MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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

FACULTY OF COMPUTER APPLICATIONS

CURRICULUM

AND

SCHEME OF EXAMINATION

(BACHELOR OF COMPUTER APPLICATIONS) BATCH:

2022-25

FOREWORD

This is to certify that this booklet contains the entire Curriculum and Scheme of Examination of Bachelor of Computer Applications being offered at Faculty of Computer Applications of this University. This has been duly vetted and finally approved by the Academic Council of the University vide its 38th and 40th meeting held on 09-11-2021 and 10-05-2022 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 2021-24.

Date: **Dean-Academics, MRIIRS**

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 Mathematicsand Mathematical Foundations of Computer Science are offered to enhance the basic mathematical skills of regional students.

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

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

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

Although the curriculum has been designed after thorough deliberations involving experts from academia and industry, and considering the feedbacks obtained from various stakeholders, there is always a scope of regular revision and updation of the syllabus keeping in view the changing needs of the industry and society. Thus a wellarticulated process is followed to revise the curriculumfrom time to time. The process begins with obtaining feedbacks fromvarious 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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FACULTY OF COMPUTER APPLICATIONS

DEPARTMENT OF COMPUTER APPLICATIONS

VISION AND MISSION OF THE DEPARTMENT

VISION

To be a reputed source for globally competent professionals in computer applications through strong research and teaching environment; to empower them to become socially and economically responsible citizens for the betterment of society.

MISSION

1. To impart theoretical and practical training in advanced areas of computer applications and contribute new knowledge through analytical learning which encourages creativity, insight development and a passion for information technology.

2. To provide better ambience for research in order to enhance the performance of faculty members and scholars while continually providing conducive teaching- leaning and research environment.

3. To provide learning ambience to generate innovative and problem solving skills with professionalism.

ABOUT THE DEPARTMENT

Department of Computer Applications is one of the oldest departments of the university engaged in teaching and research in computer applications. Currently, it is offering BCA, BSc (IT) MCA and PhD programmes with latest, industry-ready curriculum which is being kept regularly updated in the light of latest developments in the IT industry. There is great thrust on practical applications. We provide a highly interactive learning environment so that the students get a full feel of the subject and get fully involved in the acquisition of computer skills. Students are encouraged in innovative and critical thinking in various computer languages, platforms and protocols. They are exposed to live industry projects to enable them to gain insights into the working of the industry.

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 graduates' 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

	Programme Outcome(PO)/ Programme Specific Outcome (PSO)	PEOs that are attained through concerned PO
PO1	Computational Knowledge: Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.	**1,2**
PO2	Problem Analysis: Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.	**1,2**
PO3	Design / Development of Solutions: Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies..	**1,2,3**
PO4	Conduct Investigations of Complex Computing Problems: Ability to devise and conduct experiments, interpret data and provide well informed conclusions.	**2,3**
PO5	Modern Tool Usage:Ability to select modern computing tools, skills and techniques necessary for innovative software solutions	**2**
PO6	Professional Ethics: Ability to apply and commit professional ethics and cyber regulations in a global economic environment.	**3**
PO7	Life-long Learning: Recognize the need for and develop the ability to engage in continuous learning as a Computing professional	**3,4**
PO8	Project Management: Ability to understand management and computing principles with computing knowledge to manage projects in multidisciplinary environments.	**2,3**
PO9	Communication Efficacy: Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.	**3,4**
PO10	Societal & Environmental Concern: Ability to recognize economical, environmental, social, health, legal, ethical issues involved in the use of computer technology and other consequential responsibilities relevant to professional practice.	**3,4**
PO11	Individual & Team Work: Ability to work as a member or leader in diverse teams in multidisciplinary environment	**3,4**
PO12	Innovation and Entrepreneurship: Identify opportunities,	**1,3**

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

SEMESTER SYSTEM AND CHOICE BASED CREDIT SYSTEM

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

(a) Course credits assignment

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

(b)Earning of credits

At the end of every course, a letter "Grade" shall be awarded in each course for which a student has registered. On obtaining a minimum Pass Grade, 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 students 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 DeanAcademics.

· 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

Course Type	Course Code	Title of Course	Pre-requisite Course, if any		Periods/Week				Marks			Duration of Exam	Credits
			SEMESTER- I										
			Title	Code	L	T	P	Total	Continuous Assessment	End Semester Exam	Total		
Compulsory Courses													
Fundamentals	BCA-DS-101	Elements of Mathematics	NA	NA	3	1		4	100	100	200	3	4
Core	BCA-DS-102	Hardware Interfaces	NA	NA	3			3	100	100	200	3	3
Core	BCA-DS-104	Introduction to IT & Programming in C	NA	NA	3			3	100	100	200	3	3
Core	BCA-DS-105	Database Management System	NA	NA	3			3	100	100	200	3	3
Core	BCA-DS-106	Business Communication	NA	NA	3			3	100	100	200	3	3
Core	BCA-DS-154	C Programming Lab	NA	NA			4	4	50	50	100	3	2
Core	BCA-DS-155	Database Management System Lab	NA	NA			2	2	50	50	100	3	1
Total													**19**

* 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.

			SEMESTER- II										

Course Type	Course Code	Title of Course	Pre-requisite Course, if any		Periods/Week				Marks			Duration of Exam	Credits
			Title	Code	L	T	P	Total	Int	Ext	Total		
Compulsory Courses													
Core	BCA-DS-201	Data Structures using C	NA	NA	3			3	100	100	200	3	3
Core	BCA-DS-202	Internet Technologies	NA	NA	3			3	100	100	200	3	3
Core	BCA-DS-203	Software Engineering	NA	NA	3			3	100	100	200	3	3
Core	BCA-DS-251	Data Structures Lab	NA	NA			2	2	50	50	100	3	1
Core	BCA-DS-252	Internet Technology Lab	NA	NA			2	2	50	50	100	3	1
Fundamentals	CH-202B	Environmental Studies	NA	NA	3			3	100	100	200	3	3+1*
Total Credits													**15**

* 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.

SEMESTER- III

Course Type	Course Code	Title of Course	Pre-requisite Course, if any		Periods/Week				Marks			Duration of Exam	Credits
			Title	Code	L	T	P	Total	Continuous Assessment	End Sem. Exam	Total		
Compulsory Courses													
Core	BCA-DS-301	Object Oriented Programming using C++	Introduction to IT & Programming in C	BCA-DS-104	3			3	100	100	200	3	3
Core	BCA-DS-302	Introduction to Operating System	NA	NA	3			3	100	100	200	3	3
Fundamentals	BCA-DS-303	Mathematics for Computer Science	Elements of Mathematics	BCA-DS-101	3	1		4	100	100	200	3	4
Core	BCA-DS-351	C++ Lab	C Programming Lab	BCA-DS-154			4	4	50	50	100	3	2
	BCA-RIC-I	Research Innovation Catalyst-I	NA	NA		1		1	50		50		0.5
Fundamentals	BCA-DS-309	Soft Skills and Aptitude Development-I	NA	NA	2			2	50	50	100	3	2
Domain Specific Elective	BCA-DS-304	Web Applications Development	NA	NA	3			3	100	100	200	3	3
	BCA-DS-306	Shell Programming	NA	NA									
Domain Specific Elective	BCA-DS-354	Web Applications Development Lab	NA	NA			2	2	50	50	100	3	1
	BCA-DS-356	Shell Programming Lab	NA	NA									
Total Credits (BCA)													**18.5**
BCA Specialization: Data Science and Big Data Analytics (In Association with Microsoft)													
Domain Specific	BCA-ED-351	Azure Fundamentals	NA	NA			4	4	50	50	100	4	2
Domain Specific	BCS-DS-376	Azure Data Fundamentals	NA	NA			4	4	50	50	100	4	2
BCA Specialization: Cyber Security In Association with Microsoft)													
Domain Specific	BCA-ED-351	Azure Fundamentals	NA	NA			4	4	50	50	100	4	2
Domain Specific	BCS-DS-376	Azure Data Fundamentals	NA	NA			4	4	50	50	100	4	2
BCA Specialization: Artificial Intelligence and Machine Learning In Association with Microsoft)													
Domain Specific	BCS-DS-375	Azure AI Fundamentals	NA	NA			4	4	50	50	100	4	2
Domain Specific	BCS-DS-376	Azure Data Fundamentals	NA	NA			4	4	50	50	100	4	2
Total Credits (BCA Specialization)													**22..5**

SEMESTER- IV

Course Type	Course Code	Title of Course	Pre-requisite Course, if any		Periods/Week				Marks			Duration of Exam	Credits
			Title	Code	L	T	P	Total	Continuous Assessment	End Semester Exam	Total		
Compulsory Courses													
Fundamentals	BCA-DS-401	Numerical Analysis and Statistical Techniques	Elements of Mathematics	BCA-DS-101	3	1		4	100	100	200	3	4
Core	BCA-DS-402	Programming in Java	Object Oriented Programming using C++	BCA-DS-301	3			3	100	100	200	3	3
Core	BCA-DS-406	Computer System Architecture	NA	NA	3			3	100	100	200	3	3
Core	BCA-DS-452	Java Lab	C++ Lab	BCA-DS-351			4	4	50	50	100	3	2
Fundamentals	BCA-DS-407	Soft Skills and Aptitude Development-II	NA	NA	2			2	50	50	100	3	2
Core	BCA-RIC-II	Research Innovation Catalyst –II	Research Innovation Catalyst-	BCA-RIC-I		1		1	50		50		0.5
Core	BCA-DS-453	Vocational Training	NA	NA	4 Week				100		100	2	2
Domain Specific Elective	BCA-DS-404	System Programming	NA	NA	3			3	100	100	200	3	3
	BCA-DS-405	Fundamentals of Artificial Intelligence	NA	NA									
Total Credits (BCA General)													**19.5**
BCA Specialization: Data Science and Big Data Analytics (In Association with Microsoft)													
Domain Specific	BCS-DS-490	Azure Database Administrator Associate					4	4	50	50	100	4	2
Domain Specific	BCA-ED-451	Azure Cosmos DB developer specialty					4	4	50	50	100	4	2
BCA Specialization: Cyber Security (In Association with Microsoft)													
Domain Specific	BCA-EC-451	Security Operations Analyst Associate					4	4	50	50	100	4	2
Domain Specific	BCA-EC-452	Security, Compliance and Identity Fundamentals					4	4	50	50	100	4	2
BCA Specialization: Artificial Intelligence and Machine Learning (In Association with Microsoft)													
Domain Specific	BCS-DS-489	Azure Developer Associate					4	4	50	50	100	4	2
Domain Specific	BCS-DS-490	Azure Database Administrator Associate					4	4	50	50	100	4	2
Total Credits (BCA Specialization)													**23.5**

* 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.

SEMESTER- V

Course Type	Course Code	Title of Course	Pre-requisite Course, if any		Periods/Week				Marks			Duration of Exam	Credits
			Title	Code	L	T	P	Total	Continuous Assessment	End Semester Exam	Total		
Compulsory Courses													
Core	BCA-DS-501	Data Communication & Networking	NA	NA	3			3	100	100	200	3	3
Core	BCA-DS-502	RDBMS	Database Management System	BCA-DS-105	3			3	100	100	200	3	3
Core	BCA-DS-503	Python Programming	Introduction to IT & Programming in C	BCA-DS-104	3			3	100	100	200	3	3
Fundamentals	BCA-DS-506	Soft Skills and Aptitude Development-III	NA	NA	2			2	50	50	100	3	2
Core	BCA-DS-552	RDBMS Lab	Database Management System	BCA-DS-155			4	4	50	50	100	3	2
Core	BCA-DS-553	Python Programming Lab	NA	NA			4	4	50	50	100	3	2
Core	BCA-RIC-III	Research Innovation Catalyst-III	Research Innovation Catalyst-II	BCA-RIC-II			2	2	100		100		1
Domain Specific Elective	BCA-DS-504	Fundamentals of Object-Oriented Analysis & Design	Object Oriented Programming using C++	BCA-DS-301	3			3	100	100	200	3	3
	BCA-DS-505	Introduction to Cloud Computing	Data Communication & Networking	BCA-DS-501									
Total													**19**
BCA Specialization: Data Science and Big Data Analytics (In Association with Microsoft)													
Domain Specific	BCS-DS-593	Azure Data Engineer Associate					4	4	50	50	100	4	2
Domain Specific	BCA-ED-551	Customer Data platform specialty					4	4	50	50	100	4	2
BCA Specialization: Cyber Security (In Association with Microsoft)													
Domain Specific	BCA-EC-551	Azure Security Engineer Associate					4	4	50	50	100	4	2
Domain Specific	BCA-EC-552	Identity and access Administrator Associate					4	4	50	50	100	4	2
BCA Specialization: Artificial Intelligence and Machine Learning (In Association with Microsoft)													
Domain Specific	BCS-DS-592	Azure AI Engineer Associate					4	4	50	50	100	4	2
Domain Specific	BCS-DS-593	Azure Data Engineer Associate					4	4	50	50	100	4	2
Total Credits (BCA Specialization)													**23**

* 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.

			SEMESTER-VI											
			Pre-requisite Course, if any		Periods/Week				Marks			Dura tion of Exa m	Cred its
Cours e Type	Course Code	Title of Course	Title	Code	L	T	P	Total	Continuou s Assessme nt	End Seme ster Exam	Tota l		
Core	BCA-DS-601	Programmin g in .NET using C#	Object Oriented Programming using C++	BCA-DS-301	3			3	100	100	200	3	3
Core	BCA-DS-651	Programmin g in .NET using C# Lab	NA	NA			4	4	50	50	100	3	2
Core	BCA-DS-652	Project	NA	NA			8	8	200	100	300	-	4
Domai n Specific Electiv es	BCA-DS-603	Security of Information System	Data Communication & Networking	BCA-DS-501	3			3	100	100	200	3	3
	BCA-DS-606	Machine Learning	NA	NA									
Domai n Specific Electiv es	BCA-DS-604	Multimedia & Animation	Elements of Computer Graphics	BCA-DS-403	3			3	100	100	200	3	3
	BCA-DS-605	Basics of MIS & ERP	Principles of Management	BCA-DS-307									
Total Credits (BCA General)													15
BCA Specialization: Data Science and Big Data Analytics (In Association with Microsoft)													
Domai n Specific	BCS-DS-692	Azure Data Scientist Associate					4	4	50	50	100	4	2
Domai n Specific	BCS-DS-693	Azure Enterprise Data Analyst Associate					4	4	50	50	100	4	2
BCA Specialization: Cyber Security (In Association with Microsoft)													
Domai n Specific	BCA-EC-651	Information protection Administrato r Associate					4	4	50	50	100	4	2
Domai n Specific	BCA-EC-652	Cyber Security Architect Expert					4	4	50	50	100	4	2
BCA Specialization: Artificial Intelligence and Machine Learning (In Association with Microsoft)													
Domai n Specific	BCS-DS-692	Azure Data Scientist Associate					4	4	50	50	100	4	2
Domai n Specific	BCS-DS-693	Azure Enterprise Data Analyst Associate					4	4	50	50	100	4	2
Total Credits (BCA General / Specialization)													19
* 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 degree, the students need to earn 106 credits of compulsory courses & electives and at least 14 of Open Elective/MOOC/Coursera Courses													
Total Credit (BCA General)													120
Total credit (BCA with Specialization) (16 Extra Credits)													136

FIRST SEMESTER

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES
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BCA-DS-101: ELEMENTS OF MATHEMATICS

Periods/week   Credits
L: 3   T: 1   4
Duration of Examination: 3 Hrs

Max. Marks: 200
Continuous Evaluation: 100
End Semester Examination:100

Pre-Requisite: NA
Course Type: Fundamentals

Course Outcomes: At the end of the course, the student will be able to: BCA-DS-
101.1. Understand the concept of matrices along with its operations BCA-DS-101.2.
Analyze the concept of power and exponent.
BCA-DS-101.3. Compute word problems using permutation and combination.
BCA-DS-101.4. Demonstrate the rules of continuity and differentiation to evaluate elementary functions BCA-DS-
101.5. Apply the concept of power series to find the expansion of any given function.

PART-A
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 binominal theorem

3.2 Positive index

3.3 Applications of binomial theorem (Only positive index)

3.4 Basics of Permutations and Combinations

PART-B

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
6.2 Definition of Maclaurin's Theorems
6.3 Applications of Maclaurin's Theorems
6.4 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.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
http://www.schurzhs.org/ourpages/auto/2015/9/6/44741179/Chapter%205%20Indices%20and%20Surds%
20pg_%2096%20-%20135.pdf
https://www.vedantu.com/ncert-solutions/ncert-solutions-class-10-maths-chapter-8-introduction-
totrigonometry
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 conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30
Sessional II	30
Assignment	20
Class Performance	10
Attendance	10

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
BCA-DS-101 .1	1	1		2			2	3						
BCA-DS-101.2	1	1		2			3	3						
BCA-DS-101.3	1	1	1		2		3	3					2	1
BCA-DS-101.4	1	1	1	2	2		2	3					1	
BCA-DS-101.5	1	1		2			3	3						

BCA-DS-102: HARDWARE INTERFACES

Periods/week Credits	Max. Marks :200
L:3　　T:0　　3	Continuous Evaluation :100
Duration of Examination: 3 Hrs	End Semester Examination: 100

Pre-Requisite: NA
Course Type: Core

Course Outcomes: At the end of the course, the student will be able to
BCA-DS-102.1. Explain the working of computer components and how these components are inter-related.
BCA-DS-102.2. Describe the pivotal role of motherboard in any computer.
BCA-DS-102.3. Differentiate between the interfaces of keyboard, USB, serial port, parallel port, etc.
BCA-DS-102.4. Report the issues of storage devices.
BCA-DS-102.5. Troubleshoot various problems related to the overall performance of computer.

PART -A

UNIT 1: Introduction
1.1 Concept of hardware
1.2 Relationship between hardware and software
1.3 Fundamental building blocks of the PC
1.4 Basic PC handling techniques, Concept of Booting
1.5 CPU essentials and processor modes
1.6 Over clocking and its requirement
1.7 Types of Computer: Micro, Mini and Mainframe
1.8 Generation of processor Intel Brand (Pentium processor I, II, III, IV, I3, I5,I7,I9)
1.9 Mobile processor and its configuration
1.10 Characteristics of robust mobile processor

UNIT 2: Input Output Peripheral device
2.1 Keyboard and pointing devices
2.2 Keyboard controller
2.3 Super IO controller
2.4 Interrupt controller
2.5 Serial port and parallel port
2.6 Monitor,CRT controller
2.7 Printer and its type
2.8 Printer maintenance
2.9 Pin diagram for connectors of peripheral devices
2.10 Requirements for wireless printers
2.11 How to connect mobile with your printer

UNIT 3: Storage Devices
3.1 Introduction to Memory
3.2 Memory types: Primary memory and Secondary Memory
3.3 Memory Card, USB, Data Card
3.4 Organization of memory - logical and physical
3.5 Cache Memory: L1-cache, L2-cache

3.6 Memory modules, SIMM and DIMM

PART-B

UNIT 4: Motherboard

4.1 Motherboard controller and system resource
4.2 System bus
4.3 Universal serial bus
4.4 North bridge and south bridge
4.5 POST sequence
4.6 BIOS and boot sequence
4.7 BIOS shortcoming
4.8 Expansion card
4.9 Power supply and power management

UNIT 5: Bus Architecture

5.1 Industry standard architecture(ISA), EISA

5.2 Peripheral components Interconnect (PCI)

5.3 Accelerated graphics port (AGP)

5.4 Plug-and-play devices

5.5 SCSI concepts

5.6 USB Architecture

5.7 UART, RS-232

UNIT 6: PC handling and Troubleshooting

6.1 Protecting PC from various threats like virus problem
6.2 Trojan horse andworm
6.3 Handle problem related to hard disk
6.4 Antivirus
6.5 Ransomware
6.6 Bots or Internet Robots

Suggested Readings:

1. Craig Zacker& John Rourke, 2017, The complete reference: PC hardware, Tata McGraw-Hill
2. W. L.Rosch, 2003, Hardware bible,Techmedia
3. Mark Minasi, 2005, The complete PC upgrade and maintenance guide, BPB
4. Stephon J Bigelow, 2013, Trouble shooting, maintaining and repairing PCs, Tata McGraw Hill

Note: Only latest editions of the books are recommended.

Weblinks:
https://www.tutorialspoint.com/computer_fundamentals/computer_hardware.htm
http://www.learning-about-computers.com/

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30
Sessional II	30
Assignment	20
Class Performance	10
Attendance	10

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
BCA-DS-102.1	3	2	3	1	2	3	2				2	2	2	2
BCA-DS-102.2	3	1	2	2	1	2	2							
BCA-DS-102.3	3	3	1	1	2	2	2							
BCA-DS-102.4	3	3	2	2	3									
BCA-DS-102.5	2	2	3	3	3	2	2	2			2	3		

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BCA-DS-104: INTRODUCTIONTO IT & PROGRAMMING IN C

Periods/week Credits
L: 3   T: 0   3
Duration of Examination: 3 Hrs

Max. Marks: 200
Internal / Continuous Assessments:100
End Semester Examination: 100

Pre-Requisite: NA
Course Type: Core

Course Outcomes: At the end of the course, students will be able to
BCA-DS-104.1.Identify and analyze top down and bottom up strategies of programming.
BCA-DS-104.2. Understand the key hardware components in a modern computer system and how software is mapped to the hardware.
BCA-DS-104.3. Examine the relationships and interaction between the different parts of complex problem.
BCA-DS-104**.4**. Designflowcharts, pseudo code and decision table for solving a real time problems.
BCA-DS-104.5. Compare and Contrast the various algorithmic solutions to solve a particular problem.

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PART −A
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, Pseudo code
1.5 Browser and Internet basics.
1.6 Email and Social Media Tools

UNIT 2: Basics of CLanguage 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 loop
3.5 Alternative and Jump: switch statement; break; continue; goto; exit() function

PART −B
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 latest editions of the books are recommended.

