 1 to 10 in separate lines.
4. Create a web page and show the output from 1 to 10 in separate lines, each number being in different colour.
5. How do I make a picture as a background on my web pages?
6. Create a web page to print a paragraph with 4-5 sentences, each sentence shall have a different font.
7. Write HTML code to print a paragraph that is 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.
8. Write HTML code to print your name using Heading tag, every letter shall be of different heading size
9. Write HTML code to print the sequence of numbers 1-20. Each number shall be in different line with

number 2 next to it as subscript, an equal sign and the result.

10. Write HTML code to display an image with border of size with width 200, height 200 pixels, leaving Hspace and Vspace of your choice with image hanging in the right side on the screen.
11. Write HTML code to create a web page with heading. The heading shall be displayed at the top center of the page and the image shall be at the center, just below the heading.
12. Write HTML code using Multimedia tags.
13. Create a Table using Rowspan and Colspan taking example of student Record.
14. Write HTML code using table tag <table> and cellpadding and cellspacing as its attributes.
15. Create unordered, ordered and definition Lists taking example of your subjects in MCA IST, IInd and IIIrd Semester.
16. Write HTML code using <frameset> and <frame> tag with all its attributes
17. Write HTML code to design a form in HTML using controls and buttons such as Teatxbox, Textarea, password, submit button, browse button, drop-down menu
18. Write HTML code to design a Registration Form in HTML.
19. Write HTML code to design a student admission Form in HTML.
20. Create a proper home page of your own using any components and styles.
21. Write HTML code for including Local hyperlinking in a web page.
22. Write HTML code for including Inter hyperlinking in a web page.
23. Write HTML code for including External hyperlinking in a web page.
24. Write code to show External CSS with HTML code.
25. Write code to show Internal CSS with HTML code.
26. Write code to show Inline CSS with HTML code.
27. Write a program to add two numbers using form in Javascript.
28. Write a program in Javascript to swap two images using Onmouseover event.
29. Write a simple JavaScript program to sort an array.
30. Write a JavaScript program to take as input three numbers from the user. Find the minimum and maximum of the three numbers. Print the following output in BOLD in the following format:  
MINIMUM =  
MAXIMUM =
31. Make a mini project based on above mentioned list of practical. Suggested mini projects are:
  - a). Student Admission Process for University:  
Website will have all the necessary contents and number of web pages pertaining the admission process of any university. The process will inculcate the eligibility criteria, entrance exam and its result, based on the fetched information, a student can get the admission in a particular course in the University.
  - b). Movie Ticket Booking System:  
The website will facilitate the advance booking of movie tickets, local shows, applying discounts and different payment options for registered users.
  - c). Online Food Order System:  
The online portal will provide the complete food order from nearby restaurants. The site will be first

register the users and further go for processing of orders.

d). Online Event Booking in Delhi/NCR

The website will show all the events details of Dehi/NCR to the registered users. After taking and interest of the user, an appropriate notification will be sent to the user for an event.

### **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.

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

### **Software required/Weblinks:**

Notepad

Web Browser

<https://www.tutorialspoint.com/html/> (Last accessed: May 9, 2024)

<https://www.csstutorial.net/>(Last accessed: May 9, 2024)

<https://javascript.info/> (Last accessed: May 9, 2024)

### **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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
O4.5CA152C01.1	3						3		2			2	2	3
O4.5CA152C01.2		1			3				3		2		2	3
O4.5CA152C01.3	3			3	2		2						2	3
O4.5CA152C01.4	2					1			3			2	2	3

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

**O4.5CA153C01: DATABASE MANAGEMENT SYSTEM LAB**

Periods/week Credits

1

Duration of Examination: 3 Hrs

Max. Marks: 100

Continuous Evaluation: 30

End Semester Examination: 70

**Pre-Requisite:** NA

**Course Type:** Core

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

**O4.5CA153C01.1.** Create tables and databases using SQL.

**O4.5CA153C01.2.** Design a query in database using SQL DML/DDL commands

**O4.5CA153C01.3.** Implement the relational databases in order to optimize database performance in practice.

**O4.5CA153C01.4.** Apply query-based data on any given set of conditions.

**O4.5CA153C01.5.** Develop a database schema from a problem statement to conceptualize the database design.

**Q1: Create the following tables**

**Student**

Column_name	Data type	Size	Constraint
StudentId	Number	4	Primary Key
Student name	Varchar2	40	Not null
Address1	Varchar2	300	
Gender	Varchar2	15	
Course	Varchar2	8	

**Course:**

CourseID	Data type	Size	Constraint
DeptNo	Number	2	Primary Key
Dname	Varchar2	20	
Location	Varchar2	10	

1. Insert five records for each table.
2. List all information about all students from student table
3. List all student numbers along with their Courses.
4. List Course names and locations from the Course table
5. List the details of the Students in MCA Course.
6. List the names of the employees whose employees' numbers are 7369, 7777, 2233 7.



- List the employee names not belonging to the department 10, 40
8. List the employee names who are not eligible for commission.
  9. List the employees whose names start with —S|| not s.List the employees ending with name —s||.
  10. Display all the Arithmetic functions used in SQL.
  11. List the names, salary and PF amount of all the employees (PF is calculated as 10% of salary)
  12. List the employee names having —k|| as the second character.
  13. List the students not assigned to any department.
  14. List the students details in ascending order of course
  15. List the number of Students in BCA course.
  16. List the number of students available in student table.
  17. Create a table with a primary key constraint.
  18. Create a table with all column having not null constraints
  19. Create a foreign key constraint in a table
  20. Create a Table with a unique key constraint
  21. Display the different students in department 1 and 2.
  22. Display list of students ordered by course
  23. Display alphabetically sorted list of students

**Q2: Create the tables Customer and Orders as per the following:**

Table CUSTOMER

column name	Characteristic
SID	Primary Key
Last_Name	
First_Name	

Table ORDERS

column name	Characteristic
Order_ID	Primary Key
Order_Date	
Customer_SID	Foreign Key
Amount	Check > 20000

1. Insert five records for each table
2. The Customer\_SID column in the ORDERS table is a foreign key pointing to the SID column in the CUSTOMER table.
3. List the details of the customers along with the amount.
4. List the customers whose names end with —s||.
5. List the orders where amount is between 21000 and 30000

6. List the orders where amount is increased by 500 and replace with name —new amount||.
7. Display the order\_id and total amount of orders
8. Calculate the total amount of orders that has more than 15000.
9. Display all the contents of s4 and s5 using union clause.
10. Find out the intersection of s4 and s5 tables.
11. Display the names of s4 and s5 tables using left, right, inner and full join.
12. Display the first name of employee and their managers using self-join.
13. Find out the names of s4 which are distinct
14. Write a query to Grant access and modification rights to customer table to user
15. Write a query to revoke access rights to customer table to user
16. Write a query to take backup of a database
17. Write a query to restore a database

Case Study:

Develop three different methods to combine data from multiple tables into single result. Tables are:

Event

Column_name	Data type	Size	Constraint
Event_id	Varchar2	6	Primary Key
Duration	Number	20	
Status_code	Varchar2	6	Foreign Key
Reason_code	Varchar2	15	Foreign Key

Status

Column_name	Data type	Size	Constraint
Status_code	Varchar2	6	Primary Key
Name	Char	20	

Ready Reason

Column_name	Data type	Size	Constraint
Reason_code	Varchar2	15	Primary Key
Name	Char	20	

Delay Reason

Column_name	Data type	Size	Constraint
Reason_code	Varchar2	15	Primary Key
Name	Char	20	

Method 1: Joining to the Status table to get the status name (using Inner join).

Method 2: Utilizing UNION to Combine Reason Table Rows

### Suggested Readings:

Parteek Bhatia, Gurvinder Singh, 2016, Simplified approach to DBMS, Kalyani Publishers

IyanByross, 2010, Introduction to PL/SQL, BPB Publications

### Software required/Weblinks:

ORACLE 10g

<https://www.tutorialspoint.com/sql>

<https://www.w3schools.com/sql/>

### Evaluation Policy:

The evaluation will include two types of assessments:

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

Weightage of assessments are as follows:

1. 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%

2. 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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
O4.5CA153C01. 1	2	3	1	3	3	2		2	1		2	2	3	1
O4.5CA153C01. 2	1	3	2	3	3			2	1		2		3	
O4.5CA153C01. 3		3	1	3	3			1			2		3	
O4.5CA153C01. 4	1	2	2	3	3		1				1	2	3	
O4.5CA153C01. 5		1	2	2	3		1	1			1		3	1

## MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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

### **O4.5CDC196C05: PLACEMENT COMPETENCY ENHANCEMENT-I**

Periods/week Credits

1

Duration of Examination: 3 Hrs.

Max. Marks: 100

Continuous Evaluation: 30

End Semester Examination: 70

**Pre-Requisite:** NA

**Course Type:** Core

#### **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.
- 1.4 Power Dressing

#### **Unit 2: Syntactical Communication - I**

- 1.5 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
  - 2.3.2 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**

1. Vedic Mathematics
  - 5.1.1 Basic of mathematics
  - 5.1.2 Addition and subtraction using Vedic Mathematics
  - 5.1.3 Multiplication of two and three numbers.
2. Simplification
  - 5.2.1 BODMAS rule
  - 5.2.2 Fractions and recurring decimals
  - 5.2.3 Surds and indices
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

#### **SUGGESTED READINGS:**

1. Koneru, Arun, Professional Communication, Tata McGraw Hill, New Delhi
2. Monipally, M.M., Business Communication Strategies, Tata McGraw Hill, New Delhi
3. McGrath, E.H., Basic Managerial Skills for All, Prentice Hall of India, New Delhi
4. Rai, Urmila and S.M. Rai, Business Communication, Himalaya Publishing House

**Note: Only latest available editions of the books are recommended**

**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 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
O4.5CDC196C05 .1	2	3	3	2	2	1	2	2	2	3
O4.5CDC196C05 .2	2	3	3	2	1	1	2	2	2	3
O4.5CDC196C05 .3	2	3	3	2	1	1	2	2	2	3
O4.5CDC196C05 .4	2	3	2	1	-	-	-	1	1	2
O4.5CDC196C05 .5	2	3	2	1	-	-	-	1	1	2

**Manav Rachna International Institute of Research and Studies (MRIIRS)**

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**INDIAN KNOWLEDGE SYSTEM**

**COURSE CODE: O4.5BSS100C04**

Periods/week Credits

2

Maximum marks: 100

Continuous Assessment: 30

Duration of examination: 2Hrs

End Semester Examination: 70

Pre-requisites: NIL

Course Type: Compulsory Courses

**Course Outcomes**

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

- O4.5BSS100C04.1: This course will provide the scientific value of the traditional knowledge of Bhārata.
- O4.5BSS100C04.2: To sensitize the students to the contributions made by ancient Indians schools.
- O4.5BSS100C04.3: The course will promote the youths to do research in the various fields of Bhāratīya knowledge system.
- O4.5BSS100C04.4: It will introduce the relevance of the Indian Knowledge System to the world.
- O4.5BSS100C04.5: Know the contribution of the Indian Knowledge system in science, engineering, and technology.

**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

### **List of Suggested Textbooks/Reference Books**

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

### **Assessment Tools**

#### **Continuous assessment:**

- Class assignments and/or Tutorials 20%
- Sessional tests (30% + 30%)
- Class Performance (10%)
- Class Attendance (10%)

### **End semester paper setting instructions:**

The question paper will be divided into 2 parts, with one question in Part A and four questions in Part B. The questions will be of 20 marks each. In Part A, the first question will consist of 10 conceptual questions (2 marks each) covering the entire syllabus and all the COs (up to BTL 3). There will be no choice in question 1. In Part B (question number 2 to 5), there can be an internal choice between each of the questions covering the same (set) of COs and BTL. All COs will be covered in Part B.