Software required/ Web links:

https://sourceforge.net/projects/orwelldevcpp/
http://www.codeblocks.org/

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30
Sessional II	30
Assignment	20
Class Performance	10
Attendance	10

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
BCA-DS-104.1	2	2					2				1		2	1
BCA-DS-104.2	2	1			2		1						1	1
BCA-DS-104.3	2	3		2	2		1				2		3	2
BCA-DS-104.4	1	2	2	2			2				2		2	2
BCA-DS-104.5	3	3	3	2	1		2						1	1

BCA-DS-105: DATABASE MANAGEMENT SYSTEM

Periods/week Credits   Max. Marks   : 200
L:3   T: 0   3   Continuous Evaluation:100
Duration of Examination: 3 Hrs   End Semester Examination: 100

Pre-Requisite: NA
Course Type: Core

Course Outcomes: At the end of the course, students will be able to
BCA-DS-105.1. Learn the concept of databases.
BCA-DS-105.2. Understand the three schema architecture of database system .
BCA-DS-105.3. Study various strategies of database security and recovery.
BCA-DS-105.4. Apply the query based data on given set of conditions.
BCA-DS-105.5. Analyze the interface that works with a normalized database.
BCA-DS-105.6. 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:Hierarchal, Network, Relational Data Models
2.5Introduction: Entities; Entity types; Entity set;Attributes
2.6E-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
3.4Rrelational calculus
3.5Introduction to SQL:History of SQL; Basic Structure
3.6DDL Commands, DML Commands
3.7 SQL functions: Character functions, Aggregate Functions, Date functions

PART B

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
4.5Normal 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
5.4Locks: 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
6.5Introduction 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 conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks. **Distribution of Continuous Evaluation Table**

Sessional I	30
Sessional II	30
Assignment	20
Class Performance	10
Attendance	10

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
BCA-DS-105 .1	1				2			2					2	3
BCA-DS-105.2		3	2				1	1					2	3
BCA-DS-105.3	2			2			2	1	3					3
BCA-DS-105.4	2			2			2		3					3
BCA-DS-105.5		2	3		3		2							3
BCA-DS-105.6		3	2		3		2							

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BCA-DS-106: BUSINESS COMMUNICATION

Periods/week Credits	Max. Marks : 200
L:3 T:0 3	Continuous Evaluation : 100
Duration of Examination: 3 Hrs	End Semester Examination: 100

Pre-Requisite: NA
Course Type: Core

Learning Outcomes:

By the end of course, the learners should be able to:
BCA-DS-106.1: Gain an in-depth knowledge of how formal communication is done at the workplace;
BCA-DS-106.2: Understand the impact of communication skills in a professional scenario;
BCA-DS-106.3: Hone their formal writing skills;
BCA-DS-106.4 Deliver effective presentations;
BCA-DS-106.5: Create impressive first impressions at the workplace by writing good business reports;

PART-A

Unit 1: Introduction:Business Communication
1.1 Nature, process and types of communication
1.2 Role of communication skills in business
1.3 Communication networks
1.4 Barriers to communication
1.5 How to make communication effective

Unit 2:Communication Skills
2.1 Listening skills –process and types of listening
2.2 Barriers to listening
2.3 Reading skills
2.4 Body Language

Unit 3: Written Communication
3.   1.Email
3.2 Layout of Business Letter Writing
3.3Notices,circulars, Memos
3.4 Agenda and minutes of a meeting

PART-B

Unit 4:Presentation Skills
4.1 Audience Analysis
4.2 Creation of PPT
4.3 How to deliver presentation
4.4 Do's and Don't's of ppt delivery

Unit 5: Report Writing
5.1 Format of a business report
5.2 Types of business reports

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

Only latest available editions of the books are recommended

Distribution of Continuous Evaluation Table

Sessional I	30
Sessional II	30
Assignment	20
Class Performance	10
Attendance	10

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
BCA-DS-106.1	2	3	3	2	2	1	2	2	2	3
BCA-DS-106.2	2	3	3	2	1	1	2	2	2	3
BCA-DS-106.3	2	3	3	2	1	1	2	2	2	3
BCA-DS-106.4	2	3	2	1	-	-	-	1	1	2
BCA-DS-106.5	2	3	2	1	-	-	-	1	1	2

BCA-DS-154: C PROGRAMMING LAB

Periods/week Credits   Max. Marks   : 100
P: 4   T:0   2   Continuous Evaluation : 50
Duration of Examination: 3 Hrs   End Semester Examination : 50

Pre-Requisite: NA
Course Type: Core

Course Outcomes: At the end of the course, students will be able to
BCA-DS-154.1. Explain the concepts of Procedural programming.
BCA-DS-154.2. Solve basic programming problems using the building blocks of C Language.
BCA-DS-154.3. Design programs involving decision structures and loops.
BCA-DS-154.4. Create programs using the concept of dynamic memory management.
BCA-DS-154.5. 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.

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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

30. 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/

Distribution of Continuous Evaluation Table

Viva I	30%
Viva II	30%
File/Records	20%
Class Performance	10%
Attendance	10%

Assessment Tools:

    Experiments in lab
    File work/Class Performance
    Viva (Question and answers in lab)
    End Term Practical Exam

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BCA-DS-154.1	2	2	2	3									3	3
BCA-DS-154.2	1	2	2										1	1
BCA-DS-154.3		1	2	2									1	1
BCA-DS-154.4	2	2	3	3	3								1	1
BCA-DS-154.5	1	2	3	3			2	1					2	2

BCA-DS-155: DATABASE MANAGEMENT SYSTEM LAB

Periods/week Credits		Max. Marks: 100
P: 2 T: 0 1		Continuous Evaluation : 50
Duration of Examination: 3 Hrs		End Semester Examination : 50

Pre-Requisite: NA
Course Type: Core

Course Outcomes: At the end of the course, students will be able to **BCA-DS-155.1.** Create tables and databases using SQL.
BCA-DS-155.2. Design a query in database using SQL DML/DDL commands
BCA-DS-155.3. Implement the relational databases in order to optimize database performance in practice.
BCA-DS-155.4. Apply **q**uery based data on any given set of conditions.
BCA-DS-155.5. 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.
10. List the employees ending with name "s".
11. Display all the Arithmetic functions used in SQL.
12. List the names, salary and PF amount of all the employees (PF is calculated as 10% of salary)

13. List the employee names having "k" as the second character.
14. List the students not assigned to any department.
15. List the students details in ascending order of course
16. List the number of Studentsin BCA course.
17. List the number of students available in student table.
18. Create a table with a primary key constraint.
19. Create a table with all column having not null constraints
20. Create a foreign key constraint in a table
21. Create a Table with a unique key constraint
22. Display the different students in department 1 and 2.
23. Display list of student ordered by course
24. 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:
1. Parteek Bhatia, Gurvinder Singh,2016, Simplified approach to DBMS ,Kalyani Publishers
2. IyanByross, 2010, Introduction to PL/SQL, BPB Publications

Software   required/Weblinks:
    ORACLE 10g
    https://www.tutorialspoint.com/sql
      https://www.w3schools.com/sql/

Distribution of Continuous Evaluation Table

Viva I	30%
Viva II	30%
File/Records	20%
Class Performance	10%
Attendance	10%

Assessment Tools:

Experiments in lab

File work/Class Performance

Viva (Question and answers in lab)

End Term Practical Exam

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BCA-DS-155.1	2	3	1	3	3	2		2	1		2	2	3	1
BCA-DS-155.2	1	3	2	3	3			2	1		2		3	
BCA-DS-155.3		3	1	3	3			1			2		3	
BCA-DS-155.4	1	2	2	3	3		1				1	2	3	
BCA-DS-155.5		1	2	2	3		1	1			1		3	1

SECOND SEMESTER

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

BCA-DS-201: DATA STRUCTURES USING C

Periods/week Credits   Max. Marks   : 200
L:3   T: 0   3   Continuous Evaluation: 100
Duration of Examination: 3 Hrs   End Semester Examination : 100

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
BCA-DS-201.1.Define the concepts of data structures and its applications.
BCA-DS-201.2. Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
BCA-DS-201.3.Apply data structures in solving real life problems.
BCA-DS-201.4. Analyze the complexity of different data structures such as stacks, queues and Linked list.
BCA-DS-201.5. Evaluate the complexity of various sorting algorithms in best, average and worst case scenarios.

PART -A

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 &non linear 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
2.9Applications 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
4.11B+ 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.youtube.com/watch?v=1PI58Q3Ne2w

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Assessment Tools:

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

COURSE ARTICULATION MATRIX:

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO2
BCA-DS-201.1	3	1	2	2	2		3	2	1			
BCA-DS-201.2	2	2	3	1	1		2					
BCA-DS-201.3	2	2	2	2	3		3				2	2
BCA-DS-201.4	3	3	3	2	2		1					
BCA-DS-201.5	2	2	2					2				

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES

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BCA-DS-202: INTERNET TECHNOLOGIES

Periods/week Credits   Max. Marks   : 200
L:3   T: 0   3   Continuous Evaluation: 100
Duration of Examination: 3 Hrs   End Semester Examination : 100

Pre-Requisite: NA
Course Type: Core

Course Outcomes: At the end of the course, students will be able to
BCA-DS-202.1. Understand the concept and basic working schemes of the internet and World Wide Web.
BCA-DS-202.2. Learn how to use internet tools & technologies effectively including current web-based applications.
BCA-DS-202.3. Acquire skills and gain knowledge to support and secure network environments. BCA-DS-202.4. Apply basic knowledge of IOT in different areas related to IT.

PART –A
UNIT 1: Introduction to Internet and World Wide Web
1.1 Introduction to Internet
1.2 Architecture of Internet
1.3 Modes of Connecting to Internet
1.4 Links, URLs and Hyperspace
1.5 World Wide Web & Internet Browser
1.6 Software Requirements and Internet Service providers
1.7 File types used for Internet

UNIT 2: Internet Protocols
2.1 DNS: Working of DNS
2.2 Type of Records in DNS
2.3 DHCP: Working of DHCP
2.4 DHCP Header
2.5 Domain Allocation
2.6 IP address configuration
2.7 Addressing Mechanism
2.8 SMTP : The basis for Internet Mail System
2.9 Understanding email header and email addresses

UNIT 3: Internet ethics and etiquettes
3.1   Need for Electronic Mail Ethics
3.2   Ethical Rules for Internet
3.3   Ethics and Language
3.4   Human rights issues
3.5   Copyright Laws
3.5   Patents
3.6   Trade Secrets
3.7   Laws for Protecting Information
3.8   Rights for employees and employers

Part B

UNIT 4: Ethical Hacking Techniques
4.1 Basic Terminology
4.2 Passive Scanning Techniques
4.3 Active Scanning Techniques
4.4 Type of Attacks
4.5 Ethical Hacking
4.6 SQL Script Injection
4.7 Cross-Site Scripting

Unit 5: Cyber Security and Cyber Laws
5.1 Identity Theft
5.2 Protecting Yourself against Cyber Crime
5.3 Secure Browser Settings
5.4 Need of Legal Protection from cyber crimes
5.5 Cyber laws and their scope and coverage
5.6 Need of Data Security
5.7 Data Security threat techniques

Unit 6: Internet of things
6.1 Need of Internet of Things
6.2 Envisioning of Internet of Things Era
6.3 Concept of Device-to-Device/Machine-to-Machine Integration
6.4 Cloud Infrastructures for Smart Phone Services
6.5 Applications of Internet of Things

Suggested Readings:
1. Olivier Hersent, 2012, Internet of Things Key Applications and Protocols, Wiley Publications
2. Pethuru Raj and AnupamaC. Raman,2017, The Internet of Things Enabling Technologies, Platforms and use cases, CRC Press
3. Harley Hahn, 2011, The Internet Complete Reference, Tata McGraw Hill
4. Anne-Marie Bradley, 2002, Internet Technologies: Stage I Award for OCR , Making the Internet Work for You, Pearson
5. Keith Sutherland, 2007, Understanding the Internet: A Clear Guide to Internet Technologies , A ButterworthHeinemann Title

Note: Only latest editions of the books are recommended. Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Software required/ Web links:
https://www.youtube.com/watch?v=1PI58Q3Ne2w

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-202.1							2	1						
BCA-DS-202.2		1			2		1	1						
BCA-DS-202.3				1			1						1	
BCA-DS-202.4						2	1							

MANAV RACHNA INTERNATIONAL INSTITUE OF RESEARCH & STUDIES

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BCA-DS-203: SOFTWARE ENGINEERING

Periods/week Credits
L:3   T: 0   3
Duration of Examination: 3 Hrs

Max. Marks   : 200
Continuous Evaluation: 100
End Semester Examination: 100

Pre-Requisite: NA
Course Type: Core

Course Outcomes: At the end of the course, students will be able to
BCA-DS-203.1 Define the basic Software engineering methods and practices, and their appropriate application.
BCA-DS-203.2 Understand software process models and software requirements and the SRS documents.
BCA-DS-203.3Implement project management planning, scheduling, and risk management using real life applications.
BCA-DS-203.4Classify different software architectural designs
BCA-DS-203.5 Compare the various testing strategies at functional level and behavior level.
BCA-DS-203.6 Assess software quality attributes and to integrate software quality control and software quality assurance.

PART -A
UNIT 1: Introduction
1.1 Software Engineering, software Characteristics and Software Crisis
1.2 Software Engineering Principles and goals
1.3 Software Product and Software Process
1.4 Software life cycle models: Build and fix model, Waterfall, Prototype, Spiral model, RAD model
1.5 Comparison of software life cycle model

UNIT 2: Requirement Analysis and Specification
2.1 Engineering,
2.2 System modeling and simulation
2.3 Analysis principles of modeling
2.4 Partitioning software
2.5 Prototyping Model
2.6 Requirement Software Requirement Specification and Review
2.7 Modeling Analysis: functional modeling and information flow
2.8 Creating Entity-Relationship diagrams,
2.9 Data flow model, control flow model.
2.10 Control and process specification, Data dictionary.

UNIT 3: Software Project Planning and Management
3.1 Software Project Management Concept, Planning Goals and Activities
3.2 Cost- Benefit Analysis
3.3 COCOMO model.
3.4 Software Metrics: Product Metrics (LOC, Token Count, Function Count)
3.5 Data Structure Metrics, Information Flow Metrics and Design Metrics
3.6 Software Project Scheduling: Introduction and its techniques (WBS, Gantt chart, Pert, CPM)

PART-B

UNIT 4: Software Design

4. 1 Design goals and principles

4. 2 Design concepts: abstraction, Refinement, modularity, Software architecture

4. 3   Control hierarchy, Structural partitioning, and modular design: functional
independence 4. 4 Cohesion and coupling

4. 5 Design Models: design documentation, design methods

4. 6 Architectural Design of Software

4. 7 Data Design: Data Modeling, data structures and databases.

UNIT 5: Software Testing

5.1 Error, Bug, Fault, Defect & Failure, test case, test suite

5.2 Testing Process and Principles

5.3 Black Box Testing : Equivalence Class Partitioning, Boundary Value Analysis, Cause-Effect Graphs, Comparison
Testing

5.4 White Box Testing: Basis Path Testing, Structural Testing, Logic based Testing, Fault Based Testing

5.5 Alpha testing and beta testing,

5.6 System testing, recovery testing, security testing,

5.7 Stress testing, performance testing, Integration
testing.

5.8 Testing Tools & Standards.

UNIT 6: Software Quality Assurance and Maintenance

6.1 Software Quality, Quality Assurance, Quality Standards like ISO 9001

6.2 SEI-Capability Maturity Model

6.3 Software reliability, measurements of reliability.

6.4 Reverse Engineering, Software Re-engineering

6.5 Software Configuration Management

6.6 Software Maintenance

Suggested Readings:
1.   Rogers. Pressman, 2009, Software Engineering-A practitioner's Approach, MGH
2.   Rajib Mall, 2018, Fundamentals of Software Engineering, PHI 3. Ian Sommerville,
2011, Software Engineering , Pearson Education,
4. David Gustafson, 2019, Software Engineering, TMH.

Note: Only latest editions of the books are recommended.
Weblinks:
https://www.tutorialspoint.com
https://www.nptel.ac.in

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering
entire syllabus and will be compulsory to attempt. 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 20
marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-203.1	2	3	2	3	2	1	2	2	3	1	1	3	2	2
BCA-DS-203.2	2	1	1	3	2	1	2	1	2	1	2	3	2	2
BCA-DS-203.3	2	2	1	3	2	1	1	2	2	1	2	3	2	2
BCA-DS-203.4	2	1	2	3	1	1	2	2	2	1	3	3	2	2
BCA-DS-203.5	1	2	1	2	2	1	2	2	3	1	3	3	2	2
BCA-DS-203.6	2	1	1	2	2	1	1	3	3	1	3	3	2	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES

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

BCA-DS-251: **DATA STRUCTURES LAB**

Periods/week Credits   Max. Marks : 100
P: 2   T:0   1   Continuous Evaluation : 50
Duration of Examination: 3 Hrs   End Semester Examination : 50

Pre-Requisite: C Programming Lab
Course Type: Core

Course Outcomes: At the end of the course, students will be able to BCA-DS-
251.1.Analyze the asymptotic performance of various algorithms.
BCA-DS-251.2. Design and implement various algorithms with use of arrays, records, linked structures, stacks,queues.
BCA-DS-251.3 Demonstrate different methods for traversing trees.
BCA-DS-251.4 Compare alternative implementations of data structures with respect to performance. BCA-DS-251.5 Design and develop non-linear data structures like Trees and Graphs.

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 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 above mentioned list of practical. 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 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.youtube.com/watch?v=1PI58Q3Ne2w

Distribution of Continuous Evaluation Table

Viva I	30%
Viva II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Assessment Tools:

Experiments in lab
File work/Class
Performance
Viva (Question and answers in lab)
End Term Practical Exam

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO 8	PO9	PO10	PO11	PO12	PSO1	
BCA-DS-251.1	1	1	1		2		2						2	3
BCA-DS-251.2	1	1	1				2						3	3
BCA-DS-251.3	1	1	2	2	1		1	2					1	2
BCA-DS-251.4	1	1	2	2	1		2	2				3	2	2
BCA-DS-251.5	1	1	1	1	2		2	3				3	2	1

BCA-DS-252: INTERNET TECHNOLOGY LAB

Periods/week Credits   Max. Marks : 100
P: 2   T:0   1   Continuous Evaluation : 50
Duration of Examination: 3 Hrs   End Semester Examination: 50

Pre-Requisite: NA
Course Type: Core

Course Outcomes: At the end of the course, the student will be able to: BCA-DS-
252.1. Create blog on various real world contemporary issues.
BCA-DS-252.2. Install and configure various Servers (SMTP Apache etc.)
BCA-DS-252.3. Set up DNS, HTTP and E-Mail server in Cisco Packet tracer. BCA-DS-
252.4. Design website through Wordpress website builder tool.

List of Experiments:
1. a) To Create a Technical Blog on any popular contemporary technical topic using any popular Blogging
    Software.
     b) To Try and Configure following settings in Gmail
     i) Vacation
     Responder   ii)
     Creating a Signature
     iii) Creating Labels iv)
     Creating Filters
          v) Setting up Mail Forwarding
2.   To Setup DNS, HTTP and E-Mail server in Cisco Packet tracer
  a) To setup a DNS Server.
  b) To Setup a HTTP Server
  c) To setup a e-mail Server
3.   To describe the steps of creating a domain e-mail id (e.g. myname@mycompany.com) on Hosting website
        and   updating CNAME Records.
4.   To describe chatting components on internet.   5. To Create website through Wordpress
a)Choosing the appropriate template
b) Customizing the template
c) Inserting content (Images and Text)
d) Finalize settings and Publishing the site
6.   To Demonstrate usage of Task automation application (e.g. Tasker on Android).
7.   To demonstrate SQL Injection attack on website.
8.   To demonstrate the effective uses of various search engine (Google/Yahoo/Bing etc)
9.   To Demonstrate cross-site scripting attack on website.
10. To understand the working of downloading and Installing Plug-ins to view multimedia.
11. To Connect to a Remote Server and execute some basic commands using Telnet.
12. To demonstrate the internal working of a Web Browser using the developer console.
13. Make a mini project based on above mentioned list of practical. Suggested mini projects are
    a)   Create and Publish an E-commerce website using Wordpress.
    b)   To Install and setup a local SMTP Server with functioning E-mail.

    c)   To create and cofigure micro-blogging website using Word.

Suggested Readings:

1. William Easttom,2016, Computer Security Fundamentals, Pearson
2. Dr. Pramod Kr. Singh,2007, Laws on Cyber Crimes,Book Enclave
3. Mark. F. Grady and Francesco Parisi, 2005, The Law and Economics of Cyber Security, Cambridge University Press
4. Dougles E-Commer, 2015, Internet Working with TCP/IP Vol-III , Pearson Pub.

Note: Only latest editions of the books are recommended.

Software required/ Weblinks:
Apache Server
Wordpress
SMTP Server
Domain Name account
Hosting Account
FTP Server
Web Browser
Telnet Client (Putty)
 https://www.tutorialspoint.com/internet_technologies/ https://softchalk.com/lessons/InternetTech-Research/InternetTech-Research4.html https://nptel.ac.in/courses/106105084/

Hardware requirement:
 Router
 Switches
 Hub
 Bridge
 Transmission cable

Distribution of Continuous Evaluation Table

Viva I	30%
Viva II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Assessment Tools:
Practical file
Sessional tests
Lab Performance
Term end examination

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BCA-DS-252.1.	3				2		1							
BCA-DS -252.2.	3		3		1		1						1	
BCA-DS -252.3.	2		3											
BCA-DS -252.4.			3						2		1			

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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CH-202B: ENVIRONMENTAL STUDIES

Periods/week Credits	Max. Marks : 200
L:3 T: 0 3+1*	Continuous Evaluation: 100
Duration of Examination: 3 Hrs	End Semester Examination: 100

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: At the end of the course, students will be able to
CH-202B.1Understand the significance of equitable use of natural resources and will be able to utilize the knowledge of biodiversity conservation and protection of environment.
CH-202B.2Learn about atmospheric pollution and global issues related to environment like natural disasters and will be able to understand the different acts for pollution control.
CH-202B.3Able to develop an understanding to major health issues of women and children will gain knowledge of Mortality and Mortality rate.
CH-202B.4Have the knowledge of different ecosystems and energy flow in ecosystem. CH-202B.5Gain knowledge of disaster management.

PART

- A Unit 1: Multidisciplinary Nature of Environmental

Studies 1.1 Definition, scope and importance.
1.2 Need for Public awareness.

Unit 2: Natural Resources

2.1 Natural resources and associated problems.
2.2 Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
2.3 Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
2.4 Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
2.5 Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
2.6 Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
2.7 Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
2.8 Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyles.

Unit 3: Ecosystems

3.1Concept of an ecosystem, Structure and function of an ecosystem
3.2 Producers, consumers and decomposers, Energy flow in the ecosystem
3.3 Ecological succession
3.4 Food chains, food webs and ecological pyramids
3.5 Introduction, types, characteristic features, structure and function of the following eco-system: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit 4: Biodiversity and its Conservation

4.1 Introduction – Definition: Genetic, species and ecosystem diversity

4.2 Biogeographical classification of India,

4.3 Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values

4. 4 Biodiversity at global, National and local levels

4.5   India as a mega-diversity nation, Hot-spots of biodiversity

4.6   Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India

4.7   Conservation of biodiversity: In- situ and Ex-situ conservation of biodiversity.

PART-B

Unit 5: Environmental Pollution

5.1 Definition, causes, effects and control, measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal Pollution

5.2 Nuclear hazards

1.3 Solid waste management: Causes effects and control measures of urban and industrial wastes.

1.4 Role of an individual in prevention of pollution.

1.5 Pollution case studies.

5.6 Disaster management: Floods, earthquake, cyclone and landslides.

Unit 6: Social Issues and the Environment

6.1 From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management

6.2 Resettlement and rehabilitation of people; its problems and concerns, Case Studies.

6.3 Environmental ethics: Issues and possible solutions.

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies.