### **Course Articulation Matrix**

CO Statements	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3
O4.5SBSS100C04.1	3	3	3		3	3		3
O4.5SBSS100C04.2	3		2	3		3	3	3
O4.5SBSS100C04.3		3	2	3	2	3	3	2
O4.5SBSS100C04.4	3	2	2		3	3	3	2
O4.5SBSS100C04.5	2			3	2	2	2	3



**SECOND  
SEMESTER**

**Manav Rachna International Institute of Research and Studies (MRIIRS)**

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

**O4.5CA200C00: MATHEMATICS FOUNDATION OF COMPUTER SCIENCE**

Periods/week    Credits

4

Maximum marks: 100

Continuous Assessment: 30

Duration of examination: 2Hrs

End Semester Examination: 70

**Pre-Requisite:** Elements of Mathematics

**Course Type:** Foundation

**Course Outcomes**

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

O4.5CA200C00.1. Understand the knowledge of mathematical foundations of computer science

O4.5CA200C00.2. Solve problems involving sets, functions, relations, Principle of Mathematical Induction and Lattices.

O4.5CA200C00.3. Evaluate Boolean functions and simplify expression using the properties of Boolean algebra; apply Boolean algebra to circuits and gating networks.

O4.5CA200C00.4. Demonstrate the knowledge about the recursive functions and their properties. Apply their working knowledge in Graph theory.

O4.5CA200C00.5. Appraise the Cartesian system and apply the principles and concept of coordinate Geometry in real-time problems

**Unit 1: Concepts of set, relation and functions**

1.1 Set: Cardinality

1.2 Set-operations

1.3 Relations

1.4 Posets

1.5 Matrix of Relation

1.6 Equivalence Relations

1.7 Operation Functions

**Unit 2: PMI, Pigeonhole Principle**

2.1 Principles of Mathematical Induction

2.2 Greatest Common Divisor (GCD)

2.3 Euclidean Algorithms

2.4 Application of Euclidean Algorithm

2.5 The Pigeonhole Principle

2.6 Application to solve problems based on Pigeonhole Principle

**Unit 3: Lattices and Boolean algebra**

3.1 Lattices

3.2 Definition of Lattices

3.3 Properties

3.4 Lattice isomorphism

3.5 Types of lattice

3.6 Boolean Algebra

- 3.7 Definition and basic properties
- 3.8 Representation Theorems
- 3.9 Boolean expressions
- 3.10 Boolean functions (Disjunctive Normal form (DNF) & Conjunctive Normal form (CNF))

#### **Unit 4: Recurrence Relations**

- 4.1 Definition
- 4.2 Order of the recurrence relation
- 4.3 Degree of the difference equation
- 4.4 Linear recurrence relations with constant coefficients
- 4.5 Linear homogeneous recurrence relations with constant coefficients
- 4.6 Particular solutions (Homogeneous equations)

#### **Unit 5: Co-ordinate Geometry**

- 5.1 Quadrant Planes
- 5.2 Distance Formula
- 5.3 Section Formula
- 5.4 Bisection Formula
- 5.5 Slope
- 5.6 Equation of Straight Line (One Point Form & Two Point Form)
- 5.7 Intercept Form
- 5.8 Normal form
- 5.9 Angle between two lines
- 5.10 Condition of Concurrency of Three Lines.

#### **Unit 6: Graph Theory**

- 6.1 Definition & Basic concepts
- 6.2 Properties
- 6.3 Types of graphs
- 6.4 Matrix representation of graphs
- 6.5 Minimum spanning graphs
- 6.6 Trees
- 6.7 Spanning tree of a graph and minimum distance trees
- 6.8 Minimum weight and minimum distance spanning trees

#### **Suggested Readings:**

1. Babu Ram, 2009, Engineering Mathematics, Pearson Education
2. Schaum Series, 2017, Discrete Mathematics, Tata McGraw Hill
3. R.C. Joshi, 2007, Discrete Mathematics for Computer Students, New Academic Publishing
4. Satinder Bal Gupta, 2008, Discrete Mathematics, Laxmi Publications

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

**Web links:** <https://www.bu.edu/lernet/artemis/years/2011/slides/settheory.pdf>  
<http://home.cc.umanitoba.ca/~thomas/Courses/InductionExamples-Solutions.pdf>  
<https://andromeda.rutgers.edu/~loftin/discfal06/sampletest2sol.pdf>  
<http://faculty.uml.edu/klevasseur/ads2/c13/c13a.pdf>



**Manav Rachna International Institute of Research and Studies (MRIIRS)**

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**O4.5CA200C01: DATA STRUCTURES USING C**

Periods/week Credits

3

Maximum marks: 100

Continuous Assessment: 30

Duration of examination: 2Hrs

End Semester Examination: 70

**Pre-Requisite: Introduction to IT and Programming in C**

**Course Type: Core**

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

O4.5CA200C01.1. Define the concepts of data structures and its applications.

O4.5CA200C01.2. Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.

O4.5CA200C01.3. Apply data structures to solve real-life problems.

O4.5CA200C01.4. Analyze the complexity of different data structures such as stacks, queues and Linked list.

O4.5CA200C01.5. Evaluate the complexity of various sorting algorithms in best, average and worst case scenarios.

**UNIT 1: Introduction to Data Structure**

1.1 Concept and Definition of Data and Information

1.2 Concepts of Data type –primitive and non-primitive

1.3 Performance analysis and measurement (Time and space analysis of algorithms-average; best and worst case analysis)

1.4 Types of Data Structures: Linear & nonlinear data structures

1.5 Array: Representation of one and multidimensional arrays in memory

1.6 Operations: traversing; insertion; deletion; reversing; searching; sorting; merging two arrays

1.7 Sparse matrices: representation

**UNIT 2: Linear Data Structure**

2.1 Stacks: Stack-definitions; concepts and representation

2.2 Operations of Stack

2.3 Applications: Matching Parenthesis; Recursion; Towers of Hanoi;

2.4 Polish Notation; infix to postfix notation; evaluating postfix expression

2.5 Queues: Representation

2.6 Operations on Queues: Insert; delete

2.7 Circular queues

2.8 Types of queue: Deque and Priority Queues

2.9 Applications of Queue

**UNIT 3: Introduction to Linked List**

3.1 Linked List: Representation

3.2 Operations of Linked List

3.3 Circular Linked List

3.4 Polynomial Representation

3.5 Double Linked List and operations

**UNIT 4: Trees**

- 4.1 Trees: Some definitions
- 4.2 Representing a general tree
- 4.3 Types of Trees
- 4.4 Representation of Binary Tree
- 4.5 Traversing Binary Tree
- 4.6 Convert general tree into binary tree
- 4.7 Threads
- 4.8 Operations on BST
- 4.9 AVL Tree
- 4.10 B tree
- 4.11 B+ tree

### **UNIT 5: Graph Theory**

- 5.1 Graph Definition
- 5.2 Graph representation (Adjacency List and Adjacency Matrix)
- 5.3 Multi graphs
- 5.4 Directed Graphs
- 5.5 Sequential and Linked Representation of Graphs
- 5.6 Traversing a Graph: BFS; DFS
- 5.7 Spanning trees
- 5.8 Minimum Spanning Tree: Prim's method and Kruskal's method
- 5.9 Single source shortest path

### **Unit 6: File Organization**

- 6.1 Introduction to File Organization
- 6.2 Hashing Techniques
- 6.3 Collision Resolution Techniques
- 6.4 Sorting: Bubble sort; Selection sort; Quick sort; Merge sort; Insertion sort; Heap sort
- 6.5 Searching: Linear search and Binary search

### **Suggested Readings:**

1. Seymour Lipschutz, 2014, Data Structure, McGraw Hill Education
2. Jean-Paul Tremblay & Paul G. Sorenson, 2017, An Introduction to Data Structures with Applications, Tata McGraw Hill Publishing.
3. Rashmi Agrawal, Sachin Sharma, Seema Sharma, 2013, Data Structure, ManavRachna Publishing House.
4. Ten Baum, 2015, Data Structures using C & C++, Prentice-Hall International.

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

### **Software required/ Web links:**

Dev C/ Turbo C++

[https://www.tutorialspoint.com/design\\_and\\_analysis\\_of\\_algorithms](https://www.tutorialspoint.com/design_and_analysis_of_algorithms) (Last accessed: May 12, 2024)

<https://www.youtube.com/watch?v=1PI58Q3Ne2w> (Last accessed: May 12, 2024)

**Note: Only latest available editions of the books are recommended**

**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%
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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	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO2
O4.5CA200C01.1	3	1	2	2	2		3	2	1			
O4.5CA200C01.2	2	2	3	1	1		2					
O4.5CA200C01.3	2	2	2	2	3		3				2	2
O4.5CA200C01.4	3	3	3	2	2		1					
O4.5CA200C01.5	2	2	2					2				

**Manav Rachna International Institute of Research and Studies (MRIIRS)**

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**O4.5CA201C01: OBJECT ORIENTED PROGRAMMING USING JAVA**

Periods/week    Credits

3

Maximum marks: 100

Continuous Assessment: 30

Duration of examination: 2Hrs

End Semester Examination: 70

**Pre-Requisite:** Introduction to IT and Programming in C

**Course Type:** Core

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

O4.5CA201C01.1. Explain basic syntaxes of control Structures of Java Programming Language.

O4.5CA201C01.2. Understand various object-oriented paradigms in the context of Java Programming Language.

O4.5CA201C01.3. Design solutions to basic problems using concepts of Exception Handling.

O4.5CA201C01.4. Analyze various controls available in AWT library and choose controls on the basis of requirement.

O4.5CA201C01. 5. Identify, Design and develop complex Graphical user interfaces using principal Java AWT classes.

O4.5CA201C01. 6. Design GUI based solution to small Business Problems using Concepts of Event-Handling and Database Programming.

**PART –A**

**Unit 1: Concepts of Java**

- 1.1 Introduction: C++ vs Java
- 1.2 Java and Internet
- 1.3 Java and WWW
- 1.4 Java support systems
- 1.5 Java environment
- 1.6 Java program structure
- 1.7 Tokens; Statements;
- 1.8 Java Virtual machine
- 1.9 Constant & Variables
- 1.10 Data Types;
- 1.11 Symbolic Constants
- 1.12 Type Casting Operators.

**Unit 2: Control Statements**

- 2.1 Simple if statement
- 2.2 If...else... statement
- 2.3 Nesting if...else... statement
- 2.4 else...if Ladder
- 2.5 Switch statement
- 2.6 Conditional Operator
- 2.7 Loops –While; Do; For
- 2.8 Jumps in Loops; Labelled Loops



### **Unit 3: Arrays and Classes**

- 3.1 Arrays: One Dimensional and two-Dimensional arrays
- 3.2 Classes: Fundamentals; objects; methods
- 3.3 Constructors: Method overloading; constructor overloading
- 3.4 Inheritance: Superclass; sub class;
- 3.5 this and super operator
- 3.6 Method overriding; use of final keyword
- 3.7 Abstract class
- 3.8 Interface.

### **Unit 4: Exception Handling and Packages**

- 4.1 Packages: Creation and implementation
- 4.2 Exception Handling: Exception Class
- 4.3 Built in checked and unchecked exceptions
- 4.4 User defined exceptions; Try; Catch; Throw; Throws; Finally.
- 4.5 Java Library: String handling (only main functions); String Buffer class.