6.4 Wasteland reclamation.

6.5 Consumerism and waste products.

6.6 Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act.

6.7 Issues involved in enforcement of environmental legislation, Public awareness.

Unit 7: Human Population and the Environment

7.1 Population growth, variation among nations

7.2 Population explosion – Family Welfare Programme

7.3 Environment and human health. Human Rights

7.4 Value Education.HIV/ AIDS, Woman and Child Welfare

7.5 Role of Information Technology in Environment and human health, Case Studies.

Unit 8: Chemistry for peaceful purposes

8.1 The duality of chemistry: Chemistry for peaceful purposes versus Chemical Weapons

8.2 Dual – use nature of toxic and precursor chemicals

8.3 Weapons of mass destructions, disarmament

Unit 9: Field work*

9.1 Visit to a local area to document environmental assets river/ Forest/grassland/hill/mountain

9.2 Visit to a local polluted site-Urban/Rural/Industrial/Agricultural

9.3 Study of common plants, insects, birds

9.4 Study of simple ecosystems-pond, river, hill slopes, etc.

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CH-202B .1	3	3	3	3	2	2	1	2	2	3		2		
CH-202B .2		3	3	2	3	2			1	3	1	2		
CH-202B .3		2	3	3	3	2						3		
CH-202B .4		2	2	2	2		2					2		
CH-202B .5		3	3	3	3	3	2			3		2		

Suggested Readings:

1. SaritaSachdeva, 2009, Text book of Environmental Studies,ManavRachna Publishing House Pvt. Ltd.
2. ErachBharucha, 2017, Textbook of Environmental Studies for Undergraduate Courses, University Grants Commission Publication.
3. R. Rajagopalan, 2015, Environmental Studies, Oxford University Press.
4. A.K. De, 2016, Environmental Chemistry, Wiley Eastern Ltd.
5. M. James, Lynch & Alan Wiseman, 2011, Environmental Bio-monitoring: The Biotechnology Eco-toxicology Interface, Cambridge University Press.
6. R.K. Morgan, 2012, Impact Assessment: A Methodological Perspective,Kluwar Academic Publications, Boston.
7. V. Subramanian, 2011, A Text Book in Environmental Science,Narosa Pub. **Distribution of Continuous Evaluation Table**

Sessional I	30%
Sessional II	30%
Assignment /Field work	20%
Class Performance	10%
Attendance	10%

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

Instructions for paper setting End Semester Examination: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B. Student needs to attempt two questions out of three from each part. Each question will be of 20 marks.

THIRD SEMESTER

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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

BCA-DS-301 : OBJECT ORIENTED PROGRAMMING USING C++

Periods/week   Credits
L: 3   T: 3
Duration of Examination: 3 Hrs

Max. Marks: 200
Continuous Evaluation: 100
End Semester Examination: 100

Pre-Requisite: Introduction to IT and Programming in C
Course Type: Core

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-301.1. Learn the various programming paradigms.
BCA-DS-301.2. Describe the concepts of Object Oriented Programming.
BCA-DS-301.3. Implement programs using advanced C++ features.
BCA-DS-301.4. Demonstrate the use of Exception handling.
BCA-DS-301.5. Implement the concept of Dynamic Memory Management.

PART-A

UNIT 1: Basic Concepts of OOP
1.1 A Brief history of C++
1.2 Concepts of OOP
1.3 Advantages and applications of OOP
1.4 Procedural and Non-Procedural languages
1.5 Comparison of Procedural programming and Object Oriented Programming
1.6 Introduction to Classes&
Objects 1.7 Program compilation
and execution.

UNIT 2: Elements of C++ Language
2.1 Tokens and identifiers; Keywords
2.2 Variables and Constants
2.3 Dynamic initialization of variables
2.4 Data types
2.5 Operators
2.6 Conditional statements
2.7 Looping statements
2.8 Function Prototyping
2.9 Call by Address
2.10 Call by Value
2.11 Return by Value
2.12 Default arguments
2.13 Constant arguments
2.14 Function overloading
2.15 Inline functions.

UNIT 3: Classes and Objects
3.1 Declaration of Class and Object in C++
3.2 Class definition
3.3 Access specifiers
3.4 Array with in a Class

3.5 Array of objects
3.6 Static data members
3.6 Static member functions
3.7 Object as function argument 3.8 Returning Object from function
3.9 Friend function.
3.10 Function overloading

PART-B

UNIT 4: Constructors, Destructors and Operator Overloading
4.1 Basic Constructor
4.2 Types of Constructor: Zero argument constructor; Parameterized constructor; Constructor with default arguments; multiple constructors in class; Copy constructor
4.3 Destructor
4.4 Constraints on constructors and destructors.
4.5 Operator Overloading: Overloading unary operators; binary operators
4.6 Overloading Operator using friend function
4.7 Rules for Overloading Operators

UNIT 5: Inheritance and Pointers
5.1 Derived and Base class
5.2 Types of inheritance
5.3 Order of execution of constructors and destructors in inheritance
5.4 Overriding member functions
5.5 Ambiguity resolution
5.6 Virtual Base class
5.7 Abstract class
5.8 Memory management using new and delete operators
5.9 Pointers to objects
5.10 This pointer
5.11 Pointer to derived class
5.12 Virtual function
5.13 Pure Virtual function
5.14 Early Vs Late binding
5.15 Polymorphism and its applications

UNIT 6: Streams, Exceptional Handling
6.1 Stream classes
6.2 Unformatted I/O operations
6.3 Formatted console I/O operations
6.4 Managing output with manipulators
6.5 Use of exception handling
6.6 Exception handling mechanism
6.7 Try block & Catch handler
6.8 Throw statement
6.9 Specifying exception

Suggested Readings:
1. Robert Lafore, 2008, Object Oriented Programming in C++, Pearson
2. E Balaguruswamy, 2006, Object Oriented Programming with C++ , Tata McGraw Hill
3. Herbert Schildt Herbert,2003, C++: The Complete Reference, Tata McGraw Hill

4. Ashok Kamthane, 2003, Object Oriented with ANSI and Turbo C++, Pearson

Note: Only latest editions of the books are recommended.

Weblinks:
https://www.w3schools.in
http://www.tutorialdost.com/   http://www.ddegjust.ac.in/studymaterial/mca-3/ms-17.pdf   http://www.vssut.ac.in/lecture_notes/lecture1427492371.pdf

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-301.1.	1	1	1	1									1	1
BCA-DS-301.2.	1	1	1	1									1	1
BCA-DS-301.3.	2	2	2	2	2		1						2	2
BCA-DS-301.4.	2	2	2	2	2		2						2	2
BCA-DS-301.5.	2	2	2	2	2		2						2	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)
BCA-DS-302: INTRODUCTION TO OPERATING SYSTEM

Periods/week   Credits   Max. Marks: 200
L: 3   T: 3   Continuous Evaluation: 100
Duration of Examination: 3 Hrs   End Semester Examination: 100

Pre-Requisite: NA
Course Type: Core

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-302.1. Describe the important computer system resources and the functions of operating system BCA-DS-302.2. Understand the working of CPU scheduling algorithms.
BCA-DS-302.3. Demonstrate various deadlock techniques and implementation of its algorithms.
BCA-DS-302.4.Distinguish and compare page replacement algorithm in memory management.
BCA-DS-302.5. Explain and analyze various structures and implement related algorithms in secondary storage management.

PART-A

UNIT 1: Introduction
1.1 Introduction of Operating System
1.2 Operating System Architecture
1.3 Operating System Services
1.4 Types of Operating system: Batch, Multi-programmed, Time-sharing, Real-time, Distributed, Parallel
1.5 Concepts of Multitasking, Multiprogramming, Multiuser, Multithreading, Multiprocessing
1.6   System Programs and System calls

UNIT 2: Process Management
2.1 Concept of Process
2.2 Process Scheduling
2.3 Operations on Processes
2.4 Inter process Communication
2.5 Threading and Multithreading
2.6 Scheduling Criteria, Preemptive & Non-Preemptive Scheduling
2.7 Scheduling algorithms: First Come First Served (FCFS), Shortest-Job-First (SJF)
2.8 Priority Scheduling, Round Robin (RR), Multilevel Queue Scheduling

UNIT 3: Process Synchronization and Deadlocks
3.1 Concepts of Process Synchronization
3.2 Critical Section Problem, Critical Region
3.3 Synchronization Hardware
3.4 Classical Problems of Synchronization
3.5 Semaphores
3.6 Basic Concepts of Deadlock
3.7 Deadlock Characterization
3.8 Deadlock Prevention
3.9 Deadlock Avoidance, Detection and Recovery

PART-B

UNIT 4: Memory Management
4.1 Logical & Physical Address Space

4.2 Swapping

4.3 Contiguous Memory Allocation, Non-Contiguous Memory Allocation

4.4 Paging

4.5 Segmentation

4.6 Virtual Memory Management - Demand Paging

4.7 Page-Replacement Algorithms: First In First Out (FIFO), Least Recently Used (LRU), Optimal Page Replacement (OPT)

4.8 Demand Segmentation

4.9 Concept of Fragmentation, Internal and External Fragmentation

UNIT 5: File and I/O System Management

5.1 File System and its Functions

5.2 Different types of Files and their Access Methods

5.3 Directory Structures

5.4 File Allocation Methods

5.5 Disk Structure

5.6 Disk Scheduling Algorithms: First come First Serve (FCFS), Shortest Seek Time First (SSTF), Elevator (SCAN), Circular-SCAN(C-SCAN)

5.7 I/O Hardware

5.8 Application I/O Interface, Kernel

5.9 Transforming I/O requests

UNIT 6: Case Studies

6.1 Linux: Design Principles

6.2 Kernel Module

6.3 Process Management

6.4 Scheduling

6.5 Windows 7: Design Principles

6.6 System Components

6.7 File System

6.8 Case Study of Mobile OS

Suggested Readings:
1. Milenkovie M, 1992, Operating System: Concept & Design, McGraw Hill.
2. Colin Ritche,2003, Operating System Incorporating With Unix & Windows, TMH.
3. Mandrik& Donovan, 2005, Operating Systems, TMH.
4. SibsankarHaldar, 2010, Operating Systems, Pearson.
Note: Only latest editions of the books are recommended.

Weblinks:
> https://www.tutorialspoint.com/operating_system/index.ht
> m https://www.studytonight.com/operating-system/

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-302.1	2	3	2	2			1						2	2
BCA-DS-302.2	1	1	1	2			2						3	2
BCA-DS-302.3	2	1	1	1			2						2	3
BCA-DS-302.4	1	1	2	2			1						2	2
BCA-DS-302.5	1	2	1	2			2						1	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES

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

BCA-DS-303: MATHEMATICS FOR COMPUTER SCIENCE

Periods/week Credits	Max. Marks: 200
L: 3 T: 1 4	Continuous Evaluation: 100
Duration of Examination: 3 Hrs	End Semester Examination: 100

Pre-Requisite: Elements of Mathematics
Course Type: Fundamentals

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-303.1.Understand the knowledge of mathematical foundations of computer science
BCA-DS-303.2. Solve problems involving sets, functions, relations, Principle of Mathematical Induction and Lattices. BCA-DS-303.3.Evaluate Boolean functions and simplify expression using the properties of Boolean algebra; apply Boolean algebra to circuits and gating networks.
BCA-DS-303.4. Demonstrate the knowledge about the recursive functions and their properties.Apply their working knowledge in Graph theory.
BCA-DS-303.5. Appraise the Cartesian system and apply the principles and concept of coordinate Geometry in real time problems

PART-A
Unit 1: Concepts of set, relation and functions
1.7 Set: Cardinality
1.8 Set-operations
1.9 Relations
1.10 Posets
1.11 Matrix of Relation
1.12 Equivalence Relations
1.13 Operation Functions

Unit 2: PMI, Pigeonhole Principle
2.1 Principles of Mathematical Induction
2.2 Greatest Common Devisor(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
http://www.schurzhs.org/ourpages/auto/2015/9/6/44741179/Chapter%208%20Coordinate%20Geometry%2
0pg_%20200%20-%20243.pdf   http://nms.lu.lv/wp-content/uploads/2016/04/21-linear-recurrences.pdf

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-303.1	☐1	3	☐3	2	☐1	☐	☐1						2	3
BCA-DS-303.2	☐2	☐1	☐2				☐1						2	3
BCA-DS-303.3	☐1	☐2	☐1				☐2	☐2	☐3	☐1			2	3
BCA-DS-303.4	☐1	3	3	☐2										3
BCA-DS-303.5	3	☐2	☐2	☐2	☐1		☐						3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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BCA-DS-351: C++ LAB

Periods/week   Credits   Max. Marks: 100
P: 4   T: 2   Continuous Evaluation: 50
Duration of Examination: 3 Hrs   End Semester Examination: 50

Pre-Requisite: C Programming Lab
Course Type: Core

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-351.1. Implement the application programs using C++.
BCA-DS-351.2. Design and develop programs with advanced features of the C++ programming language.
BCA-DS-351.3. Identify errors and apply error-handling techniques in programs. BCA-DS-
351.4. Develop mini projects using C++.

1.   Write a program in C++ to find the factorial of an integer using for Loop in C++.

2.   Write a program in C++ to find prime numbers between 1 and 100 using for Loop in C++.

3.   Write a program in C++ to print Fibonacci series upto a given number using While Loop in C++.

4.   Write a program in C++ to print even and odd numbers between 1 and 100 using Do While loop.

5.   Write a program with a class named student. The class should have data members for the name and marks of a student. The program should check if a student's marks are above, below or equal to pass marks of 35. If the student's marks are below 35 the student should be given an extra 5 marks. Use overloaded functions wherever possible. If the marks are still below 35 the student fails, display the marks of the student and whether the student has passed or failed.

6.   Write a program that uses two classes Circle and Rectangle. Each of these classes will contain data members and member functions that will be used to calculate the area of the object e.g. the circle will need radius or diameter variable and the rectangle will need length and width. In addition, the classes will have data members that will hold the value of the area of the objects created.

7.   Assume that a bank maintains Savings account for customers. Saving account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class Account that stores Customer name, Account number .Write member functions in order to achieve the following tasks:

i)   to accept deposit from a customer and update the balance.
ii)   to display the balance iii) to permit withdrawal and update the balance
v) to check for the minimum balance , impose penalty necessary and update the balance.

8.   Write a program in C++ to interchange the value of two variables. Name the class as Interchange and pass the two integers to the member function swap() by value. Do the interchange by passing the integers by reference also.

9.   Create a class String with an array of characters (string) as its data member. Write a program in C++ to concatenate the two strings defined in two objects of String class using Friend function.

10.   Consider two classes DM and DB which store the value of distances. DM stores distance in meters and centimeter and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out addition operation.

11.   Write a program in C++ to find the largest element of the array in an object. The details of the class to be made are as follows:

Data: An array of type integer
Member functions: to read array, to display array, to find the largest element of the array

12.   Write a program in C++ to read and display the Roll No., Name and Percentage marks of 5 students using an array of objects.
13.   Create a class **String** with data as a single String and appropriate member functions. Overload the binary operator '+' so that the following expressions are understood by the compiler:

S3=S1+S2 where S1,S2 and S3 are objects of class **String**.
S1!=S2
S1==S2

14.   Design a class **Matrix** to model a matrix of size m*n. Overload '+' to add two **Matrix** objects.
15.   Write a program in C++ to overload ++ and − operator in both prefix and postfix form.

16.   Consider a class DB which store the value of distances in feet and inches. Write a Program to perform Addition, Subtraction, Multiplication, Comparison, Input Operation and Display Operation using Operator Overloading concept.

17.   Using the **Account class** as a base class, write two derived classes called **SavingsAccount** and **CurrentAccount**. A SavingsAccount object, in addition to the attributes of an Account object, should have an interest variable and a method which adds interest to the account. A CurrentAccount object, in addition to the attributes of an Account object, should have an overdraft limit variable. Ensure that you have overridden methods of the Account class as necessary in both derived classes.

18.   Create a class called **Employee** whose objects are records for an employee. This class will be a derived class of the class **Person**. An employee record has an employee's name (inherited from the class Person), an annual salary represented as a single value of type double, a year the employee started work as a single value of type int and a national insurance number, which is a value of type String.

Your class should have a reasonable number of constructors. Write main method() to fully test your class definition.

19.   Write a program in C++ to demonstrate the following inheritance.
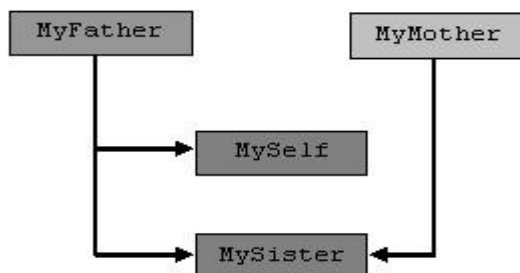
20.   Design a class Student in C++ with data as : Name (String), Marks (int). This class should have member functions to read and display Name and Marks. Also raise an exception whenever the user enters numeric characters while entering the name. Add a member function to print the result of every student as "Pass" or "Fail" depending on the Marks. If Marks are less than 35 then declare student as "Fail otherwise "Pass". Use an array of objects of this class.

21.   Write a program for Exception Handling of Division by zero.

22.   Add a function to h class 'String' that will return the character from the position that is passed as a parameter to it. If the position is out of bounds, the function should throw a user-defined exception.

23.   Write a program to read a file, also display the total number of characters, words, lines and blank spaces in the file.

24.   Make a mini project based on above mentioned list of practical. Suggested mini projects are:

   c) Human Resource Management
       Consider a company ABC which produces medical instruments. Write a program for Human Resource department of company ABC for 50 employees with following functionalities:
       1. Add new employee
       2. Delete employee information
       3. Update employee information
       4. Make reports based on specific field
       5. Search employee
       6. Quit
   d) Phone Directory

Develop a system using the general need required by the user while using the phone directory book. In order to keep updated the phone book directory, the admin will have the authority to add and delete as well as modify the existing records within the phone book directory. The users of the directory will only have the authority to search any particular record and listing details of all available records. Admin will have the authority to perform various operations such as add customer records, search any particular record, delete record, modify existing record etc.

e) Student Result Record System

Develop a system to eliminate the repetitive tasks which is to be performed manually thus saving time and investment. The new system will store all the student records along with their marks and mark sheet details, by which faculties and admin will able to retrieve these records whenever they required. It will enable faculties to get information on various sections such as list of failures students, list of toppers students, students list who have failed in particular subject etc using the predefined rules set by the University.

   f) Canteen Management System

Develop a system that will allow the users to know what items are available under their canteen shop and in what quantity they are available. At the mean time customers are also provided with option of purchasing the particular item. If the customer enters the yes option, then they can enter the number of quantity for each product and at the end they will able to get the bills for the items which they have purchased.

Suggested Readings:

   1. Robert Lafore, 2008, Object Oriented Programming in C++ , Pearson
   2. E Balaguruswamy, 2006, Object Oriented Programming with C++ , Tata McGraw Hill
   3. Herbert Schildt Herbert, 2003, C++: The Complete Reference , Tata McGraw Hill
   4. Ashok Kamthane, 2003, Object Oriented with ANSI and Turbo C++, Pearson

Note: Only latest editions of the books are recommended.

Software required: Turbo
         C++ for Windows
         Microsoft Visual C++

Distribution of Continuous Evaluation Table

Viva I	30%
Viva II	30%
File /Records	20%
Class Performance	10%
Attendance	10%

Assessment Tools:

Practical file
Viva tests
Lab Performance
Term end examination

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BCA-DS-351.1	3	3	3	3		3		3						3
BCA-DS-351.2	3	3	3	3		3		3						3
BCA-DS-351.3	3	3	3	3		3		3						3
BCA-DS-351.4	3	3	3	3		3		3						3

BCA-RIC-I: RESEARCH INNOVATION CATALYST-I

Periods/week	Credits	Max. Marks : 50
T: 1	0.5	Continuous Evaluation : 50

Pre-requisites: NA
Course Type: Research & Training

Course Outcomes:At the end of the course, the student will be able to:
BCA-RIC.I.1. Understand what is Research and Innovation.
BCA-RIC.I.2. Be in a position to describe the process and the procedure to carry out research/ innovation
BCA-RIC.I.3. Understand the research documentation that is needed for, journals publication, conferences etc. BCA-RIC.I.4.Understand and adopt the ethical practice in the research / Innovation activities. BCA-RIC.I.5. Comprehend the benefits obtained by means of systematic research/ Innovation
BCA-RIC.I.6. Inculcate Team building and collaborative approach.

Unit 1: What is Research?
    1.1 Capturing the current research/ Innovation trends
    1.2 Insight about scientific research/ Innovation performed by renowned experts in the related field.
    1.3 Exploration and excavation of in-house and commercially available facilities
    1.4 Model design about framing the research/ Innovation question – A motivational Approach
    1.5 Do's and Don'ts pertaining to research/ Innovation

Unit 2: Insight about Scientific Documentation
    2.1 Different types of Journals/Conferences
    2.2 Different components of a research paper
    2.3 Indexing of Journals
    2.4 Parameters involved in publication
    2.5 Scientific/technical writing and ethical practice

Unit 3: Understanding the Literature Survey (LS)
    3.1 Finding research papers related to a topic
    3.2 Understanding the different aspects of Literature search and Databases.
    3.3 Usage of different sources like Google scholar, WoS, PubMed, Scopus, ABDC, EBSCO etc.
    3.4 Exploration of online library-Deepdyve for research/ Innovation.
    3.5 Usage of scholarly networking sites like Research Gate, Mendeley, Academia.edu etc.
3.6 Demo sessions on the usage of above mentioned sources

Unit 4: Implementation of Process
    4.1 Understanding and selection of the research/ Innovation theme.
    4.2 Finding out the specific research/ Innovation problem in the relevant area
    4.3 Seeking information through published work w.r.t the problem
    4.4 Reading & categorizing the downloaded/referred papers or articles and structuring of the idea.