### **Unit 5: Applet**

- 5.1 Applets: Introduction
- 5.2 Local and Remote Applets Vs Application
- 5.3 Writing Applet
- 5.4 Applet Life Cycle; Creating an Executable Applet
- 5.5 Designing a Web Page; Applet Tag
- 5.6 Adding Applet to HTML File; Running the Applet
- 5.7 Passing Parameters to Applets; Aligning the Display; HTML Tags & Applets
- 5.8 Getting Input from the User

### **Unit 6: AWT Controls**

- 6.1 AWT controls: Button; Label; TextField; TextArea; Choice lists; list; scrollbars; check boxes; Layout managers;
- 6.2 Elementary concepts of Event Handling
- 6.3 Delegation Event Model
- 6.4 Event classes and listeners
- 6.5 Adapter classes
- 6.6 Inner classes

### **Suggested Readings:**

1. Cay S. Horstmann, Gary Cornell, 2020, Core Java™, Volume I : Fundamentals, Pearson Education.
2. E. Balaguruswami, 2017, Core Java, TMH.
3. HebertSchild, C. S, Gray Cornel, 2013, Core Java Reference, TMH.
4. Brett Spell, 2015, Professional Java Programming, WROX Publication

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

### **Software required/Weblinks :**

JDK 1.8 <https://www.tutorialspoint.com/java/index.htm> <https://www.javatpoint.com/java-tutorial>  
(Last accessed: May 11, 2024)

**Note: Only latest available editions of the books are recommended**

**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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
O4.5CA201C01.1.	1	2	2		1		2	2	1	2	2		3	
O4.5CA201C01.2.	2	2	1					2	3	1	3	1		
O4.5CA201C01.3.			2	2			3	1	1	2	1		2	1
O4.5CA201C01.4.		1		2		2			2		3			
O4.5CA201C01.5.			3					2	1	1		2	1	2
O4.5CA201C01.6.	1			3	3		2			2	3			3

# MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES

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

## O4.5CA251C01: DATA STRUCTURES LAB

Periods/week Credits

2

Duration of Examination: 3 Hrs

Max. Marks: 100

Continuous Evaluation: 30

End Semester Examination: 70

**Pre-Requisite:** C Programming Lab

**Course Type:** Core

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

O4.5CA251C01.1. Analyze the asymptotic performance of various algorithms.

O4.5CA251C01.2. Design and implement various algorithms using arrays, records, linked structures, stacks, queues.

O4.5CA251C01.3 Demonstrate different methods for traversing trees.

O4.5CA251C01.4 Compare alternative implementations of data structures with respect to performance.

O4.5CA251C01.5 Design and develop non-linear data structures like Trees and Graphs.

### List of Experiments:

Every student is required to maintain a Practical File and write the following steps in each practical:

a) Problem statement

b) Formula(s) used

c) Algorithm

d) Flow Chart

e) Source codes in student's handwriting

f) Program listing (print-out)

g) Input & Output.

1. Write a program in C to implement insertion in 1-D Arrays

2. Write a program in C to implement deletion in 1-D Arrays

3. Write a program in C to implement linear and binary searching in 1-D Arrays

4. Write a program in C to implement sorting in 1-D Arrays

5. Write a program in C to concatenate two arrays

6. Write a program in C to implement the following Operations on 2-D Array (addition; subtraction; multiplication; transpose)

7. Write a program in C to implement operations on Stack using array

8. Write a program in C to implement operations on Stack using linked list

9. Write a program in C to implement applications of Stack

10. Write a program in C to implement operations on queue using array

11. Write a program in C to implement operations on queue using linked list

12. Write a program in C to implement operations on circular queue using array

13. Write a program in C to implement insertion in a linked list(beg; mid; end)

14. Write a program in C to implement deletion from a linked list(beg; mid; end)

15. Write a program in C to implement insertion in a circular linked list(beg; mid; end)

16. Write a program in C to implement deletion from a circular linked list(beg; mid; end)

17. Write a program in C to implement insertion in a doubly linked list(beg; mid; end)

18. Write a program in C to implement deletion from a doubly linked list(beg; mid; end)

19. Write a program in C to implement insertion in Binary tree
20. Write a program in C to implement deletion from Binary tree
21. Write a program in C to implement recursive tree traversals (Inorder; Preorder; Postorder)
22. Write a program in C to Sort a list using Bubble Sort
23. Write a program in C to Sort a list using Selection Sort
24. Write a program in C to sort a list using Quick Sort
25. Write a program in C to sort a list using Merge Sort
26. Write a program in C to sort a list using Insertion Sort
27. Write a program in C to sort a list using Heap Sort
21. Make a mini project based on the above-mentioned list of practicals.

Suggested mini projects are:

**a) Library Management**

Implement the library management system with the help of linked list for 50 books with following functionalities:

1. Add new books
2. Delete outdated books
3. Update Books
4. Make reports for the total no of books
5. Search books
6. Quit

**b) Railway Reservation System**

Develop a system using to reserve the railway tickets with the help of dynamic queue with the help of following functionalities:

1. Book the ticket and confirm
2. Waiting
3. Clear the waiting on FCFS basis
4. Report the number of list confirmed
5. Report the number of waitings
6. Quit

**Suggested Readings:**

1. Seymour Lipschutz, 2014, Data Structure, McGraw Hill Education
2. Jean-Paul Tremblay & Paul G. Sorenson, 2015, An Introduction to Data Structures with Applications, Tata McGraw Hill Publishing.
3. Rashmi Agrawal, Sachin Sharma, Seema Sharma, 2013, Data Structure, ManavRachna Publishing House.
4. Ten Baum, 2015, Data Structures using C & C++, Prentice-Hall International.