Unit 5: Report Writing and Presentation skill Development
    5.1 Report making on the surveyed literature to cater the basic idea of the author/ inventor
    5.2 Compiling and analyzing the published results to justify and understand the proposed ideas

5.3 Usage of MS-PowerPoint and other technical resources for the presentation
5.4 Development of presentation skills and group addressing

References:

1. http://nptel.ac.in/courses/121106007/
2. http://public.wsu.edu/~taflinge/research.html

Evaluation Criteria: The following evaluation parameters shall be considered for internal assessment by both research coordinators and faculty coordinator or research mentors:-

Criteria	Evaluation parameters	Weightage (Marks)	
Online and offline Attendance	▯ Percentage of classes attended by the students	3+2	5
Group participation and response of the students to a given task	• Judge individual student in the group • Meeting timelines as per lesson plan	5 10	15
Selection of research/ Innovation topics and Literature Survey	• Student interaction with faculty mentors • Relevance of the topic • Usage of Scientific Literature Databases. e.g., Scopus/ Web of Science/ etc. • Scientific/Technical writing • Number of relevant papers referred for the given topic	3 2 1 2 2	10
Presentation and Report Making	• Report structure and Slide sequence, • Contribution of individual group member towards the presentation and report • Reference listing • Plagiarism/Authenticity of the report	5 5 5 5	20

Course Articulation Matrix:

CO Statement (XX-300)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BCA-RIC.I.1	√	√	√	√	√	√			√		√		√	√
BCA-RIC.I.2			√	√	√				√				√	√
BCA-RIC.I.3		√		√					√	√			√	√
BCA-RIC.I.4								√					√	√
BCA-RIC.I.5	√					√	√					√	√	√
BCA-RIC.I.6	√	√							√			√	√	√

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

BCA-DS-304: WEB APPLICATIONS DEVELOPMENT

Periods/week Credits	Max. Marks: 200
L: 3 T: 3	Continuous Evaluation: 100
Duration of Examination: 3 Hrs	End Term Examination: 100

Pre-Requisite:NA
Course Type: Domain Specific

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-304.1 Understand the concept of World Wide Web and its applications
BCA-DS-304.2 Learn the basics of HTML and its structure
BCA-DS-304.3 Compare Client side and Server side technologies to develop web applications. BCA-DS-304.4 Apply basic syntax and semantics of JavaScript to create a dynamic web pages BCA-DS-304.5 Integrate CSS with HTML for designing interactive web pages.

PART-A
UNIT 1: Introduction to Networks, Protocols and World Wide Web
1.1 History of Networks
1.2 Network & its types
1.3 Internet and its essentials
1.4 Applications of Internet
1.5 Internet Addressing
1.6 E-mail Architecture and Services
1.7 Simple Mail Transfer Protocol, File Transfer Protocol, Uniform Resource Locator, Telnet and Internet Relay Chat 1.8 World Wide Web
1.9 Different Web Browsers and their Characteristics
1.10 Search Engines and their Features
1.11 Web Client and Server

UNIT 2: Effective 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: Internal and End Semester Examination
2.8 Images and Multimedia used in HTML

UNIT 3: Lists and Tables in HTML
3.1 Lists in HTML
3.2 Ordered and Unordered List
3.3 Definition List
3.4 Directory List
3.5 Menu List
3.6 Tables in HTML
3.7 HTML table and its Structure

3.8 Aligning the HTML Table

3.9 Alignment within row and within a cell in table

3.10 Table Formatting

3.11 Spanning of multiple rows and columns.

3.12 Advantages of using HTML Tables

PART-B

UNIT 4: Modern Web Applications using Frames and Forms

4.1 Frames in HTML

4.2 Frames and its usages in HTML

4.3 Applications of Frames

4.4 <FRAMESET> and Nesting <FRAMESET> tag

4.5 Placing Content in Frames with the <FRAME> tag

4.6 Targeting Named Frames

4.7 Different Frames Documents

4.8 Forms in HTML

4.9 Creating Forms using <FORM> tag

4.10 Named Input Fields

1.11 Text Box; Radio Button; Check Box; List Box; Combo Box

1.12 Creating Submit and Reset Button

1.13 Multiple Line Text Windows

4.14 Introduction to XML and
XHTML.

UNIT 5: Cascading Style Sheets (CSS)

5.1 Introduction to Cascading Style Sheets

5.2 The Need for Style Sheets

5.3 Basic Syntax and Structure of Style Sheets

5.4 Inline Style sheets; Internal Style sheets; External Style sheets; Embedding Style sheets

5.5 Linking External Style sheets

5.6 Background; Manipulating Text; Margins and Padding

5.7 Positioning using CSS

UNIT 6: Web Programming using Java Script

6.1 Introduction to JavaScript

6.2 Basic Programming Structure of JavaScript

6.3 Data Types; Variables and Constants

6.4 Operators; Operator Precedence; Expressions

6.5 Functions in JavaScript

6.6 Arrays and its types

6.7 Concept of Objects

6.8 Different Events in JavaScript

6.9 Dialogue Boxes and their Usages

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 latest editions of the books are recommended.

Software required/ Weblinks:
Notepad
Web Browser
https://www.tutorialspoint.com/html/
https://www.csstutorial.net/
https://javascript.info/

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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	P12	PSO1	PSO2
BCA-DS-304.1	3						2		3			1	3	3
BCA-DS-304.2		3			2				2		3		3	3
BCA-DS-304.3	2			3	1		3						3	3
BCA-DS-304.4	3					2			3			1	3	
BCA-DS-304.5	2			2							3		3	3

BCA-DS-306: SHELL PROGRAMMING

Periods/week Credits	Max. Marks: 200
L: 3 T: 3	Continuous Evaluation: 100
Duration of Examination: 3 Hrs	End Semester Examination: 100

Pre-Requisite:NA
Course Type: Domain Specific

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-306.1. Understand the basic structure of Linux operating system
BCA-DS-306.2. Classify Linux kernel mode with user mode and differentiate Kernel structuring methods.
BCA-DS-306.3. Demonstrate internal file system structure with device drivers and file operations using system calls.
BCA-DS-306.4. Analyze and evaluate process management and memory management in Linux BCA-DS-306.5. Construct shell scripts using sed and awk

PART-A

UNIT 1: Introduction to Linux/Unix
1.1 Linux distributions
1.2 Linux/Unix operating system
1.3 Linux/Unix architecture
1.4 Features of Linux/Unix
1.5 Accessing Linux/Unix system
1.6 Starting and shutting down system
1.7 Logging in and Logging out
1.8 Security in Linux/Unix

UNIT 2: Basic Commands of Linux/Unix
2.1File permissions and attributes
2.2 General-Purpose Commands
2.3 File Oriented Commands
2.4 Directory Oriented Commands
2.5 Communication Oriented Commands
2.6 Process Oriented Commands

UNIT 3: Regular expressions, Filters and File System
3.1 Regular Expressions
3.2 Simple filters viz. more, wc, diff, sort, uniqetc
3.3 grep family
3.4 Features of File System
3.5 Structure of file system
3.6 File System Components
3.7 Types of File System

PART-B

UNIT 4: Process Handling
4.1 Introduction to Processes
4.2 Starting and stopping processes

4.3 Initialization of processes

4.4 Mechanism of process creation

4.5 Running jobs in background

4.6 Killing processes with signals

4.7 Job control – at, batch, cron

UNIT 5: Essential of Shell Programming

5.1 Available shells under Linux (viz. Bash, TCSH, Korn)

5.2 Working with vi editor

5.3 Basic Commands of Shell Programming

5.4 Using command line arguments

5.5 Logical operators and conditional execution in shell

UNIT 6: Writing Interactive Shell Scripts

6.1 Conditional Statements (if, if-else, nested if)

6.2 Conditional Statements (case, switch)

6.3 Control structures for shell scripts using for and while

6.4 Manipulating positional parameters using shift

6.5 Basics of System Administration

Suggested Readings:
1. John Goerzen,2010, Linux Programming Bible, IDG Books
2. Yashwant Kanetkar,2003, Unix & Shell programming, BPB Publishing
3. Stephen Prata, 2008, Advanced UNIX-A programmer's Guide, SAMS
4. Sumitabha Das, 2017, Unix Concepts and Applications, TMH

Note: Only latest editions of the books are recommended.

Software   required:
> Linux 6
> SCO UNIX
> Ubuntu 18.04

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks. **Distribution of Continuous Evaluation Table**

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-306.1	2												3	3
BCA-DS-306.2		1											2	3
BCA-DS-306.3	2		3	2	2									3
BCA-DS-306.4	1		2	3	2								2	3
BCA-DS-306.5	2	3	1	2	2									3

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BCA-DS-354: WEB APPLICATIONS DEVELOPMENT LAB

Periods/week Credits	Max. Marks: 100
P: 2 T: 2	Continuous Evaluation: 50
Duration of Examination: 3 Hrs	End Semester Examination: 50

Co-Requisite: Knowledge of HTML and JavaScript
Course Type: Domain Specific
Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-354.1 Apply markup language elements in web pages.
BCA-DS-354.2 Use Java scripting language to web pages.
BCA-DS-354.3 Implement cascading style sheets on web pages.
BCA-DS-354.4 Develop websites incorporating web technologies (HTML,CSS and Java script)

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 Teaxtbox, 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:
31. MINIMUM =
32. MAXIMUM =

33. 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 send to the user for an event.

Suggested Readings:
1. IvanBayross,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/
https://www.csstutorial.net/
https://javascript.info/

Distribution of Continuous Evaluation Table

Viva I	30%
Viva II	30%
File /Records	20%
Class Performance	10%
Attendance	10%

Assessment Tools:

Experiments in lab
File work/Class Performance
Viva (Question and answers in lab)
End Term Practical Exam

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BCA-DS-354.1	3						3		2			2	2	3
BCA-DS-354.2		1			3				3		2		2	3
BCA-DS-354.3	3			3	2		2						2	3
BCA-DS-354.4	2					1			3			2	2	3

BCA-DS-356: SHELL PROGRAMMING LAB

Periods/week   Credits   Max. Marks: 100
P: 2   T: 1   Continuous Evaluation: 50
Duration of Examination: 3 Hrs   End Semester Examination: 50

Pre-Requisite: NA
Course Type: Domain Specific

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-356.1. Understand the installation process of Linux operating system.
BCA-DS-356.2. Execute various file processing commands used in UNIX.
BCA-DS-356.3. Apply Regular expression to perform pattern matching using utilities like grep,sed and awk.   BCA-DS-356.4. Implement shell scripts using this editor involving decision control, looping and control flow statements
BCA-DS-356.5. Construct shell scripts using Sed and AWK.
BCA-DS-356.6. Demonstrate process management using system calls of UNIX environment

1. Make a directory in your home directory called "practice". It will be used to do the exercises in this project unit. Change directories so this is your current directory.
    a. Verify the path by using the "pwd" command.
    b. Examine the files and directories using the ls command.
    c. List the contents of subdirectories using the ls -R command.
    d. Change your current directory to "practice".
    e. Are there any hidden files inside "practice"?
    f. Make a directory inside "practice"called "temp"
    g. Create its existence and contents in directory "practice"using "ls"
    h. Now create a file a.c into "temp"
    i. Try to remove the directory using the rmdir command.
    j. Enter the "temp" directory, remove the file "a.c" and return to "practice"
    k. Now remove the directory "temp"
2. What command would you issue to find out the date?
3. What command would you issue to display the current time?
4. What command would display all files in the current directory, with as much information displayed as possible?
5. What command would you use to make a copy of a file (whose name is **original**) with the name of the copy to be **copied.file**?
6. What command can you use to display a list of people currently logged onto the system?
7. What command can you use to display a list (with headings at the top) to display a list of people currently logged onto the system (displaying the amount of inactivity - how long they have not used the terminal)
8. Issue the UNIX command **cal 09 1752.** What happen?
9. Issue a UNIX command (not an editor!) to create a file called **stuff** that contains the following lines (include the mistakes!!)

    The cow is mad
    I tell you!
    I think the cow is looking at me
    Terrible news!
    I think the cow is looking at me

a. Issue a UNIX command to verify the contents of the file **stuff**
b. Issue a UNIX command to determine the file type of **stuff**
c. Try to issue a series of UNIX commands to take the contents of **stuff** and modify the content (to be saved in the file **stuff.new**) as shown below:

I tell you!
I think the cow is looking at me
Terrible news!

Here is the challenge:

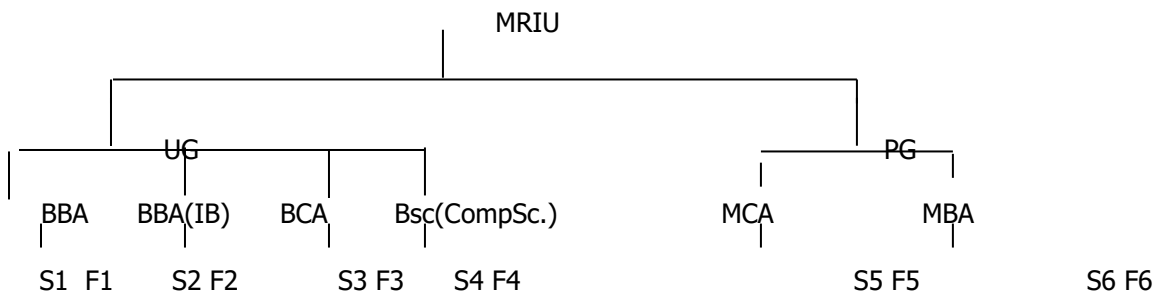**1 - you are <u>not</u> permitted to use an editor!**
2 - You have to issue those commands on just one line!
 Issue a UNIX command to verify the contents of the file **stuff.new**

d. Issue a UNIX command to change the name of the file **stuff.new** to **stuff,** but make sure that the system makes the user confirm overwriting the existing file and select "**yes**".
e. Issue a UNIX command to take the contents of the modified file **stuff** and place into a file called **cows** lines that only contain the pattern "cow"
f. Issue a UNIX command to take the contents of the modified file **stuff** and place into a file called **not_cows** all lines that <u>do not</u> contain the pattern "cow". (Hint: use the online manual to check for an appropriate option).
g. Issue a UNIX command to compare the file **cows** with the file **not_cows**
h. Issue a UNIX command to compare the file **stuff** with the file **cows**. According to the results, what has to be done to the file **stuff** to make it identical to **cows**?

10. Write down the commands of the following statements.

- To see all user who logged on to Unix.
- To see ur present working directory.
- To create 5 empty files file1, file2, file3, file4, file5.
- Make a file structure

```
                              MRIU
           ┌───────────────────┴───────────────────┐
          UG                                        PG
  ┌────────┼──────┬──────────┐            ┌──────────┴──────┐
 BBA    BBA(IB)  BCA    Bsc(CompSc.)     MCA              MBA
  │        │      │          │            │                │
S1  F1   S2 F2  S3 F3     S4 F4         S5 F5            S6 F6
```

- To see a long listing of your home directory.
- Copy files F5 under BCA directory.
- Copy files F3 under MCA.
- Rename file F5 under BCA to F3
- Rename file F3 under MCA to F5
- Create a new file by concatenating the contents of 2 files
- To the new file created above append the contents of third file.
- Show the complete directory structure. □   Create a file named largefile containing 50 lines □ Display the first 20 lines of file largefile.
- Display the last 20 lines of file largefile.

- Display the largefile from line number 30.
- Display all the files in ur current directory starting with a digit.
- Display all the files in ur current directory starting with 'a' character.
- Display all the files in ur current directory starting with 'a' character followed by a digit between 0-9 ☐ Move the file s2 and f2 to the dir MBA ☐ List the current directory in columnar format.
- Calculate the following:
  i) sqrt(25)
  ii) 21+2*3-9
  iii) Binary equivalent of 153 iv) Hexadecimal equivalent of 100
Octal equivalent of 250

11. Create a file named " Key"and then assign all permissions to the owner and remove all permissions from the rest.
12. Assign read permission for all to all files starting with **c** in your home directory.
13. Change the mode of the file "Key" so that all can execute the file.
14. Prevent the file "Key" from being read by group and others.
15. For the file "Key" assign all permissions to the owner, read and write permissions to the group and only execute permission to others.
16. Check the umask value of the system.
17. Change the umask so that write permission is denied to all for all files created.
18. Print the number of lines found that DO NOT match the string "teststring" in the file "testfile"
19. Display the strings 'aaa' and 'bbb' in two different lines using the banner command.
20. A file contains records with each record containing name of city, name of state and name of country. How would you sort this file with state as the sort key.
21. List all files beginning with the character 'f' on the screen also store them in a file called file1

 a) Construct pipelines to carry out the following jobs :-
- List all files beginning with the character 'p' on the screen and also store them in a file called file1.
- List all files beginning with the character 'p' on the screen twice in succession.
- Output of who should be sorted and displayed on the screen along with the total number of users. The same output except the number of users should also be stored in a file file1.
- Merge the contents of files a.txt, b.txt and c.txt, sort them and display the sorted output on the screen page by page.
- Display the list of last 20 files present in the current directory. Also store this list in a file profile.
- Output of who should be displayed on the screen with value of total number of users who have logged in displayed at the bottom of the list.
- Output of ls should be displayed on the screen and from this output the lines containing the word 'poem' should be counted and the count should be stored in a file file1
- Contents of file1 and file2 should be displayed on the screen and this output should be appended to the file file3.
- From the output of ls the lines containing 'poem' should be displayed on the screen along with the count.
- Names of cities should be accepted from the keyboard. This list of cities should be combined with the list of cities present in the file cityfile. This combined list should be sorted and the sorted output should be stored in a file newcity.
22. Display a HELLO message on ur system 5 minutes from now.
23.Ramesh's basic salary is input through the keyboard. His DA is 40% of basic salary, and HRA is 20% of basic salary. Write a program to calculate his gross salary.
24.The distance between two cities (in Km) is input through the keyboard. Write a program to convert and print this distance in meters, feet, inches and centimeters.
25. The length and breadth of a rectangle and radius of a circle are input through the keyboard. Write shell script to calculate the area and perimeter of the rectangle and the area & circumference of a circle.

26.   If a five digit number is input from the keyboard, write a program to calculate the sum of its digit.

27.Write a shell script which would receive the logname during execution, obtain information about it from /etc/passwd and display this information on the screen in easily understandable format.

28. Write a shell script to check whether the string entered by user is palindrome or not.

29. Write a menu driven program which has following options:-

   a) Contents of /etc/passwd
   b) List of users who have currently logged in
   c) Present working directory
   d) Exit

   30.Make a mini project using shell script on one of the following topics:
   a) Car Rental System
   b) Password Management System
   c) Stone paper Scissor game
   d) Guess the number game

Suggested Readings:
   1. John Goerzen,2010, Linux Programming Bible, IDG Books
   2. Yashwant Kanetkar,2003, UNIX& Shell programming, BPB Publishing
   3. Stephen Prata, 2008, Advanced UNIX-A programmer's Guide, SAMS
   4. Sumitabha Das,2017, Unix Concepts and Applications, TMH

Software required:
   Linux 6
   SCO UNIX
   Ubuntu 18.04

Distribution of Continuous Evaluation Table

Viva I	30%
Viva II	30%
File /Records	20%
Class Performance	10%
Attendance	10%

Assessment Tools:
   Experiments in lab
   File work/Class Performance
     Viva (Question and answers in lab)
     End Term Practical Exam

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BCA-DS-356.1	2												3	3
BCA-DS-356.2		2											3	3
BCA-DS-356.3			2	3	2								3	3
BCA-DS-356.4			2	2	2								2	3
BCA-DS-356.5			2	1	2								3	3
BCA-DS-356.6			2	3	2								3	3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)
NAAC 'A' Grade University

BCA-DS-309 : Soft Skills and Aptitude Development-I

Periods/week	Credits		Max. Marks	: 100
L:2	T:0	2	Internal	: 50
Duration of Exam: 2 hrs			External	: 50

Course Outcomes:
BCA-DS-309.1. Students will be able to recognize problems based on arithmetic & number system.
BCA-DS-309.2. Students will be able to solve problems based on verbal reasoning & simplification.
BCA-DS-309.3. Students will be able to calculate the correct answers to the problems within given time.
BCA-DS-309.4. Students will be able to plan their career meticulously by setting their time oriented goals.
BCA-DS-309.5. Students will be able to introspect and enhance their personality.
BCA-DS-309.6. Students will be able to develop cultural sensitivity and communicate respectfully across cultures.

PART – A
Unit 1: Number System 1

1.1   Vedic Mathematics
    1.1.1   Basic of mathematics
    1.1.2   Addition and subtraction using Vedic Mathematics
    1.1.3   Multiplication of two and three numbers.
1.2   Simplification
    1.2.1   BODMAS rule
    1.2.2   Fractions and recurring decimals
    1.2.3   Surds and indices
1.3   Numbers
    1.3.1   Types of numbers and number tree
    1.3.2   Divisibility Rule
    1.3.3   HCF & LCM

Unit 2: Verbal Reasoning 1

2.1   Direction Sense Test
2.2   Blood Relation Test

Unit 3: Arithmetic 1

3.1   Problem on Ages
3.2   Problem on Numbers
3.3   Averages

Part B

Unit 4: Career Planning

4.1   **Career Planning Process** - Self Assessment, Research, Decision Making, Action and   Employability

4.2   **Goal Setting:** Relevance, SMART goals, The Dos & Don'ts

Unit 5: Personality Enhancement

5.1   **Emotional Intelligence:** Emotional Self -Awareness, Self- Control, Emotional Management
5.2   **Stress Management:** What is Stress, Types of Stress, Stress Response Example, Vulnerability to Stress, Why do we Stress out, Stress Warning Symbols, Suggestions for Reducing Stress,
5.3   **Time Management:** Setting Priorities, Managing Time, Four Quadrants of Time Management
5.4.   **Team Building:** Definition –Team, Characteristics of effective Teams, Competence, Clear and Compelling goal, Supportive Environment, Alignment, Designing the Team, Identifying Roles and Responsibilities, Determining Reward, Troubleshooting Guide, Good Team member

Unit 6: Effective Communication

6.1   **Courtesy in Communication:** Being Polite, Self -Discipline, Respecting Others and understanding other's perspective in communication
6.2   **Inter cultural Communication:** Breaking Stereotypes, Diversity Inclusion and Cultural Sensitivity

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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

Text Books/Reference Books:
1.   Quantitative Aptitude for Competitive Examinations: R S Aggarwal, S Chand & Company Pvt Ltd, Edition 2017
2.   A Modern Approach to Verbal& Non Verbal Reasoning: R S Aggarwal, S Chand & Company Pvt. Ltd, Edition 2018
3.   College to Career: The Student Guide to Career and Life Navigation by Mark A Griffin
4.   Effective Communication in the Workplace by Anthony Gutierez

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES
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BCA-ED-351: Azure Fundamentals

Periods/week Credits   Max. Mark: 100
L: 4 T: 0 2   Continuous Evaluation: 50
Duration of Examination: 4 Hrs   End Semester Examination: 50
Pre-Requisite: NA
Course Type: Domain Specific

Course Outcomes: At the end of the course the student will be able to:
BCA-ED-351.1 Be familiar with the general cloud technology concepts
BCA-ED-351.2 Build Practical knowledge of Azure services and Azure workloads.
BCA-ED-351.3 Detail knowledge of Implementation related to security and privacy in Azure, Azure pricing and support.
BCA-ED-351.4 Develop capability to build and deploy the application support, and application development

1. Register For Azure Free Trial Account on Azure Portal .

2. Create Microsoft Windows virtual machines with template images using Azure

3. Create Red Hat Enterprise Linux® virtual machines with template images using Azure

4. Create the containers and manage blobs in cloud environment using Microsoft Azure

5. Upload, download, and list blobs with the Azure portal and Upload

6. Analyze a file with Azure Functions and Blob Storage.

7. Query Azure Data Lake Storage Gen2 using SQL language in Synapse Analytics.

8. Implement the services using Azure Data Lake Storage Gen2, Azure Databricks & Spark.

9. Extract, transform, and load data by using Azure HDInsight**.**

10. Implement an IoT hub using the Azure portal.

11.create and deploy Azure Functions. Explore hosting options, bindings, triggers, and how to use Durable Functions to define stateful workflows.

12.   Create a VM template based on an existing VHD or VM template in the library.

13..Create a virtual machine With PowerShell.

14.create a VirtualBox VM from command line

15.Implement Secure Network Traffic with Microsoft Azure.

16.Implement Azure Key Vault.

17.Create and Launch the Azure Policy service in the Azure portal

18.Implement and Manage Access With Role Based Access Control (RBAC).

19.Manage Resource Locks.

20.Implement Resource Tagging.

21.Explore The Trust Centre.

22.Use The Azure Pricing Calculator.

23.Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.

Case Studies:

1. In Microsoft Azure, a server takes lot of time to upload a file, so create some function or macro to reduce the file uploading time on Azure.
2. Develop a Hadoop-based cloud computing application that pro-cases sequences of microscope images of live cell.

Suggested Readings:

1. Microsoft Certified Azure Fundamentals Study Guide: Exam AZ-900 by James Boyce
2. **EXAM REF AZ-900 MICROSOFT AZURE FUNDAMENAL** by Jim Cheshire
3. Cloud Computing-Concepts, Technology & Architecture: Eri, Pearson Publication

Note: Only latest editions of the books are recommended.
Web links:
AZ-900 Exam Study Guide (microsoft.com)
https://infrastructuremap.microsoft.com/explore
Microsoft Certified: Azure Fundamentals - Certifications | Microsoft Learn

Assessment Tools:

Experiments in lab

File work/Class Performance

Viva (Question and answers in lab) End Term Practical Exam

Distribution of Continuous Evaluation Table:

Viva-I	30%
Viva-II	30%
File/ Records	20%
Class performance	10%
Attendance	10%

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BCA-ED-351.1	3	2	3		3		3			3		3		
BCA-ED-351.2	3	3	3	3								2	3	
BCA-ED-351.3		2	3		3		2			3			1	
BCA-ED-351.4	3	1	3	3	1		2					3	3	

FOURTH SEMESTER

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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

BCA-DS-401: NUMERICAL ANALYSIS AND STATISTICAL TECHNIQUES

Periods/week   Credits
L: 3   T: 1   4
Duration of Examination: 3 Hrs

Max. Marks: 200
Continuous Evaluation: 100
End Semester Examination: 100

Pre-Requisite: Elements of Mathematics
Course Type: Fundamentals

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

BCA-DS-401.1 Understand the accuracy of numbers and types of errors
BCA-DS-401.2 Apply the knowledge of iterative methods to solve algebraic and transcendental equations.
BCA-DS-401.3 Acquire knowledge of finite differences, interpolationand numerical integration.
BCA-DS-401.4 Determine system of linear equations and can find Best Curve fitting for data.
BCA-DS-401. 5 Use statistical techniques solve to analyze business problems. BCA-DS-
401.6 Apply probabilistic reasoning in resolving real life problems

PART-A

UNIT 1: Introduction to Numerical Analysis
   1.1 Introduction to Numerical Analysis

   1.2 Errors :Definition, Types of Errors

   1.3 Bisection method

   1.4 Regula Falsi method

   1.5 Newton Raphson method

UNIT 2: Interpolation
   2.1 Finite Difference Interpolation

   2.2 Relation between Finite Difference

   2.3 Newton's Forward interpolation

   2.4 Newton's Backward interpolation

   2.5 Lagrange's, interpolation

   2.6 Newton Divided difference interpolation

   2.7 Curve fitting: Least square line and parabola fitting

UNIT 3: Numerical Integration and Differential equation
   3.1 General Quadrature formula

   3.2 Trapezoidal rule

   3.3 Simpson's one-third rule

   3.4 Simpson's three-eight rule.

3.5 Taylor series method

3.6 Euler method

3.7 Runga-Kutta method

PART-B

UNIT 4: Statistical techniques

4.1 Measure of Central Tendency

4.2 Standard deviation and variance

4.3 Correlation Analysis: Karl Pearson's Coefficient of correlation,Spearman's rank correlation

4.4 Regression Lines

UNIT 5: Probability

5.1 Basics of Probability

5.2 Addition Theorem on Probability

5.3 Conditional Probability

5.4 Multiplication Theorem on Probability

5.5 Independent Events

5.6 Baye's Theorem

UNIT 6: Probability Distribution

6.1 Discrete Random Variable

6.2 Probability Distribution

6.3 Mean of Discrete Random Variable

6.4 Variance of a Discrete Random Variable

6.5 Binomial Distribution

6.6 Poisson Distribution

6.7 Normal Distribution

Suggested Readings:

1   Richard L. Burden,2010, Numerical Analysis,   Cengage
Learning 2   Dr. Babu Ram,2009, Engineering Mathematics,
Pearson Publication.
3   S.P Gupta and M.P Gupta, 2013, Business Statistics, Sultan Chand Publication
4   S.S. Sastry, 2005, Numerical Analysis, Prentice Hall of India
5   M.K.Jain, , S.R.K.Iyengar, R.K. Jain,2014, Numerical methods for Scientific and Engineering Computation ,New Age International (P) Limited

Weblinks:

https://en.wikibooks.org/wiki/Introduction_to_Numerical_Methods/Interpolation
https://ocw.mit.edu/courses/mathematics/18-330-introduction-to-numerical-analysis-spring-2012/lecturenotes/MIT18_330S12_Chapter2.pdf
https://www.tutorialspoint.com/statistics/sampling_methods.htm
https://2012books.lardbucket.org/books/beginning-statistics/
https://2012books.lardbucket.org/books/beginning-statistics/s12-01-the-elements-of-hypothesis-tes.html   https://2012books.lardbucket.org/books/beginning-statistics/s08-03-the-binomial-distribution.html   https://2012books.lardbucket.org/books/beginning-statistics/s15-01-chi-square-tests-for-independe.html

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-401 .1	1	1		2				3					1	2
BCA-DS-401. 2	1	1	1	1			2	3					1	2
BCA-DS-401.3	1	2	2	3			2	3						
BCA-DS-401.4	1	1		2				3					3	
BCA-DS-401.5	1	1	2	2	3		2	3			3	3	1	1
BCA-DS-401.6	1	1	2	1	2	2		3		3	2		2	

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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BCA-DS-402: PROGRAMMING IN JAVA

Periods/week   Credits   Max. Marks: 200
L: 3   T: 3   Continuous Evaluation: 100
Duration of Examination: 3 Hrs   End Semester Examination: 100

Pre-Requisite: Object Oriented Programming using C++
Course Type: Core

  Course Outcomes: At the end of the course, students will be able to
BCA-DS-402.1. Explain basic syntaxes of control Structures of Java Programming Language.

BCA-DS-402.2. Understand various object-oriented paradigms in the context of Java Programming Language.
BCA-DS-402.3. Design solutions to basic problems using concepts of Exception Handling.
BCA-DS-402.4. Analyze various controls available in AWT library and choose controls on the basis of requirement.
BCA-DS-402. 5. Identify, Design and develop complex Graphical user interfaces using principal Java AWT classes.
BCA-DS-402. 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: Super class; sub class;
3.5 this and super operator
3.6 Method overriding; use of final
keyword   3.7   Abstract   class   3.8
Interface.

PART –B

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 Cornelll,2020, Core Java^{TM} , 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

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-402 1.	1	2	2		1		2	2	1	2	2		3	
BCA-DS-402 2.	2	2	1					2	3	1	3	1		
BCA-DS-402 3.			2	2			3	1	1	2	1		2	1
BCA-DS-402 4.		1		2		2			2		3			
BCA-DS-402 5.			3					2	1	1		2	1	2
BCA-DS-402 6.	1			3	3		2			2	3			3

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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BCA-DS-452: JAVA LAB

Periods/week Credits   Max. Marks   : 100
P: 4   T:0   2   Continuous Evaluation: 50
Duration of Examination: 3 Hrs   Endd Term Examination: 50

Pre-Requisite: C++ Lab
Course Type: Core

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-452.1. Demonstrate the use of basic programming constructs.
BCA-DS-452.2. Solve basic problems using flow control constructs.
BCA-DS-452.3. Create Reusable objects conforming to the object-oriented paradigms.
BCA-DS-452.4. Evaluate user requirements and propose a solution to meet the requirements.
BCA-DS-452.5. Assess various AWT components and justify their usage in various programming situations. BCA-DS-452.6. 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 that 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) <u>Online Cab Booking System</u> :-

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 vie wall 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
https://www.javatpoint.com/java-tutorial

Distribution of Continuous Evaluation Table

Viva I	30%
Viva II	30%
File/Records	20%
Class Performance	10%
Attendance	10%

Assessment Tools:

Experiments in lab
File work/Class Performance
Viva (Question and answers in lab)
End Term Practical Exam

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BCA-DS-452 1.	1	2		2	1	1	3	1	2	1	2	2	2	3
BCA-DS-452 2.			3	2		1	2	2		2	1		1	1
BCA-DS-452 3.	1	1	3			2		2		3	3	1	2	2
BCA-DS-452 4.	1	3		1	2		3	2		3	2	3	3	3
BCA-DS-452 5.	2	2	1	3	1	2	1	3	1	1`	1	2	1	2
BCA-DS-452 6.	2	2	1	3	1	2	1	3	1	1`	1	2	1	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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BCA-RIC-II: Research and Innovation Catalyst-II

Periods/week   Credits   Max. Marks   : 50
T: 1   0.5   Continuous Evaluation : 50

Pre-requisites: Research and Innovation Catalyst-I
Course Type: Research & Training

Course Outcomes:At the end of the course, the student will be able to:
BCA-RIC-II.1. Critically evaluate the work done by various researchers relevant to the
research topic
BCA-RIC-II.2. Integrate the relevant theory and practices followed in a logical way and draw appropriate
Conclusions
BCA-RIC-II.3. Understand the research methodologies/approaches/techniques used in research/ Innovation
domains
BCA-RIC-II.4. Structure and organize the collected information or findings through an appropriate abstract,
headings, reference citations and smooth transitions between sections
BCA-RIC-II.5. Learn the structuring of the paper/ concept in the form of Power Point Presentation BCA-RIC-
II.6. Adapt working with group members and outside world.

Unit 1: Literature Survey (LS)

1.1 Collection of research papers related to previously identified gap/problem
1.2 Comprehend and arrange the literature based on the idea framed
1.3 Presenting the collected data and inferring it with the further scope of expansion

Unit 2: Structuring of Review Paper

2.1 Analysis of different approach/methodology adopted by various researchers
2.2 Listing out the components of the paper w.r.t the problem
2.3 Identification of suitable Journal or Conference
2.4 Formatting/Styling the paper according to the respective template

Unit 3: Presenting the findings

3.1 Structuring and preparation of PPT
3.2 Mock presentation
3.3 Review on presentation skills and content delivered both
3.4 Incorporating the review comments in the slides

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
BCA-RIC-	√	√		√									√	√	√	√
BCA-RIC-	√			√		√				√			√	√	√	√
BCA-RIC-	√			√		√				√			√	√	√	√
BCA-RIC-		√		√		√		√		√			√	√	√	√
BCA-RIC-																
BCA-RIC-																

Evaluation Criteria: The following evaluation parameters shall be considered for internal assessment by both research coordinators and faculty coordinator or research mentors:-

Criteria	Evaluation parameters	Weightage (Marks)	
Online and offline Attendance	▢ Percentage of classes attended by the students	3+2	5
Group participation and response of the students to a given task	• Judge individual student in the group • Meeting timelines as per lesson plan	5 10	15
Literature Survey	• Usage of Scientific Literature Databases. e.g., Scopus/ Web of Science/ etc. • Number of relevant papers referred for the given topic • Summarizing the referred paper • Plagiarism/Authenticity ▢ Reference listing	2 4 4 3 2	15
Structuring and presentation	• Paper structuring and presentation • Group presentation with individual contribution • Target journal, Impact factor/ Topic centered Journal • Students response towards comments by research/faculty mentors	7 2 1 5	15

References:

1. http://www.sciencedirect.com/
2. https://www.ncbi.nlm.nih.gov/pubmed
3. https://www.elsevier.com/books-and-journals
4. https://www.plos.org/
5. https://www.deepdyve.com/
6. http://ieeexplore.ieee.org/Xplore/home.jsp
7. https://www.researchgate.net/
8. https://www.science.gov/
9. https://scholar.google.co.in/
10. http://www.popsci.com/

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES
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BCA-DS-404: SYSTEM PROGRAMMING

Periods/week Credits		Max. Marks: 200
L: 3 T: 3		Continuous Evaluation: 100
Duration of Examination: 3 Hrs		End Semester Examination: 100

Pre-Requisite: Logical Organization of Computer
Course Type: Domain Specific

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-404.1. Understand the programming environment, software tools and different translators used in programming environment
BCA-DS-404.2. Define the basics of system programs like editors, compiler, assembler, linker, loader interpreter, macros and debugger.
BCA-DS-404.3 Apply the knowledge and techniques learnt to develop solutions to real world problems; BCA-DS-404.4 Design and implement system level programs.
BCA-DS-404.5. Write system software with the aid of sophisticated OS services, programming languages and utility tools.

<div align="center">PART –A</div>

UNIT 1: Overview of System Software
1.1 Introduction to Software
1.2 Software Hierarchy
1.3 Systems Programming
1.4 Machine Structure
1.5 Interfaces
1.6 Address Space
1.7 Computer Languages
1.8 Life Cycle of a Source Program
1.9 System Software Development
1.10 Recent Trends in Software Development

UNIT 2: Overview of Language Processors
2.1 Programming Languages and Language Processors
2.2 Causes of Language Semantic Gaps
2.3 Language Processing Activities & Program Execution
2.4 Fundamental of Language Processing
2.5 Symbol Tables
2.6 Data Structures for Language Processing: Search Data structures
2.7 Allocation of Data Structures.

UNIT 3: Assemblers
3.1 Concepts of Assembly Language Programming
3.2 Design of an Assembler
3.3 Types of Assemblers
3.4 Data Structures of One-Pass Assemblers
3.5 Data Structures of Two-Pass Assemblers
3.6 Single Pass Assembler Algorithm
3.7 Multi-Pass Assembler Algorithm

PART-B

UNIT 4: Scanning and Parsing

4.1 Grammar in Programming Language

4.2 Classification of Grammars

4.3 Ambiguity in Grammar Specification

4.4 Scanning

4.5 Parsing

4.6 Top-down Parsing

4.7 Bottom-up Parsing

4.8 Language Processor Development Tools

UNIT 5: Compilers

5.1 Structure of Compiler

5.2 Phases of Compiler

5.3 Data Structure used in Compiling

5.4 Scope Rules

5.5 Memory Allocation

5.6 Compilation of Expression

5.7 Compilation of Control Structure

5.8 Code Optimization

5.9 Example of Compliers

UNIT 6: Interpreters & Debuggers

6.1   Overview and Benefits of Interpreter

6.2 Types of Interpreters

6.3 The Java Language Environment

6.4 Java Virtual Machine

6.5 Types of Errors

6.6 Debugging Procedures

6.7 Classification of Debuggers

6.8 Dynamic/Interactive Debugger

Suggested Readings:

1. Dhamdhare, 1999, System Programming and Operating system, Tata McGraw- Hill.
2. John J. Donovan,2001, System Programming, Tata McGraw- Hill.
3. Beck and Manjula,2016, System software , Pearson Education
4. R.K Maurya,System Programming and Compiler Construction ,Wiley-Dreamtec

Note: Only latest editions of the books are recommended.

Weblinks:

https://www.docsity.com/en/study-notes/computer-science/system-programming/

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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	P010	PO11	PO12	PSO1	PSO2
BCA-DS-404.1	3	2	-	-	1	-	-							3
BCA-DS-404.2	3	2	-	3	2	-	2							
BCA-DS-404.3	2	-	2	1	-	-	-							3
BCA-DS-404.4	3	3	2	-	2	-	-							3
BCA-DS-404.5	-	-	-	-	3	2	2							3

BCA-DS-405: FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

Periods/week Credits	Max. Marks: 200
L: 3 T: 3	Continuous Evaluation: 100
Duration of Examination: 3 Hrs	End Semester Examination: 100

Pre-Requisite: NA
Course Type: Domain Specific

Course Outcomes: At the end of the course, students will be able to
BCA-DS-405.1. Understand the basic concepts of Artificial Intelligence techniques.
BCA-DS-405.2. Interpret and solve the problems based on search techniques.
BCA-DS-405.3. Examine knowledge representation and rule-based systems.
BCA-DS-405.4. Apply artificial intelligence techniques in problem solving.
BCA-DS-405.5. Assess the need and justification of Expert systems and neural networks.

PART -A
UNIT 1: Introduction to Artificial Intelligence
1.1 Introduction to Artificial Intelligence
1.2 Intelligent Agents
1.3 Agents and environment
1.4 The nature of Artificial Environment
1.5 The structure of Agents
1.6 Application areas of Artificial Intelligence

UNIT 2: Problem, Problem Space and Search
2.1 Defining Problem as a State Space
2.2 Problem Characteristics
2.3 Production System
2.4 Search Space Control Strategy
2.5 Breadth First Search and Depth First Search
2.6 Heuristic Search Techniques
2.7 Generate and Test
2.8 Hill Climbing
2.9 Best First Search
2.10 Means End Analysis

UNIT 3: Knowledge Representation
3.1 Knowledge, Knowledge Representation and Mapping
3.2 Approaches to Knowledge Representation
3.3 The Frame Problem
3.4 Representing Instance and is a Relationship
3.5 Logic: Representing Simple Facts in Logic
3.6 Propositional logic: Reasoning patterns in propositional logic
3.7 Syntax and Semantics of First-Order Logic
3.8 Knowledge Engineering in First-Order Logic

PART-B

UNIT 4: Rule Based System and Reasoning

4.1 Procedural Versus Declarative Knowledge

4.2 Forward Reasoning

4.3 Backward Reasoning

4.4 Conflict Resolution

4.4 Use of Non Backtrack reasoning

4.5 Handling Uncertainties

4.6 Probabilistic Reasoning

4.7 Use of Certainty Factors

4.8 Fuzzy Logic

UNIT 5: Machine Learning and Programming languages of AI

5.1 Overview of Machine learning

5.2 Concept of learning

5.3 Types of learning

5.4 Learning Automation

5.5 Genetic Algorithm

5.6 Introduction to programming languages of Artificial Intelligence

UNIT 6: Expert Systems and Neural Networks

6.1 Introduction to Expert Systems

6.2 Successive development of Expert Systems

6.3 Human Experts vs Expert Systems

6.4 Characteristics of Expert Systems

6.5 Expert System Architecture

6.6 Biological Neural Networks

6.6 Artificial Neural Networks

6.7 Neuron model for Artificial Neural Networks

6.8 Learning in Neural Networks

Suggested Readings:

1. Ela Kumar,2010, Artificial Intelligence, I.K. International Publishing House Pvt. Ltd.

2. Rashmi Agrawal, 2019, Artificial Intelligence,ManavRachna Publication House.

3. Kelvin Knight, Elaine Rich, B.Nair,2008,Artificial Intelligence, Tata McGraw Hill.

4. Stuart Russel and Peter Norvig, 2015 ,Artificial Intelligence: A Modern Approach, Pearson Education

Note: Only latest editions of the books are recommended.

Weblinks:

https://www.tutorialspoint.com/artificial_intelligence/index.ht
m
http://www.ioenotes.edu.np/notes/chapter-wise-notes-of-artificial-intelligence-ai-ioe-computer-
engineering-
286
https://epub.uni-regensburg.de/13629/1/ubr06078_ocr.pdf

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-405.1	3			2			1						3	
BCA-DS-405.2	1	1	2	3	2								3	
BCA-DS-405.3	2												3	
BCA-DS-405.4		3	3				3							
BCA-DS-405.5	2						3							

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES

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

BCA-DS-456: VOCATIONAL TRAINING

Periods/week Credits   Max. Marks   : 100
 4 Weeks   2   Continuous Evaluation   : 100
Duration of Examination: 2 Hrs   End Semester Examination: ---

Internship experience provides the student with an opportunity to enhance the knowledge in their respective subject areas. This training provides insight to understand the actual behaviour of the industry able to develop a greater understanding about the career option. Each of the students is required to develop a mini project during his/ her one month internship. Evaluation will be done by the respective mentors. Internal assessment will be done on the basis of following criteria:

   1. Presentation   -   30

   marks 2. Viva   -

       50 marks

    3. Thesis/Project report   -   20 marks.

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES

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BCA-DS-406: COMPUTER SYSTEM ARCHITECTURE

Periods/week Credits	Max. Marks : 100
L:3 T: 0 3	Continuous Evaluation :100
Duration of Examination: 3 Hrs	End Semester Examination: 100

Pre-Requisite: NA
Course Type: Core

Course Outcomes: At the end of the course, student will be able to
BCA-DS-406.1. Understand the structure of various number systems, logic gates and its application in digital design BCA-DS-406.2. Describe problem solving related to number systems and Boolean algebra along with its simplification technique.
BCA-DS-406.3. Use the concept of memory hierarchy to analyze problem.
BCA-DS-406.4. Compare the operations of various combinational and sequential circuits. BCA-DS-406.5. Construct logics of micro programming in digital designing.