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

**Software required/Web links:**

Dev C/ Turbo C++

[https://www.tutorialspoint.com/design\\_and\\_analysis\\_of\\_algorithms/](https://www.tutorialspoint.com/design_and_analysis_of_algorithms/) (Last accessed: May 12, 2024)

<https://www.youtube.com/watch?v=1PI58Q3Ne2w> (Last accessed: May 12, 2024)

**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%

**COURSE ARTICULATION MATRIX:**

CO-PO Statement	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO 8	PO9	PO10	PO11	PO12	PSO1	PSO2
O4.5CA251C01.1	1	1	1		2		2						2	3
O4.5CA251C01.2	1	1	1				2						3	3
O4.5CA251C01.3	1	1	2	2	1		1	2					1	2
O4.5CA251C01.4	1	1	2	2	1		2	2				3	2	2
O4.5CA251C01.5	1	1	1	1	2		2	3				3	2	1

# MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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

## O4.5CA252C01: OBJECT ORIENTED PROGRAMMING USING JAVA LAB

Periods/week Credits

1

Duration of Examination: 3 Hrs.

Max. Marks: 100

Continuous Evaluation: 30

End Term Examination: 70

**Pre-Requisite:** C Programming Lab

**Course Type:** Core

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

O4.5CA252C01.1. Demonstrate the use of basic programming constructs.

O4.5CA252C01.2. Solve basic problems using flow control constructs.

O4.5CA252C01.3. Create Reusable objects conforming to the object-oriented paradigms.

O4.5CA252C01.4. Evaluate user requirements and propose a solution to meet the requirements.

O4.5CA252C01.5. Assess various AWT components and justify their usage in various programming situations.

O4.5CA252C01.6. Develop a responsive GUI Application to solve a basic business problem.

1. Write a program to find the average and sum of the N numbers using Command line argument.
2. Write a program to demonstrate type casting.
3. Write a program to generate prime numbers between 1 & given number
4. Write a program to generate pyramid of stars using nested for loops
5. Write a program to reversed pyramid using for loops & decrement operator.
6. Write a program for demonstrate Nested Switch
7. Write a program to calculate area of a circle using radius
8. Write a program to find G.C.D of the number.
9. Write a program to design a class account using the inheritance and static members which show all functions of a bank (Withdrawl, deposit)
10. Write a program to create a simple class to find out the area and perimeter of rectangle using super and this keyword.
11. Write a program to find the factorial of a given number using recursion.
12. Write a program to design a class using abstract methods and abstract classes.
13. Write a program to count the number of objects created for a class using static member function
14. Write a program to demonstrate the use of function overloading.
15. Write a program to demonstrate the use of inheritance
16. Write a program that show the partial implementation of Interface
17. Write a program to design a string class that perform string method (Equal, Reverse the string, change case).
18. Write a program to handle the exception using try and multiple catch block.
19. Write a program that implement the Nested Try Statements.
20. Write a program to create a package that access the member of External class as well as same package.
21. Write a program that import the user define package and access the Member variable of classes that contained by package.
22. Write a program to handle the user defined exception using throw keyword.
23. Write a program to create a class component that shows controls and event handling on those controls.

(mathcalc).

24. Write a program to draw the line, Rectangle, oval, text using the graphics method.
25. Write a program to create a menu using the frame.
26. Write a program to create a dialogbox.
27. Write a program to implement the flow layout and border layout.
28. Write a program to implement the GridLayout, cardLayout.
29. Write a program to create Frame that display the student information

#### **a) Online Cab Booking System:-**

Description: This Online Cab Booking project deals with an online system designed for booking cabs as per the requirements of the customers at their convenience. The current system is manual and it is time-consuming. It is also cost-ineffective, and the average return is low and diminishing. We give customer satisfaction the utmost priority and so give ample options to book cab by entering details like their journey date and time, origin, pickup point, destination and the drop-off point they need to reach.

#### **b) Credit Card Approval System: -**

Description: Credit Card Approval System is developed to record the details of various activities of the user. This Credit Card Approval System is used to overcome the entire problem which they are facing currently, and making complete atomization of manual system to computerized system.

#### **c) Vehicle Management System: -**

Description: Vehicle Management System is web application developed in Java and it is implemented by using windows appliance. This application provides an easy and simple way to sell or purchase vehicles online. Customers can view all the details of the vehicles and can purchase the vehicle. Customers can view all the details of the vehicle and send a request if he wants to purchase the vehicle.

#### **Suggested Readings:**

1. Joshua Bloch, 2018, Effective Java, Pearson Education.
2. E Balagurusamy, 2006, Programming with Java, Tata McGraw Hill.
3. Schildt Herbert, 2006, Java: The Complete Reference, Tata McGraw Hill.
4. Bruce Eckel, 2006, Thinking in Java, Pearson Education

#### **Software required/Weblinks:**

JDK 1.8

<https://www.tutorialspoint.com/java/index.htm> (Last accessed: May 12, 2024)

<https://www.javatpoint.com/java-tutorial> (Last accessed: May 12, 2024)

#### **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%

**COURSE ARTICULATION MATRIX:**

CO-PO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
O4.5CA252C01.1	1	2		2	1	1	3	1	2	1	2	2	2	3
O4.5CA252C01.2			3	2		1	2	2		2	1		1	1
O4.5CA252C01.3	1	1	3			2		2		3	3	1	2	2
O4.5CA252C01.4	1	3		1	2		3	2		3	2	3	3	3
O4.5CA252C01.5	2	2	1	3	1	2	1	3	1	1	1	2	1	2
O4.5CA252C01.6	2	2	1	3	1	2	1	3	1	1	1	2	1	2



## MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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

### O4.5SET100C04: ENVIRONMENTAL STUDIES

Periods/week Credits

3+1\*

Duration of Examination: 3 Hrs

Max. Marks : 100

Continuous Evaluation: 30

End Semester Examinations: 70

**Pre-Requisite:** The students should have the knowledge of environment, biodiversity, atmospheric pollution and importance of environmental studies. They should have the knowledge of causes and effects of disasters and various environmental problems.

**Course Type:** Fundamentals

**Course Outcomes:** The students will be able to:

O4.5SET100C04.1. appreciate the historical context of human interactions with the environment.

O4.5SET100C04.2. understand the concept of natural resources and explain sustainable development, its goals, targets, challenges and global strategies for sustainable development.

O4.5SET100C04.3. develop a critical understanding of the environmental issues, pollution and its types.