PART-A

UNIT 1: Information Representation
1.1 Number Systems; Arithmetic (binary; decimal; octal; hexadecimal)
1.2 One's complement and Two's Complement Representation
1.3 Arithmetic Operation: Addition, Subtraction, Multiplication and Division
1.4 Fixed-point and Floating-point representation of numbers
1.5 Binary Codes: Weighted codes; Non-weighted codes; BCD Codes, Gray Codes
1.6 Error detecting and correcting codes; Parity Checker; Hamming code
1.7 Character Representation – ASCII; EBCDIC

UNIT 2: Logic Gates
2.1 Introduction to Logic gates
2.2 Basic Gates – AND; OR; NOT
2.3 Universal Gates – NAND; NOR;
2.4 Other Gates – XOR; XNOR
2.5 Circuit Diagram using Basic Gates
2.6 Circuit Diagram using Universal Gates
2.7 Multilevel NAND and NOR circuits

UNIT 3: Boolean algebra
3.1 Binary Logic: Boolean algebra
3.2   Boolean Theorems
3.3   Boolean Functions and Truth Tables
3.4   Canonical and Standard forms of Boolean functions
3.5   Simplification of Boolean Functions – Karnaugh Maps.

PART-B

UNIT 4: Combinational Circuit
4.1 Concept of Combinational Circuit
4.2 Half-Adder
4.3 Full-Adder

4.4 Half-Subtractor

4.5 Full-Subtractor

4.6 Encoders

4.7 Decoders

4.8 Multiplexers

4.9 Demultiplexers

4.10 Comparators

UNIT 5: Sequential Circuit

5.1 Concept of Sequential Circuit

5.2 Difference between Combinational and Sequential Circuit

5.3 Flip Flop (RS; D, JK, and Master Slave & T flip flops)

5.4 Registers

5.5 Shift registers

5.6 Synchronous Counter

5.7Asynchronous counters.

UNIT 6: Memory and Introduction to Microprocessor

6.1   Classification of memory –Volatile; Non-Volatile; RAM; ROM; EPROM

6.2 Virtual memory and Cache memory

6.3 Associative Memory

6.4 Microprocessor: Basic Components of a Microprocessor (Introductory ideas)

6.5 Processor and its types

6.6 Parallel processing

Suggested Readings:

1.   M. Mano. 2017, Computer System and Architecture, Pearson
2.   N. S. Gill, 2016, Digital Design and Computer Organization, University Science Press
3.   Bartee,2001, Digital Computer Fundamentals, TMH Publication
4.   Malvino,2011, Digital Computer Electronic,TMH Publication
5.   A .Anand Kumar, 2016, Fundamentals of Digital Circuit , PHI publication   **Note: Only latest editions of the books are recommended. Weblinks:**
     https://nptel.ac.in/courses/106103068/pdf/coa.pdf
     https://www.tutorialspoint.com/computer_logical_organization/index.htm

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-406.1	3	2	2	2	2		2					1	3	2
BCA-DS-406.2	3	2	2	2	2		2						3	2
BCA-DS-406.3	1	1	1	1			1			1		1	1	1
BCA-DS-406.4	2	2	3	2			2			1		1	2	2
BCA-DS-406.5	1	2		2			2					1	1	2

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES

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

BCA-DS-407: Soft Skills and Aptitude Development-II

Periods/week	Credits	Max. Marks	: 100
L:2 T:0	2	Internal	: 50
Duration of Exam: 2hrs		External	: 50

Course Outcomes:
BCA-DS-407.1. Students will be able to analyze various forms of data.
BCA-DS-407.2. Students will be able to solve complex problems based on arithmetic reasoning.
BCA-DS-407.3. Students will be able to apply short tricks on complex problems of number system.
BCA-DS-407.4. Students will be able to enhance and expand word knowledge by fostering word consciousness.
BCA-DS-407.5. Students will be able to construct simple and complex sentences accurately.
BCA-DS-407.6. Students will be able to develop reading skills & build verbal reasoning skills.

PART – A

Unit 1: Number System II
1.1 Factors and Multiples
1.2 Unit Digits & Cyclicity
1.3 Remainders
1.4 Factorials
1.5 Logarithm

Unit 2: Arithmetic III
2.1 Interest
      2.1.1 Simple Interest
      2.1.2 Compound Interest
      2.1.3   Relation between SI & CI
2.2 Time, Speed & Distance
      2.2.1 Basics Formulas & Proportionality
      2.2.2 Average & Relative Speed
      2.2.3 Trains and Boats & Streams
      2.2.4 Circular Motion and Clocks
2.3 Data Interpretation
      2.3.1 Table and Bar graph
      2.3.2 Line and Pie Charts
      2.3.1 Mixed Charts and Caselets

Unit 3: Verbal Reasoning III
      3.1 Calendar
      3.2 Cubes and Dices
      3.3 Data Sufficiency

PART – B

Unit 4: Advanced Vocabulary
      4.1 Synonym & Antonym
      4.2 One Word Substitution
      4.3 Ordering of Words
      4.4 Idioms and Phrases

4.5 Vocabulary, COW, Punctuation

Unit 5: Sentence Construction & Syntax
5.1 Sentence Improvement
5.2 Spotting Errors
5.3 Ordering of Sentences
5.4 Change of Voice/ Direct & Indirect speech
5.5 Completing Statements/Sentences

Unit 6: Reading Comprehension & Reasoning
6.1 Strategic Reading, Eliminating Poor Reading Habits
6.2 Techniques to increase speed reading, comprehension and recall
6.3 Solving Sample RC Passages
6.4 Closet Test
6.5 Para Jumbles

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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

Text Books/Reference Books:
1. Quantitative Aptitude for Competitive Examinations: R S Aggarwal, S Chand & Company Pvt. Ltd, Edition 2017
2. A Modern Approach to Verbal& Non Verbal Reasoning: R S Aggarwal, S Chand & Company Pvt. Ltd, Edition 2018
3. An Advanced Approach to Data interpretation: R S Aggarwal, S Chand & Company Pvt. Ltd, latest Edition
4. Verbal Ability and Reasoning for Competitive Examinations: P.A. Anand, Wiley

FIFTH SEMESTER

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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

BCA-DS-501: DATA COMMUNICATION & NETWORKING

Periods/week Credits	Max. Marks: 200
L: 3 T: 3	Continuous Evaluation: 100
Duration of Examination: 3 Hrs	End Semester Examination: 100

Pre-Requisite: NA
Course Type: Core

Course Outcomes: At the end of the course the student will be able to:
BCA-DS-501.1. Describe the basic concepts of data communication.
BCA-DS-501.2. Understand various network components and standards used in data communication.
BCA-DS-501.3. Demonstrate the framework of computer networks.
BCA-DS-501.4. Illustrate the layered architecture and data flow of OSI and TCP/IP model.
BCA-DS-501.5. Summarize the processes and protocols applied in data communication.

PART-A

UNIT 1: Introduction
1.1 Introduction to Data Communication and its elements
1.2 Data and Signals: Analog and Digital
1.3 Data Transmission
1.4 Transmission impairment, Data Rate Limits
1.5 Digital transmission
1.6 Digital-to-Digital Conversion
1.7 Analog-to-Digital Conversion
1.8 Analog Transmission
1.9 Digital-to-analog Conversion
1.10 Analog-to-analog Conversion
1.11 Network Topologies

UNIT 2: Transmission Media
2.1 Multiplexing and Spreading
2.2 Guided Media: Twisted pair cable, Coaxial cable, Fiber-optic cable
2.3Unguided Media: Radio Wave, Microwaves, Infrared
2.4Switching
2.5 Telephone Networks
2.6 Dial-up Modems
2.7 Digital Subscriber Line
2.8 Cable TV Networks
2.9 Cable TV for Data Transfer

UNIT 3: OSI Model and layers
3.1 The OSI Model
3.2 Layers & Function in the OSI Model
3.3 TCP/IP Protocol Suite
3.4 Addressing: Logical addressing & Physical addressing
3.5 Physical Layer and Media
3.6 Error Detection and Correction
3.7 Framing

3.8 HDLC
3.9 Point-to-Point Protocol
3.10 Multiple Access

PART-B

UNIT 4: Addressing Mechanisms
4.1 Network Layer: Logical Addressing

4.2 IPv4 Addresses, IPv6 Addresses

4.3 Transition from IPv4 to IPv6

4.4 Unicast Routing Protocols and Multicast Routing Protocols

4.5 Process-Process Delivery

4.6 User Datagram Protocol (UDP)

4.7 Congestion Control and Quality of Service

UNIT 5: IEEE standards and Virtual LANs
5.1 IEEE Standards
5.2 MAC(Medium Access Control)
5.3CSMA,CSMA/CD,CSMA/CA
5.4 Token Bus, Token, ALOHA, Slotted ALOHA
5.5 Standard Ethernet
5.6 IEEE 802.11
5.7 Bluetooth
5.8 Virtual LANs
5.9 Satellite Networks
5.10 Virtual-Circuit Networks
5.11 Frame Relay and ATM

UNIT 6: Latest trends in Data Communication
6.1 Internet of Things
6.2 Cloud Computing
6.3 Voice over Internet Protocol (VoIP)
6.4 Security in Computer Networks

Suggested Readings:
1. B. Forouzan, 2017, Data Communication and Networking, Tata McGraw Hill.
2. A.S. Tanenbaum,2016, Computer networks, Prentice Hall.
3. Tomasi Wayne,2007, Introduction to Data Communication & Networking, Pearson Education
4. 1993, Protocol Standards and Interfaces,Computer networks, Black, Prentice Hall Education

Note: Only latest editions of the books are recommended.

Weblinks:
> https://www.smartzworld.com/notes/computer-network-cn-notes-pdf
> https://www.tutorialspoint.com
> www.tutorialspoint.com/listtutorials/networking/1

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-501.1		2		1		1	3						2	1
BCA-DS-501.2	2	2	2				3			1			3	2
BCA-DS-501.3		3		1			2						2	
BCA-DS-501.4	2	3			1		2		1		1		1	2
BCA-DS-501.5	2	1	1		2		3			1				

BCA-DS-502: Relational Database Management System

Periods/week   Credits   Max. Marks: 200
L: 3   T: 3   Continuous Evaluation: 100
Duration of Examination: 3 Hrs   End Semester Examination: 100

Pre-Requisite: Database Management System
Course Type: Core

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

BCA-DS-502.1. Describe the concepts of relational databases and its comparison with database management system.
BCA-DS-502.2. Understand the concept of extended entity relationship and normalization.
BCA-DS-502.3. Apply various column level constraints and integrity constraints.
BCA-DS-502.4. Design relational databases and apply skills to optimize database performance in practice.
BCA-DS-502.5. Analyze the architecture of PL/SQL and concept of Cursors, Functions, Triggers with their programs. BCA-DS-502.6. Summarize the concept of Concurrency Control, Locking Techniques and Deadlocks Handling.

PART-A
Unit 1: Database Management: An Evolutionary Phenomenon
1.1 Introduction to Relational Database Management System
1.2 Database Models
1.3   The 12 rules for an RDBMS (Codd's Rules)
1.4   Database Design
1.5   Data Modeling
        1.5.1 Entity
        1.5.2 Entity Relationship Diagram
        1.5.3 Degree of Relationships
        1.5.5 Functional Dependencies and Normal Forms

Unit 2: Oracle Server and Oracle Databases
2.1 Architecture of RDBMS
2.2 Features of RDBMS
2.3 Introduction to Oracle 11i
2.4 Features of Oracle 11i
2.5 Oracle 11i as an Object Oriented Database Management System (OODBMS)
2.5 Oracle Database Structure
        2.5.1 Logical Structure of a Database
        2.5.2 Physical Structure of a Database
2.6 Oracle Memory Structures
2.7 Oracle Processes

Unit 3: SQL Fundamentals
3.1 Basic Query Statements
        3.1.1 Simple Select statement using where clause and ORDER BY clause; Handling NULL values; Arithmetic Expressions; Arithmetic, Logical and Comparison Operators; Distinct Keyword
3.2 Advance Query statements

3.2.1 SET operators: UNION, UNION ALL, INTERSECT, MINUS

3.2.2 Displaying Data Flow from multiple tables: Equi Joins, Non-Equi Joins; Outer Joins; Self Join; Sub queries;

3.3 Creating and Managing Tables: Data Definition Language(DDL) - Creating tables; Different Constraints and   their implementation; Creating Table from another Table; Alter Table ; Rename table; Drop table; Truncate   table;

1.4 Manipulating Data: Data Manipulation Language (DML) - Insert; Update; Delete; Transaction Control Language; Commit and Rollback

3.5 Other Database Objects: Views and Indexes; Sequences: Creating, Dropping and Altering Database Objects.

PART-B

Unit 4: Advanced Concepts in PL/SQL

4.1 Introduction to PL/SQL

4.2 PL/SQL Block Structure and Architecture

4.3 Data types Variables and Constants

4.4 Writing PL/SQL Code; SQL in PL/SQL; %TYPE; %ROWTYPE

4.5 Operators, Functions, Control Statements, Loops

4.6 Cursor Management in PL/SQL – Implicit Cursor, Explicit Cursor

4.7 Exception Handling – Predefined Exceptions, User Defined Exceptions, Using   RAISE_APPLICATION_ERROR

4.8 Database Triggers - Parts of a Trigger, Statement Trigger and Row Triggers, Instead of Triggers, Dropping Triggers

Unit 5: Sub Programs and Packages

5.1 Procedures

5.2 Functions

5.3 Argument Modes - Actual vs. Format Parameters

5.4 Packages - Creating Packages, Advantages of Packages

5.5 Dropping - Procedures, Functions and Packages

5.6 Using Stored Procedure/Function in SQL statement

Unit 6: Distributed Database and Concurrency Control

6.1 Distributed Database management system; Data Distribution; Data Replication, Data Allocation

6.2 DDBMS Architectures

6.3 Fragmentation in DDBMS

6.4 Introduction to Concurrency

6.5 Locks

6.6 Two Phase Locking Protocol

6.7 Timestamp Based Protocol

6.8 Handling of Deadlock, Phantom Deadlock

Suggested Readings:
1. Groff James and Weinberg Paul,2011, SQL- The Complete Reference, Tata McGraw Hill.
2. Henry F Korth, Abraham Silberschatz,2013, Database System Concepts, Sixth Edition, McGraw Hill.
3. Parteek Bhatia, Gurvinder Singh,2016, Simplified approach to DBMS,Kalyani Publishers.
4. Ivan Bayross, 2010, SQL,PL/SQL, BPB Publications.

Note: Only latest editions of the books are recommended.

Software required/ Weblinks:

ORACLE 11i

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

https://www.tutorialspoint.com/plsql/index.htm

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

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Sessional I	30%
Sessional II	30%
Assignment	20%
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Assessment Tools:
Assignment/Tutorials
Sessional tests
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Term end examination

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P12	PSO1	PSO2
BCA-DS-502.1	3			3			2		2			3	3	3
BCA-DS-502.2		3			3				3		2		2	3
BCA-DS-502.3	2			3	3		2						2	3
BCA-DS-502.4	3			3			3				2		2	3
BCA-DS-502.5			3					3						3
BCA-DS-502.6			3		2					3				

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES

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BCA-DS-503: PYTHON PROGRAMMING

Periods/week   Credits   Max. Marks: 200
L: 3   T: 3   Continuous Evaluation: 100
Duration of Examination: 3 Hrs   End Semester Examination: 100

Pre-Requisite: Introduction to IT and Programming in C
Course Type: Core

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-503.1. Define the methodology and procedures related to python programming BCA-DS-
503.2. Understand various object oriented concepts related to python programming   BCA-DS-
503.3. Use Python data structures to solve complex problems.
 BCA-DS-503.4. Illustrate the use of various python libraries and functions.
 BCA-DS-503.5. Develop basic applications using python programming language
 .

PART –A

UNIT 1: Introduction & Fundamentals of Python
1.1 History of Python
1.2 Need of Python Programming
1.3 Applications & Basics of Python Programming Using the REPL(Shell)
1.4 Installation and Working with Python
1.5 Setting up path & Running Python Scripts
1.6 Variables & Data Types
1.7 Keywords
1.8 Input-Output
1.9 Indentation

UNIT 2: Python Operators & Data Types
2.1 Python basic Operators
2.2 Declaring and using Numeric data types: int, float, complex
2.3 Using string data type and string operations
2.4 Defining list and list slicing
2.5 Use of Tuple data type
2.6 Introduction to Dictionaries

UNIT 3: Python Program Flow Control
3.1 Conditional blocks using if, else and Nested If-else
3.2 Simple For loops in python
3.3 For loop using ranges, string, list and dictionaries
3.4   Use of while loops in python
3.5   Loop manipulation using pass, continue, break and else
3.6   Programming using Python conditional and loops block

PART – B

UNIT 4: Python Strings, List and Dictionary Manipulations
4.1   Building blocks of python programs

4.2   Understanding string inbuilt methods
4.3   List manipulation using inbuilt methods
4.4   Dictionary manipulation
4.5   Programming using string, list and dictionary in build functions

UNIT 5: Python Functions, Modules & Packages
5.1   Organizing python codes using functions
5.2   Organizing python projects into modules
5.3   Importing own module as well as external modules
5.4   Understanding Packages
5.5   Powerful Lambda function in python
5.6   Programming using functions, modules and external packages

UNIT 6: Exception Handling & File Handling
6.1   Basics of Exception
6.2   Exception Handling
6.3   Except clause
6.4   Try, ?, finally clause
6.5   User Defined Exceptions
6.6   Safe guarding file operation using exception handling
6.7   Handling and helping developer with error code
6.8   Understanding read functions, read (), readline() and readlines()
6.9   Understanding write functions, write () and writelines()

SuggestedReadings:
1. Allen B . Downey, 2016, Think Python: How to Think Like a Computer Scientist , Shroff/O'Reilly Publishers
2. Guido van Rossum and Fred L. Drake Jr,2011, An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. Robert Sedge wick, Kevin Wayne, Robert Dondero,2015, Introduction to Programming in Python: An Interdisciplinary Approach, Pearson India Education Services Pvt. Ltd.
4. Timothy A. Budd,2011, Exploring Python, Mc-Graw Hill Education (India) Private Ltd.

Note: Only latest editions of the books are recommended

Software required/ Web links:
>   Python 3.6.4
>   https://www.tutorialspoint.com/python/index.htm
>   https://www.programiz.com/python-programming/first-program

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%

Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-503.1	3						3	1	2	1	2		3	3
BCA-DS-503.2	2	3		3			3	2	2		3		3	3
BCA-DS-503.3			2	2			3		3				3	3
BCA-DS-503.4		2	2		2		3	2	1	3			3	3
BCA-DS-503.5	2	2	2	1	2		3			2	2		3	3

BCA-DS-552 RDBMS LAB

Periods/week Credits   Max. Marks : 100

P: 4   T:0   2   Continuous Evaluation : 50

Duration of Examination: 3 Hrs   End Semester Examination : 50

Pre-Requisite: DBMS Lab

Course Type: Core

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

BCA-DS-552.1 To implement various basic SQL (Structured Query Language) queries

BCA-DS-552.2 To apply different referential and integrity constraints on tables

BCA-DS-552.3 To create database triggers, cursors and exceptions

BCA-DS-552.4 To develop an application using oracle as backend with any frontend

List of Experiments:

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

    i. Problem statement

    ii.   Formula(s) used

    iii.   To use DDL for database objects – Table

    iv.   To use DML for database objects – Table

    v.   To use DCL for database objects – Table vi.   Input & Output.

SQL

1. Create the following tables

         Customer

Column_name	**Data type**	**Size**	**Constraint**
SID	Varchar2	4	Primary Key
First_Name	Char	20	
Last_name	Char	20	

         Orders

Column_name	**Data type**	**Size**	**Constraint**
Order_ID	Varchar2	4	Primary Key
Order_date	Char	20	
Customer_SID	Varchar2	20	Foreign Key
Amount	Number		Check > 20000

2. Insert five records for each table
3. Customer_SID column in the ORDERS table is a foreign key pointing to the SID column in the CUSTOMER table.
4. Insert five records for both tables
5. List the details of the customers along with the amount.
6. List the customers whose names end with "s".
7. List the orders where amount is between 21000 and 30000
8. List the orders where amount is increased by 500 and replace with name "new amount".

9. Display the order_id and total amount of orders
10. Calculate the total amount of orders that has more than 15000.
11. Display all the string functions used in SQL.

12. Create the following tables
    Student

Column_name	Data type	Size	Constraint
RollNo	Varchar2	20	Primary Key
Name	Char	20	
Class	Varchar2	20	
Marks	Number	6,2	

     Student1

Column_name	Data type	Size	Constraint
R_No	Varchar2	20	Primary Key
Name	Char	20	
Class	Varchar2	20	
Marks	Number	6,2	

13. Display all the contents of student and student1 using union clause.
14. Find out the intersection of student and student1 tables.
15. Display the names of student and student1 tables using left, right ,inner and full join.

<div align="center">

PL/SQL

</div>

16. Write a PL/SQL block to calculate total salary of employee having employee number 100.
17. Write a PL/SQL code to find the greatest of three numbers.
18. Write a PL/SQL code to print the numbers from 1 to n.
19. Write a PL/SQL code to reverse a string using for loop.
20. Write a PL/SQL code to find the sum of n numbers.
21. Consider a PL/SQL code to display the empno, ename, job of employees of department number 10.
22. Consider a PL/SQL code to display the employee number & name of top five highest paid employees.
23. Consider a PL/SQL procedure that accepts 2 numbers & return addition, subtraction, multiplication & division of two numbers using stored procedure AND local procedure.
24. Consider a PL/SQL code that accepts 2 numbers & return addition, subtraction, multiplication & division of two numbers using stored functions and local function.
25. Write a PL/SQL block to show the use of NO_DATA FOUND exception.
26. Write a PL/SQL block to show the use of TOO_MANY ROWS exception.
27. Write a PL/SQL block to show the use of ZERO_DIVIDE exception.
28. To create a trigger on the emp table, which store the empno& operation in the table auditor for each operation i.e. Insert, Update & Delete.
29. To create a trigger so that no operation can be performed on emp table.

30. Make a Mini project using Developer 2000.

Suggested Readings:
1. Groff James and Weinberg Paul, 2011, SQL- The Complete Reference, Tata McGraw Hill.
2. Henry F Korth, Abraham Silberschatz, S. Sudharshan,2011, Database System Concepts, Sixth Edition ,McGraw Hill.
3. Parteek Bhatia, Gurvinder Singh, 2016, Simplified approach to DBMS,Kalyani Publishers.

4. Ivan Bayross,SQL, 2010, PL/SQL, BPB Publications.

Note: Only latest editions of the books are recommended.