O4.5SET100C04.4. understand the concepts of ecosystems, biodiversity and conservation.

O4.5SET100C04.5. gain a comprehensive knowledge of climate change, its science and response measures.

O4.5SET100C04.6. develop a critical understanding of the complexity of environmental management and learn about how the nations of the world work together for the environment.

### PART- A

#### Unit 1: Humans and the Environment

**1.1** The man-environment interaction, Great ancient civilizations and the environment; Industrial revolution and its impact on the environment; Population growth and natural resource exploitation.

**1.2** Environmental Ethics and emergence of environmentalism.

#### Unit 2: Natural Resources and Sustainable Development

**2.1** Overview and classification of natural resources

**2.2** Biotic resources

**2.3** Soil and mineral resources

**2.4** Energy resources

**2.5** Introduction to sustainable development: Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs.

#### Unit 3: Environmental Issues

**3.1** Local, Regional and Global level environmental issues.

**3.2** Land use and Land cover change: land degradation, deforestation, desertification, urbanization. Biodiversity loss: past and current trends, impact.

**3.3** Ozone layer depletion; Climate change. Disasters – Natural and Man-made (Anthropogenic).

#### **Unit 4: Conservation of Biodiversity and Ecosystems**

**4.1** Biodiversity and its distribution: Biodiversity as a natural resource; Levels and types of biodiversity; Biodiversity in India and the world; Biodiversity hotspots; Species and ecosystem threat categories.

**4.2** Ecosystems and ecosystem services

**4.3** Threats to biodiversity and ecosystems

**4.4** Major conservation policies

#### **PART-B**

#### **Unit 5: Environmental Pollution and Health**

**5.1** Understanding pollution: Production processes and generation of wastes; Assimilative capacity of the environment; Definition of pollution; Point sources and non-point sources of pollution.

**5.2** Air pollution: Sources of air pollution; Primary and secondary pollutants; Indoor air pollution; Adverse health impacts of air pollutants; National Ambient Air Quality Standards.

**5.3** Water pollution: Sources of water pollution; River, lake and marine pollution, groundwater pollution; water quality Water quality parameters and standards; adverse health impacts of water pollution on human and aquatic life.

**5.4** Soil pollution and solid waste: Soil pollutants and their sources; Solid and hazardous waste; Impact on human health.

**5.5** Noise pollution: Definition of noise; Unit of measurement of noise pollution; Sources of noise pollution; Noise standards; adverse impacts of noise on human health.

**5.6** Thermal and Radioactive pollution: Sources and impact on human health and ecosystems.

#### **Unit 6: Climate Change: Impacts, Adaptation and Mitigation**

**6.1** Understanding climate change

**6.2** Impacts, vulnerability and adaptation to climate change

**6.3** Mitigation of climate change: Synergies between adaptation and mitigation measures; Green House Gas (GHG) reduction vs. sink enhancement

#### **Unit 7: Environmental Management**

**7.1** Introduction to environmental laws and regulation

**7.2** Environmental management system: ISO 14001 Concept of Circular Economy, Life cycle analysis; Cost-benefit analysis

**7.3** Environmental audit and impact assessment; Environmental risk assessment Pollution control and management; Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Ecomark scheme

#### **Unit 8: Environmental Treaties and Legislation**

**8.1** An overview of instruments of international cooperation; bilateral and multilateral agreements; conventions and protocols

**8.2** Major International Environmental Agreements

**8.3** Major Indian Environmental Legislations:

**8.4** Major International organizations and initiatives

#### **Case Studies and Field work\***

The students are expected to be engaged in some of the following or similar identified activities:

- Discussion on one national and one international case study related to the environment and sustainable development.
- Field visits to identify local/regional environmental issues, make observations including data collection and prepare a brief report.
- Participation in plantation drive and nature camps.

- Documentation of campus biodiversity.
- Campus environmental management activities such as solid waste disposal, water Management and sanitation, and sewage treatment.

**Suggested Readings:**

1. Fisher, Michael H. (2018) An Environmental History of India- From Earliest Times to the Twenty-First Century, Cambridge University Press.
2. Headrick, Daniel R. (2020) Humans versus Nature- A Global Environmental History, Oxford University Press.
3. Hughes, J. Donald (2009) An Environmental History of the World- Humankind’s Changing Role in the Community of Life, 2nd Edition. Routledge.
4. Perman, R., Ma, Y., McGilvray, J., and Common, M. (2003) Natural Resource and Environmental Economics. Pearson Education.
5. Simmons, I. G. (2008) Global Environmental History: 10,000 BC to AD 2000. Edinburgh University Press.
6. Chiras, D. D and Reganold, J. P. (2010) Natural Resource Conservation: Management for a Sustainable Future. 10th edition, Upper Saddle River, N. J. Benjamin/Cummins/Pearson.
7. John W. Twidell and Anthony D. (2015) Renewable Energy Sources, 3rd Edition, Weir Publisher (ELBS)
8. William P. Cunningham and Mary A. (2015) Cunningham Environmental Science: A Global Concern, Publisher (Mc-Graw Hill, USA)
9. Manahan, S.E. (2022). Environmental Chemistry (11th ed.). CRC Press. <https://doi.org/10.1201/9781003096238>
10. Varghese, Anita, Oommen, Meera Anna, Paul, Mridula Mary, Nath, Snehlata (Editors) (2022) Conservation through Sustainable Use: Lessons from India. Routledge.
11. Ahluwalia, V. K. (2015). Environmental Pollution, and Health. The Energy and Resources Institute (TERI).
12. Adenle A., Azadi H., Arbiol J. (2015) Global assessment of technological innovation for climate change adaptation and mitigation in developing world, Journal of Environmental Management, 161 (15): 261-275.
13. Richard A. Marcantonio, Marc Lame (2022) Environmental Management: Concepts and Practical Skills. Cambridge University Press.
14. Kanchi Kohli and Manju Menon (2021) Development of Environment Laws in India, Cambridge University Press.

**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:**

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Short/Long Questions: 70%

**Assessment Tools:**

Assignment/Tutorials

Sessional tests

Surprise questions during lectures/Class Performance

Term end examination

**COURSE ARTICULATION MATRIX:**

CO Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
O4.5SET100C04.1	3	3	3	3	2	2	1	2	2	3		2		
O4.5SET100C04.2		3	3	2	3	2			1	3	1	2		
O4.5SET100C04.3		2	3	3	3	2						3		
O4.5SET100C04.4		2	2	2	2		2					2		
O4.5SET100C04.5		3	3	3	3	3	2			3		2		
O4.5SET100C04.6	3	3	3	3	2	2	1	2	2	3		2		

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

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

**O4.5CA200C05: DIGITAL EDITING AND MOTION GRAPHICS**

Periods/week Credits

2

Duration of Exam: 3Hrs

Max.Marks: 100

Continuous Evaluation:30

End Semester Evaluation: 70

**Pre-Requisite:** NA

**Course Type:** SEC

**Course Type:** The students will be able to:

O4.5CA200C05.1 Understand the principles of digital editing and motion graphics design.

O4.5CA200C05.2. Gain proficiency in using industry-standard software for video editing and motion graphics.

O4.5CA200C05.3. Develop skills in creating visually appealing animations and motion graphics

O4.5CA200C05.4. Apply digital editing and motion graphics techniques to multimedia projects

**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**

6.1 Planning and developing a digital editing and motion graphics project

6.2 Storyboarding and pre-production

6.3 Implementing editing and motion graphics techniques learned in the course

#### **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/](http://griffinpictures.in/blog/motion-graphics-and-video-editing-whats-the-difference/) last update 30<sup>th</sup> May 2024  
Motion Graphics Notes - Akshansh Chaudhary | PDF (slideshare.net) last update 30<sup>th</sup> 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:

1. 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%

2. 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	PO12	PSO1	PSO2
O4.5CA200C05.1	2	1	3	2	3		3						2	2
O4.5CA200C05.2	2	2	3	3	2		1		3				2	1
O4.5CA200C05.3	3	2	3	2	2	3				1			1	2
O4.5CA200C05.4	2	1	3	2	2		3				3		2	2

# MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES

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

## O4.5CDC296C05: Placement Competency Enhancement-II

Periods/week Credits: 1

Max. Marks: 100

Internal Evaluation: 30

Mode of End-Term Examination: Online +Practical

End Semester Examination: 70

**Pre-Requisite:** Placement Competency Enhancement-I

**Course Type:** SEC

**Course Outcomes:** The students will be able to:

O4.5CDC296C05.1: exhibit compelling reading and writing skills in the workplace.

O4.5CDC296C05.2: learn grammatically correct formal writing skills.

O4.5CDC296C05.3: enhance their skills to effectively deliver formal and informal presentations to a variety of audiences in multiple contexts.

O4.5CDC296C05.4: solve problems based on non-verbal reasoning.

O4.5CDC296C05.5: solve complex problems based on Syllogism with mathematical operations

O4.5CDC296C05.6: apply short tricks on complex problems of Percentage, Ratio & interest.

### PART A

#### **Unit 1: Developing Communication Skills- II (Reading & Writing)**

1.1 Reading Comprehension

1.2 Writing Skills: Introduction to Writing: Organizing Principles of Paragraph, Precise Writing, Punctuations

1.3 Social Media, Digital Ethics, and Cyber Security

1.4 Report Writing

1.5 Note Taking

#### **Unit 2: Syntactical English II**

2.1 Conditionals

2.2 Preposition of Time & Place

#### **Unit 3: Effective Communication**

3.1 Concepts of Chronemics: Interpretation of time with business environment

3.2 Monochronic vs. Polychronic Cultures

3.3 Non- Verbal Communication: Kinesics & Proxemics

3.4 Acing virtual (video) interviews

#### **Unit 4: Presentation Skills**

4.1 Opening & closing of Presentations

4.2 Audience Analysis

4.3 Structuring the Presentation

4.4 Best Practices in Presentations

### **Part B**

#### **Unit 5: Arithmetic II**



- 5.1 Percentages,
- 5.2 Ratio & Proportion
  - 5.2.1. Proportionality
  - 5.2.2. Variations
  - 5.2.3 Partnership
  - 5.2.4 Problem on Ages & Numbers
- 5.3 Profit & Loss
  - 5.3.1. Basic terminology & Formulae
  - 5.3.2. Error in Weights
  - 5.3.3. Marked Price and Discounts
- 5.4 Mixtures & Allegations
- 5.5 Interest
  - 5.5.1 Simple Interest
  - 5.5.2 Compound Interest
  - 5.5.3 Relation between SI & CI

## **Unit 6: Logical Reasoning II**

- 6.1 Syllogism
- 6.2 Logical Deductions
- 6.3 Inequalities and Mathematical Operations

## **Unit 7: Non-Verbal Reasoning**

- 7.1 Pictorial Series
- 7.2 Missing Values
- 7.3 Analogy and Images

### **Recommended Texts and Readings:**

1. Gallo, C. (2015). Talk like TED. Macmillan.
2. Paul, D. S. (2022). Advanced writing skills. Goodwill Publishing House.
3. Vyner, J. (2018). Mastering soft skills. Matador.
4. Aggarwal, R. S. (2018). Quantitative aptitude for competitive exams (7th ed.). S. Chand & Company Pvt. Ltd.
5. Sharma, A. (2014). How to prepare for logical reasoning for CAT (4th ed.). McGraw Hill Education.
6. <https://www.cbs.de/en/blog/15-effective-presentation-tips-to-improve-presentation-skills/> (Last accessed - May 12, 2024)

### **Assessment Tools:**

- Continuous Assessment: Assignments/ Activities/ Quiz
- Sessional examination (Online mode) at 2nd sessional
- Term-end examination (Practical + Online mode)