Software required/ Weblinks:
ORACLE 11i
https://www.w3schools.com/sql/
https://www.tutorialspoint.com/plsql/index.htm

Distribution of Continuous Evaluation Table

Viva I	30%
Viva II	30%
File/Records	20%
Class Performance	10%
Attendance	10%

Assessment Tools:
Experiments in lab
File work/Class Performance
Viva (Question and answers in lab)
End Term Practical Exam

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BCA-DS-552.1	2	2	3				2		3	2				3
BCA-DS-552.2	3	2	3				3						3	3
BCA-DS-552.3	3	3	3				2		3	2			3	3
BCA-DS-552.4	3	2	2				2			3				3

BCA-DS-553 : PYTHON PROGRAMMING LAB

Periods/week Credits   Max. Marks   : 100
P: 4   T:0   2   Continuous Evaluation : 50
Duration of Examination: 3 Hrs   End Semester Examination : 50

Co-Requisite: NA
Course Type: Core

Course Outcomes: At the end of the course, the student will be able
BCA-DS-553.1. Develop programs using basics of Python.
BCA-DS-553.2. Implement object oriented concepts related to Python.
BCA-DS-553.3. Use Python data structures to solve complex problems.
BCA-DS-553.4. Solve real life problems using various python libraries and functions.
BCA-DS-553.5. Develop applications using python programming language.
List of Practical:
1. Create a program that asks user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old.
2. Ask the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user. Hint: how does an even / odd number react differently when divided by 2?
3. Take a list, say for example this one:

    a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89]

    and write a program that prints out all the elements of the list that are less than 5.

Extras:
    a) Instead of printing the elements one by one, make a new list that has all the elements less than 5 from this list in it and print out this new list.
    b) Write this in one line of Python.
    c) Ask the user for a number and return a list that contains only elements from the original list a that are smaller than that number given by the user.
4. Create a program that asks the user for a number and then prints out a list of all the divisors of that number. (If you don't know what a divisor is, it is a number that divides evenly into another number. For example, 13 is a divisor of 26 because 26 / 13 has no remainder.)
5. Take two lists, say for example these two: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89]   b = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13] and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.
6. Ask the user for a string and print out whether this string is a palindrome or not. (A palindrome is a string that reads the same forwards and backwards.)
7. Let's say I give you a list saved in a variable: a = [1, 4, 9, 16, 25, 36, 49, 64, 81, 100]. Write one line of Python that takes this list a and makes a new list that has only the even elements of this list in it.
8. Make a two-player Rock-Paper-Scissors game. (Hint: Ask for player plays (using input), compare them, print out a message of congratulations to the winner, and ask if the players want to start a new game)

    Remember the rules:
    • Rock beats scissors
    • Scissors beats paper
    • Paper beats rock

9. Generate a random number between 1 and 9 (including 1 and 9). Ask the user to guess the number, then tell them whether they guessed too low, too high, or exactly right. (Hint: remember to use the user input lessons
    from the very first exercise)

10. Ask the user for a number and determine whether the number is prime or not. (For those who have forgotten, a prime number is a number that has no divisors.).

11. Write a program (function!) that takes a list and returns a new list that contains all the elements of the first list minus all the duplicates.

12. Write a password generator in Python. Be creative with how you generate passwords - strong passwords have a mix of lowercase letters, uppercase letters, numbers, and symbols. The passwords should be random, generating a new password every time the user asks for a new password. Include your run-time code in a main method.

13. Write a function that takes an ordered list of numbers (a list where the elements are in order from smallest to largest) and another number. The function decides whether or not the given number is inside the list and returns (then prints) an appropriate boolean.

14. Implement a function that takes as input three variables, and returns the largest of the three. Do this without using the Python max() function!

15. For this exercise, we will keep track of when our friend's birthdays are, and be able to find that information based on their name. Create a dictionary (in your file) of names and birthdays. When you run your program it should ask the user to enter a name, and return the birthday of that person back to them. The interaction should look something like this:
    Welcome to the birthday dictionary. We know the birthdays of:
    Albert Einstein
    Benjamin Franklin
    Ada Lovelace
    Who's birthday do you want to look up?
    Benjamin Franklin
    Benjamin Franklin's birthday is 01/17/1706.
    Happy coding!

16. Write a Python Program to implement inheritance and operator overloading

17. Implement exception handling in python

18. Download Apache Spark and implement python programs in spark.

19. Implement word count problem using pyspark.

20. Make a mini project based on above mentioned list of practical. Suggested mini projects are: a) **Dice Rolling Simulator:**

    The Goal: Like the title suggests, this project involves writing a program that simulates rolling dice. When the program runs, it will randomly choose a number between 1 and 6. (Or whatever other integer you prefer — the number of sides on the die is up to you.) The program will print what that number is. It should then ask you if you'd like to roll again. For this project, you'll need to set the min and max number that your dice can produce. For the average die, that means a minimum of 1 and a maximum of 6. You'll also want a function that randomly grabs a number within that range and prints it.

    b) **Guess the Number**
    The Goal: Similar to the first project, this project also uses the random module in Python. The program will first randomly generate a number unknown to the user. The user needs to guess what that number is. (In other words, the user needs to be able to input information.) If the user's guess is wrong, the program should return some sort of indication as to how wrong (e.g. The number is too high or too low). If the user guesses correctly, a positive indication should appear. You'll need functions to check if the user input is an actual number, to see the difference between the inputted number and the randomly generated numbers, and to then compare the numbers.

    c) **Mad Libs Generator**

The Goal: Inspired by Summer Son's Mad Libs project with Javascript. The program will first prompt the user for a series of inputs a la Mad Libs. For example, a singular noun, an adjective, etc. Then, once all the information has been inputted, the program will take that data and place them into a premade story template. You'll need prompts for user input, and to then print out the full story at the end with the input included.

SuggestedReadings:

1. Allen B . Downey, 2016, Think Python: How to Think Like a Computer Scientist , Shroff/O'Reilly Publishers
2. Guido van Rossum and Fred L. Drake Jr,2011, An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. Robert Sedge wick, Kevin Wayne, Robert Dondero,2015, Introduction to Programming in Python: An Interdisciplinary Approach, Pearson India Education Services Pvt. Ltd.
4. Timothy A. Budd, 2011, Exploring Python, Mc-Graw Hill Education (India) Private Ltd.

Note: Only latest editions of the books are recommended

Software required/ Web links:

Python 3.6.4
https://www.tutorialspoint.com/python/index.htm
https://www.programiz.com/python-programming/first-program

Distribution of Continuous Evaluation Table

Viva I	30%
Viva II	30%
File /Records	20%
Class Performance	10%
Attendance	10%

Assessment Tools:

Experiments in lab
File work/Class Performance
Viva (Question and answers in lab)
End Term Practical Exam

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BCA-DS-553.1	3			1			3	1			1	2	3	3
BCA-DS-553.2	2	3					3	2		1		1	3	3
BCA-DS-553.3			2	1			3	2			2	2	3	3
BCA-DS-553.4		2	2		2		3			1			3	3
BCA-DS-553.5	2	2	2		2		3			2		1	3	3

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

BCA-RIC-III: Research and Innovation Catalyst-III

Periods/week	Credits	Max. Marks : 100
P: 2	1	Continuous Evaluation : 100

Pre-requisites: Research and Innovation Catalyst-II
Course Type: Research & Training

Course outcomes: At the end of the course, the student will be able to:
BCA-RIC-III.1. Compare the various research methodologies and thereupon choosing the appropriate one.
BCA-RIC-III.2. Apply the contextual knowledge in designing and conducting the experiments
BCA-RIC-III.3. Analyze and interpret the research/ innovation outcomes
BCA-RIC-III.4. Analyze the further scope of research/ innovation
BCA-RIC-III.5. Gain hands on experience in techniques/technologies/ case studies etc BCA-RIC-
III.6. Adapt working with group members in cohesive temperament.

Unit 1: Setting up the simulation/experiment environment

1. Deciding the hypothesis or direction to carry out simulation/experiments / case study
2. Identifying the set of experiments/simulations/ case study for designing the model or analysing the data
3. Finding the resources for performing experiments/simulations / case study
4. Choosing the appropriate research methodology/ business model

Unit 2: Planning of experiments/ case study

1. Formulate experimental procedures and case study approach
2. Procurement of materials and secondary data
3. Modification of the experimental set-up / case study approach, if required

Unit 3: Execution of experiments/simulations/ case study

1. Conduct experiments/ build prototype / case study
2. Tabulating and recording data
3. Analysis and interpretation of the data
4. Interpreting convolution between experimental data and hypothesis/simulation
5. Comparison of the results for discrepancies
6. Listing and analysing the observations to get the further research direction

COURSE ARTICULATION MATRIX:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BCA-RIC-III.1		√	√		√	√								
BCA-RIC-III.2		√		√							√			
BCA-RIC-III.3	√	√	√	√	√						√			
BCA-RIC-III.4														
BCA-RIC-III.5														
BCA-RIC-III.6														

Evaluation Criteria: The following evaluation parameters shall be considered for internal assessment by both research coordinators and faculty coordinator or research mentors:-

Criteria	Evaluation parameters	Weightage (Marks)	
Online and offline Attendance	▢ Percentage of classes attended by the students	3+2	5
Group participation	• Judge individual student's participation in the experiments • Proper experimental planning • Collecting evidences substantiating to the experiments • Time bound completion of experiments	5 2 3 5	15
Execution of experiments	• Finding available resources • Usage of Scientific Literature Databases. e.g., Scopus/ Web of Science/ etc. for theoretical guidance • Understanding the technique/technology used • Analysis and interpretation of results • Percentage of reproducibility	2 2 3 2 3	12
Report and Presentation	• Presentation of slides • Experimental findings and content (Graph, Tables, Diagrams, Real time videos etc.) ▢ Report	6 6 6	18

References:

1. www.originlab.com
2. http://www.cambridgesoft.com/software
3. http://www.synergy.com/
4. www.mathworks.com/products/matlab.html

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BCA-DS-504: FUNDAMENTALS OF OBJECT-ORIENTED ANALYSIS AND DESIGN

Periods/week   Credits   Max. Marks: 200
L: 3   T: 3   Continuous Evaluation: 100
Duration of Examination: 3 Hrs   End Semester Examination: 100

Pre-Requisite: Object-Oriented programming
 Course Type: Domain Specific

Course Outcomes: At the end of the course, students will be able to BCA-DS-
504.1. Learn the basic foundation of Object-Oriented Principles.
BCA-DS-504.2. Identify the different analysis and design models.
BCA-DS-504.3. Classify UML notations effectively for the design of object oriented systems.
BCA-DS-504.4. Demonstrate Unified Modeling Language (UML) for real life problems   BCA-DS-
504.5. Sketch Use-Case diagrams using Activity and Class diagrams.
BCA-DS-504.6 Examine the essential elements in Sequence, State transition and Timing diagram.

PART -A

UNIT 1:Introduction
1.1 Introduction to OOAD
1.2 Object oriented Paradigm
1.3 Objects, classes, attributes
1.4 Object behavior and methods,
1.5 Encapsulation and information hiding
1.6 Class hierarchy, Polymorphism
1.7 Object relationships and associations
1.8 Aggregations and object containment

UNIT 2: Object Oriented Methodologies and Design Patterns
2.1 Development Life cycles
2.2 Rumbaing et al.'s object modeling technique
2.2 Booch methodology
2.3 Jacobson et al methodologies,
2.4 Designing objects and Patterns
2.5 Low coupling and High cohesion
2.6 Frameworks
2.7 The unified process

UNIT 3: Use case Modeling
3.1 Overview of requirements
3.2 Initial understanding of the domain
3.3 Building blocks of UML diagrams
3.4 Use case Diagrams
3.5 Static and Dynamic models
3.6 UML dynamic modeling
3.7 UML extensibility
3.8 UML Meta Model

UNIT 4: Notations of Factional View

4.1 Activity Diagrams

4.2 Sequence Diagram

4.2 State machine Diagram

4.3 Timing Diagram

4.4 Object Diagram

4.5 Communication Diagram

UNIT 5: Static Structural View

5.1 Classes

5.2 Values and attributes

5.3 Operations and methods

5.4 Responsibilities for classes

5.5 Abstract classes

5.6 Access specification (visibility of attributes and operations)

5.7 Relationships among classes: Associations

5.8 Dependencies and Inheritance

5.9 Generalizations and Aggregation

UNIT 6: Testing and Management Issues

6.1 Quality Issues

6.2 Non Execution Based Testing

6.3 Execution Based Testing

6.4 Cost Benefit Analysis

6.5 Risk Analysis

6.6 Metrics – Critical Path Method/Program Evaluation Review Technique

6.7 Choice of Programming Language

6.8 Testing the Project Management

Suggested Readings:

1. Mike O'Docherty,2005, Object- Oriented Analysis and Design using UML, Wiley Publication.
2. James Rumbaugh, 2017, Object Oriented Modeling and Design with UML, Wiley Publication.
3. Charles Ritcher ,2005, Designing Flexible Object Oriented systems with UML, New Riders Publishing
4. Jackson, BurdThomson, 2007, Object Oriented Analysis & Design, Marko Publishing

Note: Only latest editions of the books are recommended.

Web links:

https://www.tutorialspoint.com/object_oriented_analysis_design/ https://airbrake.io/blog/design-patterns/object-oriented-analysis-and-design https://onlinecourses.nptel.ac.in/noc17_cs25/preview https://www.techopedia.com/definition/21104/object-oriented-analysis-and-design-ooad https://study.com/academy/lesson/what-is-object-oriented-analysis-design.html

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-504.1	2	1		2			3	2			2		2	2
BCA-DS-504.2	1	1		2			3	3	2				1	2
BCA-DS-504.3		2	1		2		3	3	1				2	1
BCA-DS-504.4	1	2	2		2		3	3	1			1	1	1
BCA-DS-504.5	1	1	1	2	2		2	3			2	2	1	1
BCA-DS-504.6	1	1	1	2	3		3	3				2	1	1

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BCA-DS-505: INTRODUCTION TO CLOUD COMPUTING

Periods/week Credits		Max. Marks: 200
L: 3 T: 3		Continuous Evaluation: 100
Duration of Examination: 3 Hrs		End Semester Examination: 100

Pre-Requisite: Data Communication and Networking
 Course Type: Domain Specific

Course Outcomes: At the end of the course, students will be able to
BCA-DS-505.1. Learn the fundamental ideas of the emerging cloud computing paradigm and its origin.
 BCA-DS-505.2. Understand the broad perceptive of cloud architecture and its model.
BCA-DS-505.3. Apply different cloud programming models as per the need of the organization.
BCA-DS-505.4. Illustrate some important cloud driven commercial systems and other businesses cloud applications.
BCA-DS-505.5. Evaluate different cloud security techniques with their pros and cons.
BCA-DS-505.6. Derive various applications of cloud computing in the field of business and science.

PART-A
UNIT 1: Basic Concepts of Cloud Computing
1.1 Cloud Computing in a nutshell
1.2 System Models for Distributed and Cloud Computing
1.3 Roots of Cloud Computing
1.4 Grid and Cloud
1.5 Layers and Types of Clouds
1.6 Desired features of a Cloud
1.7 Basic Principles of Cloud Computing
1.8 Challenges and Risks
1.9 Cloud Models (Deployment Models and Service Models)

UNIT 2: Cloud Computing Architecture
2.1 Cloud reference model (Architecture, Infrastructure, Platform, Software)
2.2 Cloud types (Public, Private, Hybrid & Community clouds)
2.3 Exploring cloud computing status; Connecting to cloud
2.4 Industry Platforms: Cloud platforms in industry (Amazon web services, Google AppEngine, Microsoft Azure, Hadoop)

UNIT 3: Understanding Services & Applications
3.1 IaaS (IaaS workloads, Pods, Aggregation & Silos);
3.2 PaaS (Application development, Using PaaS application framework)
3.3 SaaS (Characteristics, Open SaaS & SOA)
3.4 IDaaS
3.5 CaaS. Aneka: Cloud application platform (Anatomy of Aneka container; Building Aneka clouds; Aneka SDK)

PART-B

UNIT 4: Cloud Security and Trust Management, Data Security in the Cloud
4.1 An Introduction to the Data Security
4.2 The Current State of Data Security in the Cloud CryptDb
4.3 Onion Encryption layers
4.4 Join; Search

4.5 HOM; and Homomorphic Encryption; FPE
4.6 Trust, Reputation and Security Management

UNIT 5: Cloud Programming and Software Environments
5.1 Features of Cloud and Grid Platforms
5.2 Parallel and distributed Programming Paradigms
5.3 Programming Support of Google App Engine
5.4 Programming on Amazon AWS and Microsoft Azure
5.5 Emerging Cloud Software Environments

UNIT 6: Exploring Cloud Infrastructures
6.1 Managing & administrating the clouds
6.2 Securing the cloud (The security boundary, Security mapping)
6.3 Moving applications to the cloud (Functionality mapping)
6.4 Application attributes, Cloud service attributes,
6.5 System abstraction, Cloud bursting
6.6 Communicating with the cloud (Instant messaging clients)
6.7 Instant messaging interoperability, Micro blogs

Suggested Readings:
1. Jones & Bartlett, 2012, Cloud Computing K JamsaSaas, Paas, Iaas, Virtualization, Business Models & More, Learning
2. B Rajkumar , V Christian and S. ThamaraiSelvi, 2013, Mastering Cloud Computing, TMH Education
3. B Sosinky,2011, Cloud Computing Bible, Wiley Publication
4. Eri, 2013, Cloud Computing-Concepts, Technology & Architecture, Pearson Publication

Note: Only latest editions of the books are recommended.

Web links:
https://aws.amazon.com/what-is-cloud-computing/
http://www.manjrasoft.com/aneka_architecture.html
http://uir.ulster.ac.uk/20675/3/ijacivol3no1.pdf
https://en.wikipedia.org/wiki/Point_of_delivery_%28networking%29
https://www.techopedia.com/definition/25939/silo https://www.insightly.com/blog/data-silos/

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks. **Distribution of Continuous Evaluation Table**

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-505 .1	1	3	1	1		1	1					1	3	
BCA-DS-505 .2	3	1	2	1	1	1	1			1			3	1
BCA-DS-505 .3	1	2	2		1	1	1			1			3	1
BCA-DS-505 .4		1	3	2	3	2	2	1	1	3	2	2	2	2
BCA-DS-505 .5			1			3	2			3			3	
BCA-DS-505 .6	1	3	3				2	1	1				3	1

MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES

(Deemed to be University under section 3 of the UGC Act 1956)
NAAC 'A' Grade University

BCA-DS-506: Soft Skills and Aptitude Development-III

Periods/week	Credits	Max. Marks	: 100
L: 2 T:0	2	Internal	: 50
Duration of Exam: 2hrs		External	: 50

Course Outcomes
BCA-DS-506.1. Students will be able to recognize problem based on Modern Mathematics and Algebra **BCA-DS-506.2.** Students will be able to solve basic to moderate level problems based on Mensuration and Geometry.
BCA-DS-506.3. Students will be able to calculate solution to logical reasoning.
BCA-DS-506.4. Students will get proficient with resume building and will be able to draft effective cover letters. **BCA-DS-506.5.** Students will be able to participate effectively and confidently in a Group Discussion **BCA-DS-506.6.** Students will be able to manage interviews effectively.

PART – A
Unit 1: Modern Mathematics and Algebra
1.1 Permutation and Combination
      1.1.1 Principal of counting and Basic formulas
      1.1.2 Arrangements, Selection and Selection + Arrangement.
      1.1.3 Linear/Circular arrangements, Digits and Alphabetic Problems and Applications.
1.2 Probability
      1.2.1 Events and Sample Space, Basic Formulas.
      1.2.2 Problems on Coins, Cards and Dices.
      1.2.3 Conditional Probability, Bayes' Theorem and their Applications.
1.3 Algebra
      1.3.1 Linear & Quadratic equations
      1.3.2 Mathematical inequalities
      1.3.4 Maximum & Minimum Values
      1.3.3 Integral Solutions

Unit 2: Geometry and Mensuration
2.1 Geometry
      2.1.1 Basic geometry & Theorems, Lines & Angles
      2.1.2 Polygons, Triangle and Quadrilaterals
      2.1.3 Circles
2.2 Mensuration I- Areas
      2.2.1 Different types of Triangles and their area and perimeter.
      2.2.2 Different types of Quadrilateral and their area and perimeter.
      2.2.3 Circumference and Area of Circle, Area of Sector and length of Sector.
      2.2.4 Mixed Figures and their Applications.
2.3 Mensuration II- Surface Areas and Volumes
      2.3.1 Problems on Cubes & Cuboids, Cone, Cylinder and Sphere.
      2.3.2 Prism and Pyramid.
      2.3.3 Mixed Figures and their Applications.

Unit 3: Logical Reasoning
3.1 Linear Arrangement
3.2 Circular Arrangement

3.3 Puzzles

Part - B

Unit 4: Professional Writing
      4.1. Profiling on Social Sites: LinkedIn, Facebook, Instagram
      4.2. Cover Letter/Emails
      4.3. Resume Writing

Unit 5: Group Discussions
      5.1. Do's and Dont's of a Group Discussion
      5.2. Roles played in a Group Discussion
      5.3. Tips for Cracking a Group Discussion

Unit 6: Managing Interviews
      6.1. Developing the employability mindset
      6.2. Preparing for Self -Introduction
      6.3. Researching the employer
      6.4. Portfolio Management
      6.5. Answering Questions in an Interview

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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

Text Books/Reference Books:
1. Teach Your Self Quantitative Aptitude: Arun Sharma, 1st Edition, McGraw Hills Education, 2017
2. A Modern Approach to Logical Reasoning: R S Aggarwal, S Chand & Company Pvt Ltd, Edition 2017
3. The Damn Good resume Guide ByYana Parker & Beth Brown
4. Interview Answers By Ceri Roderick & Stephan Lucks

SIXTH SEMESTER

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BCA-DS-601: PROGRAMMING IN .NET USING C#

Periods/week   Credits   Max. Marks: 200
L: 3   T: 1   3   Continuous Evaluation: 100
Duration of Examination: 3 Hrs   End Semester Examination: 100

Pre-Requisite: Object Oriented Programming
Course Type: Core

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-601.1. Describe the concepts of windows application programming.
BCA-DS-601.2. Understand the internal working of .Net Framework.
BCA-DS-601.3. Demonstrate the usage of different tools and controls used in C# programming.
BCA-DS-601.4. Analyze the various types of database connectivity with visual studio .net.
BCA-DS-601.5. Assess various ASP.NET components and justify their usage in various programming situations.
BCA-DS-601.6. Design a full-fledged Web Application using ASP.NET complete with database connectivity.

PART -A
UNIT 1: Introduction
1.1 Introduction to Visual Studio
1.2 Visual Studio IDE, Development Environment Setup
1.3 .NET Overview, CLR, Assemblies (monolithic vs. component-based applications)
1.4 Execution Model, Client-Side vs. Server-Side Programming.
1.5 Debugging using Visual Studio.
1.6 Creating Different types of Projects in Visual Studio(Web, Desktop, Library)

UNIT 2:C# Basics2.1 Variables, Constants
2.2 Strings, Data Types
2.3 Arrays Different Types of Arrays and Operations on Arrays
2.4Decision statements
2.5Loop statements
2.6Exception Handling using try – catch –finally
2.7 Name Space
2.8Class and Objects, Creating and using Objects

UNIT 3: Inheritance
3. 1 Inheriting a class
3. 2 Sealed class
3. 3 Overloading an operator
3. 4 Overloading a method
3. 5 Overloading an Indexer
3. 6 Creating an Interface
3. 7 Implementing an Inheritance
3. 8 Inheriting an Interface

Unit 4: Desktop Applications and Event Handling

4.1 Windows Forms

4.2 MsgBox ,DialogBox

4.3 Handling Mouse and Keyboard Events

4.4 Basic Control Programming for following controls

4.5 Button , Label , Textbox,Rich

Textbox 4.6 RadioButton , Checkbox,

List Box 4.7 Checked List Box.

4.8 Tree View

4.9 Picture Box, Tab Control

UNIT 5: Control Programming

1.1 Architecture of ADO.NET

1.2 Data Providers in ADO.NET

1.3 Connection and Command Class

1.4 DataReader

1.5 DataAdapter

1.6 DataSet and DataTable

1.7 DataReader

1.8 DataGridView Control

1.9 Binding Controls with DataSets

UNIT 6:WebApplications using ASP.NET

10.1   Web Development and ASP NET

10.2   Features and Benefits of ASP NET

10.3   Features provided by ASP NET

10.4   Session Tracking

10.5   ASP.NET Components: Web forms

10.6   Basic Components (Textbox, Dropdown, Button)

Suglgested Readings:

1. Daniel M. Solis,2010, Illustrated C#,Apress Publications
2. Steven Holzner,2001, C#.NET Programming Black Book ,Dreamtech Publications
3. Jack Purdum, 2007, Beginning C# 3.0 An introduction to object oriented programming,Wrox Publication
4. Rebecca M. Riordan, 2002, Microsoft ADO.Net, Microsoft Press
5. Jon Skeet, 2008, C# in depth, Manning Publications Co.

Note: Only latest editions of the books are recommended.

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Software required/ Web links:

Visual Studio 2010

Database Server: SQL Server 2008

Distribution of Continuous Evaluation Table

Sessional I	30%

Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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	PSO1	PSO2
BCA-DS-601.1	2		2									
BCA-DS-601.2	2	2	2									
BCA-DS-601.3			2	2							2	
BCA-DS-601.4			2								2	
BCA-DS-601.5		2	2								2	
BCA-DS-601.6		2	2								2	
BCA-DS-601.7		2	2								2	

BCA-DS-652: PROJECT BASED ON A PROGRAMMING LANGUAGE

Periods/week   Credits   Max. Marks: 300
P: 8   T: 4   Continuous Evaluation: 200
Duration of Examination: 3 Hrs   End Semester Examination: 100

Core-Requisite: NA
Course Type: Core

Course Outcomes: At the end of the course, the student will be
able to: BCA-DS-652.1 Describe the Systems Development Life Cycle
(SDLC). BCA-DS-652.2 Evaluate systems requirements BCA-DS-652.3
Complete a problem definition.
BCA-DS-652.4 Evaluate a problem definition.
BCA-DS-652.5 Perform and evaluate feasibility studies like cost-benefit analysis, technical feasibility, time BCA-DS-652.6 Construct and evaluate data flow diagrams.
BCA-DS-652.7 Decide the S/W requirement specifications and H/W requirement specifications.
BCA-DS-652.8 Distinguish between logical and physical design requirements. BCA-DS-652.9 Design and evaluate system outputs

Internals will be calculated on the basis of following parameters

Presentation	15%
Knowledge/Viva	15%
Documentation	20%
Application	15%
Innovation	15%
Attendance	20%

Note: Project guidelines are enclosed in Annexure-A

Annexure-A:

1. Guidelines for submission of BCA Project

All the candidates of BCA Final year are required to submit a project report based on the work done by him/her during the project period based on any programming language. Presentation / viva will be based on the project work carried during the semester. The Project topics should be based on syllabus or beyond.

The project is evaluated on the basis of following heads:

1. Presentation

2. Viva

3. Project report

4. Software Coding

5. Documentation

6. Testing

2. Project Report Preparation Guidelines

Project report should consist the following:

I.   Cover page as per the format (Annexure 1)

II.   Declaration by the Student (Annexure 2)

III.   Certificate from Department (Annexure 3)

IV.   Acknowledgement

V.   Index (Table of Contents in tabular form)

VI.   Introduction

    (a) About Organization

    (b) Aims & Objectives

    (c) Manpower

VII.   System Study

    (a) Existing System along with limitations
    (b) Proposed System along with advantages

VIII.   Feasibility Study

    (a) Technical
    (b) Behavioural
    (c) Economic

IX.   Project Monitoring System

    (a) Gantt Chart

X.   System Analysis

    (a) Requirement Specification
    (b) System Flowcharts
    (c) DFDs /ERDs (up to Level 2)

XI.   System Design

    (a) File/ Data Design

XII. Input / Output Form Design

    (a) Screen Design (Screenshots of all screens In Color)
    (b) Report Design

XIII. System Testing

    (a) Preparation of Test Data
    (b) Testing With Live Data
    (c) Test Cases with results

XIV. System Implementation

    (a) System Requirements (Hardware/Software)

XV. Documentation

XVI. Scope of the Project

XVII. Bibliography

3. Project Report Submission Guidelines

a) Make 2 copies of the project.

b) Submit one original hard and one original soft copy of the project report to concerned guide.

c) A photocopy of the complete Project should be retained by the student for future reference.

d) Cover page should be properly formatted. (See Annexure 1)

e) The project report must be about 80-100 pages.

f) Source code or pseudo code should not be included in the project report

g) Student will be giving a presentation of about 5-10 minutes, highlighting the project objective, summary and report and findings of the project at the time of viva.

h) Project completed in all aspects with necessary enclosures should be submitted to the concerned Guide in specified time period.

i) The dimension of the project report should be in A4 size.

j) The project report should be bound using flexible cover of the thick plastic paper (Spiral Binding).

k) Report should use Font Arial/ Times New Roman; Font Size: 14 (For Headings Bold) and 12 (For Paragraphs). Document can have maximum of 1.5 lines spacing.

l) Project completed in all aspects with necessary enclosures should be submitted to the concerned Guide.
m) Violation of the project guidelines will lead to the rejection of the project at any stage.

n) A photocopy of the project report is not acceptable for submission.

Title of the Project

(Organization: For Whom Developed)

Submitted to:

ManavRachna International Institute of Research & Studies,

Faridabad (Haryana)

In Partial Fulfillment of

Bachelor of Computer Applications (BCA)

Session:

Under the Supervision of: By:

(Name of Project Guide, Designation)   Name: (   )

                                                                                         Roll No: (   )

Faculty of Computer Applications

ManavRachna International Instituteof Research& Studies

Sector-43, Aravalli Hills

Faridabad – 121001

Declaration

I do hereby declare that this project work entitled "_____" submitted by me for the partial fulfillment of the requirement for the award of BACHELOR OF COMPUTER APPLICATIONS (BCA) is a record of my own work. The report embodies the finding based on my study and observation and has not been submitted earlier for the award of any degree or diploma to any Institute or University.

SIGNATURE OF STUDENT

Name:

Roll No:

Annexure 3

Certificate from the Guide

This is to certify that the project report entitled "_____" submitted in partial fulfillment of the degree of BACHELOR OF COMPUTER APPLICATIONS (BCA) to ManavRachna International Institute of Research & Studies, Faridabad is an authentic and original work carried out by Mr./ Ms._____ with Roll no. _____under my guidance.

The matter embodied in this project is genuine work done by the student and has not been submitted whether to this University or to any other University / Institute for the fulfillment of the requirements of any course of study.

Signature of the Student: Signature of the Guide

Date: Date:

Name and Address   Name,   Designation

of the student   and Address of the Guide

SIGNATURE OF HOD

BCA-DS-651: PROGRAMMING IN .NET USING C# LAB

Periods/week Credits	Max. Marks: 100
P: 4 T: 2	Continuous Evaluation: 50
Duration of Examination: 3 Hrs	End Semester Examination: 50

Pre-Requisite: Knowledge of Object oriented programming approach
Course Type: Core

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-651.1 Solve simple problems using elementary concepts of programming.
BCA-DS-651.2 Evaluate the quality of programs according to C# language principles.
BCA-DS-651.3 Design programs involving decision structures, loops and functions.
BCA-DS-651.4 Implement the Object Oriented Paradigms.
BCA-DS-651.5 Develop Data-Driven Applications.
BCA-DS-651.6 Create complete application including GUI ,Event-Handling and Database Transactions.

List of Experiments:
Every student is required to maintain Practical File and write the following steps in each practical:
  (i)   Problem statement
  (ii)   Formula(s) used
  (iii)   Algorithm
  (iv)   Flow Chart
  (v)   Source codes in student's handwriting (vi)   Program listing (print-out) (vii) Input & Output.

C# Console Programming:
  1. Write program to demonstrate the working of C# SDK.
  2. Write program to show the use of various data types available in C#.
  3. Write programs to understand the use of Control statements.
  4. Write programs to understand the use of library functions.
  5. Write a program to demonstrate the use of various arithmetic, unary, logical, bit-wise, assignment and conditional operators.
  6. Write a program to store 10 elements in an array and display the array elements in increasing order.
  7. Demonstrate the use of pass by value and pass by reference by writing a program.
  8. Write a program to implement recursion.
  9. Write programs to implement one dimensional and two dimensional arrays.
  10. Write programs to understand the working of predefined string functions like Compare( ), CompareTo( ), Concat( ),
       a. Copy( ) and Join().
  11. Write a program to implement class and its objects.
  12. Write a program to implement constructors.
  13. Create one admission enquiry form.
  14. Create a windows form with registration number, name, age, class and other details.
  15. Implement the concept of file handling to read XML file and display all the values in a read only Form.
  16. Concept of three variables: temp, pressure and water level for a chemical industry boiler from the keyboard. Throw an event called alert, if these variables level shoot above a certain level. [Event Handling]
  17. Concept to illustrate overloading an indexer.

18. Implement the concept in C# consisting of a delegate called student that refers to a method called student record (), your program should get the details of student record and display. [Delegate]
19. Develop the Concept to create a class that does metric conversion from meters, centimeter to feet, inches respectively. Create a class called meters.txt and read the data from the user by prompting. Convert this data into feet and inches and save it in another file called feet.txt. [File Handling]
20. Prepare a login form, which will accept unique username, password of alphanumeric type, re-type password, date of birth, and text to remember password. And put all necessary validation. If user does not fill the complete form it should show valid error message. Also if user is new then there should be option for creating new Login and a checkbox to remember on computer. [Windows application].
21. Create a database of 10 students with registration number, age, class and other details.
22. Use ADO.NET to connect the database (Program 19) with the fields of windows form (Program 18) and populate the form field with the entries of the database.
23. Prepare a ASP.NET page to fill student details. Use any of the components available as deemed fit for the requirements. on the press of save button user should be able to save the form data in a mysqltable .
24. Develop an ASP page to display the data of students entered in the previous form in tabular format using any of the grids .use Dataset to populate the grid.
25. Mini Project by each student:

Few of the projects are as follows:

      a. Student Tracking System
      b. Mobile Wallet
      c. Toll Collection
      d. Asset Tracking System
      e. Feedback system

Suggested Readings:

1. Daniel M. Solis,2010, Illustrated C#,Apress Publications
2. Steven Holzner,2001, C#.NET Programming Black Book ,Dreamtech Publications
3. Jack Purdum, 2007, Beginning C# 3.0 An introduction to object oriented programming,Wrox Publication
4. Rebecca M. Riordan, 2002, Microsoft ADO.Net, Microsoft Press
5. Jon Skeet, 2008, C# in depth, Manning Publications Co.

Note: Only latest editions of the books are recommended.

Software required/ Web links:
   Visual Studio 2010
   Database Server: SQL Server 2008 https://docs.microsoft.com/en-us/dotnet/csharp/quick-starts/ https://www.tutorialspoint.com/csharp/

Distribution of Continuous Evaluation Table

Viva I	30%
Viva II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

Assessment Tools:

Experiments in lab
File work/Class
Performance
Viva (Question and answers in lab)
End Term Practical Exam

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
BCA-DS-651.1	2		2									
BCA-DS-651.2	2	2	2									
BCA-DS-651.3			2	2							2	
BCA-DS-651.4			2								2	
BCA-DS-651.5		2	2								2	
BCA-DS-651.6		2	2								2	
BCA-DS-651.7		2	2								2	

BCA-DS-603: SECURITY OF INFORMATION SYSTEM

Periods/week   Credits   Max. Marks: 200
L: 3   T: 3   Continuous Evaluation: 100
Duration of Examination: 3 Hrs   End Semester Examination: 100

Pre-Requisite: Data Communication and Networking
Course Type: Domain Specific

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-603.1Describe information security strategy and incorporate this in the infrastructure design and configuration
BCA-DS-603.2 Explain catalogue information assets and threats to their security.
BCA-DS-603.3Ttechniques and security solutions used for securing the network infrastructure.
BCA-DS-603.4 Analyze information security policies and procedures and explore the development of security policies..

<center>**PART   -A**</center>

UNIT 1: Introduction
1.1 Information Security Concepts

1.2 Critical Characteristics of Information

1.3 Components of an Information System

1.4 Security Model

1.5 Security Software Development Life Cycle

1.6 Computer Security Trends

1.7 Computer Security Strategy

UNIT 2: Security Investigation
2.1 Need for Security

2.2 Threats, Attacks, and Assets

2.3 Security Functional Requirements

2.4 Security Problem

2.5 Ethical and Professional Issues

2.6 Risk Management:

2.7 Identifying and Assessing Risk

2.8 Controlling Risk

UNIT 3: Security Analysis and Design
3.1 Risk Management:

3.2 Identifying and Assessing Risk

3.3 Controlling Risk

3.4 Blueprint for Security

3.5 Information Security Poicy

3.6 Standards and Practices

<center>**PART-B**</center>

UNIT 4: Cryptography
4.1 Ciphers and Secret Message

4.2 Symmetric cryptography, asymmetric cryptography

4.3 Public key, private key cryptography

4.4 Theory of Block Cipher Design

4.5 Cipher Network Structures

4.6 Data Encryption Standard (DES), Triple DES encryption algorithms

4.7 Advanced Encryption Standard(AES), RSA encryption algorithms

UNIT 5: Digital Signatures, Certificates, and Standards

5.1 Digital Signature Standard

5.2 Digital Signature Algorithm

5.3 Public key Infrastructure

5.4 Digital Certificates

5.5 Basics of Public Key Cryptography Standards

5.6 IP and Web Security Protocols

UNIT 6: System Security

6.1 Computer Virus

6.2 Firewall and Design Principles

6.3 Electronic Commerce Security

6.4 Electronic Payment Systems

6.5 Secure Electronic Transaction (SET)

6.6 Ecash and Smart Card Based Systems

Suggested Readings:

1. J. Piwprzyk, T. Hardjono, 2002, Fundamentals of Computer Security , Springer
2. W. Stallings, 2017, Cryptography and Network Security Principles and Practices, Prentice-Hall
3. Rhodes-Ousley, 2017, Network security-The Complete Reference , Tata McGraw-Hill

Note: Only latest editions of the books are recommended

Weblinks:

http://www.omnisecu.com/security

https://searchsecurity.techtarget.com

https://www.tutorialspoint.com

https://oli.cmu.edu

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. Three questions will be set from each Part A and Part B (one from each unit). A student is required to attempt two questions out of three from each part. Each question will be of 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-603.1		2			2			1			1	1		
BCA-DS-603.2	2	1		2	2			1			1	1	1	
BCA-DS-603.3	2	2	2	3	2			2			2	2	2	2
BCA-DS-603.4	2	1	2	3	2			2			3	3	2	2

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BCA-DS-604 : MULTIMEDIA AND ANIMATION

Periods/week   Credits   Max. Marks: 200
L: 3   T: 3   Continuous Evaluation: 100
Duration of Examination: 3 Hrs   End Semester Examination: 100

Pre-Requisite: Basics of Computer Graphics
Course Type: Domain Specific

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

BCA-DS-604.1. Understand various types of multimedia and its elements.
BCA-DS-604.2. Describe the features offered by various authoring programs.
BCA-DS-604.3. Demonstrate the use of Google Chrome to access and use various plug-ins of multimedia.
BCA-DS-604.4. Apply different types of animations, digitized sounds, video controls, and scanned images in real time applications.
BCA-DS-604.5. Analyze the role played by different team members in the development of an education based multimedia project.

PART -A
Unit 1: Multimedia Overview
1.1 Introduction to Multimedia concepts
1.2 Types of Multimedia
1.3 Applications of Multimedia
1.4 Methods to deliver Multimedia
1.5 Introduction to Multimedia Database
1.6 Multimedia Input and Output Devices

Unit 2: Text Manipulation in Multimedia
2.1 Introduction about font and faces
2.2 Using Text in Multimedia
2.3 Applying different types of text in multimedia
2.4 Font Editing and Design tools
2.5 Hypermedia and Hypertext application

Unit 3: Images and Sound in Multimedia
3.1 The power of images
3.2 Making Still Images
3.3 Colouring
3.4 Image File Formats (GIF, JPEG, PNG etc.)
3.5 The power of sound
3.6 MIDI Vs. Digital Audio
3.7 Audio File Formats (AIFF, WAV, MPEG, MOV etc.)
3.8 Adding Sound to multimedia project

Part B
Unit 4: Animation Basics
4.1 The power of motion
4.2 Principles of Animation
4.3 Different techniques of Animation

4.4 Animation in Powerpoint

4.5 Making Animations that work using Flash

4.6 Animation file formats(.fla, .swf, .mov, .dir etc.)

Unit 5: Introduction to Video

5.1 Working of a Video and its Display

5.2 Digital Video Containers (Codecs & Video Format Converters)

5.3 Obtaining Video Clips

5.4 Shooting and editing Video

5.5 Non Linear Editing(NLE) in Videos

Unit 6: Making Multimedia and enhancing Multimedia Skills

6.1 The stages of Multimedia Project

6.2 Hardware and Software requirements

6.3 Authoring Systems

6.4 Team for Multimedia Development

6.5 Different stages of multimedia

6.6 The internet and multimedia

Suggested Readings:

1. Tay Vaughan,2011, Multimedia: Making It Work , Tata McGraw Hills.
2. James E Shuman, 1998, Multimedia in Action ,Vikas Publishing House.
3. Andreas Holzinger,2002, Multimedia Basics – Volume – 1 Technology, Firewall Media
4. Rangan Parekh, 2006, Principles of Multimedia, Tata McGraw Hills

Note: Only latest editions of the books are recommended.

Web links:

http://www.ftms.edu.my/images/Document/MMGD0101%20

https://1.cdn.edl.io/izjEhIiCI19QuzrnjoWXM8IXLVbFB9tjpWk7NybQ6KJzwJtx.pdf

https://www.sfu.ca/~tutor/techbytes/Flash/index.html

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks.

Distribution of Continuous Evaluation Table

Sessional I	30%
Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-604.1	1	1	2		1		1	1	1	1			2	2
BCA-DS-604.2					2	1		1			1	1	2	2
BCA-DS-604.3	2	2	2		2		2	2			2	2	2	2
BCA-DS-604.4					2	2					1	1	1	1
BCA-DS-604.5	1	2	2		1	1		1			1	1	2	2

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

BCA-DS-605: BASICS OF MIS AND ERP

Periods/week Credits	Max. Marks: 200
L: 3 T: 3	Continuous Evaluation: 100
Duration of Examination: 3 Hrs	End Semester Examination: 100

Pre-Requisite: Principles of Management
Course Type: Domain Specific

Course Outcomes: At the end of the course, the student will be able to:
BCA-DS-605.1.Learn various information system and their successful implementation in an organization
BCA-DS-605.2. Identify the major challenges in building and using management information system.
BCA-DS-605.3. Assess the relationship between management information system and business processes. BCA-DS-605.4. Evaluate the role of Information systems supporting various levels of business strategy

PART-A

UNIT 1:Information Systems
1.34   Introduction

1.35   Objectives

1.36   Concept of Information System
1.37   Components of Information System
1.38   Trends in Information System
1.39   Types of Information System
1.40   Framework of Information System in an Organization
1.41   Sub Systems of an Information System
1.42   Causes for failures of Information System

UNIT 2: Management Information System(MIS)
2.1 Nature and scope of MIS
2.2 Characteristics of MIS
2.3 Functions of MIS
2.4 Structure of MIS
2.5 Physical Components of MIS
2.6 Development Process of MIS
2.7 Decision Support System(DSS)
2.8 Information requirement and levels of management

UNIT 3: Management Information System and Organization Structure
3.1 Managing in the Internet Era
3.2 MIS in Organisation
3.2 Strategic Level Planning
3.3 Operational Level Planning
3.4 Use of information for competitive advantage

3.5 Economic and Behavior Theories
3.6 MIS Pitfalls and factors affecting the same

PART-B

UNIT 4: Introduction to Enterprise Resource Planning(ERP)
 4.1 Introduction and Objective of ERP
 4.2 Need for ERP
 4.3 Basic Concepts of ERP
 4.4 ERP Models and Modules
 4.5 Growth of ERP
 4.6 Benefits of ERP
 4.7 Proper and Improper ERP Implementation

UNIT 5: ERP Modules and Vendors
 5.1 Finance
 5.2 Production Planning
 5.3 Control and Maintenance
 5.4 Sales and Distribution
 5.5 Human Resource Management (HRM)
 5.6 Inventory Control System
 5.7 Quality Management

UNIT 6: **Strategies of ERP**
 6.1 Strategy of Organization and ERP
 6.2 Role of ERP in achieving Organizational Objectives
 6.3 Developing an effective ERP system
 6.4 ERP and challenges of E-Commerce
 6.5 ERP Related Technologies (OLAP, Data Mining)

Suggested Readings:
   1. Leon Alexis,2019, Enterprise Resource Planning , Tata McGraw-Hill, 1999
   2. 2011, Management Information System: James A. O'Brien PaperBack
   3. 2013, Management Information Systems: A Global Digital Enterprise Perspective : W.S. Jawadekar, Paperback

Note: Only latest editions of the books are recommended.

Web links:
https://www.slideshare.net/sumit235/mis-and-erp
ddugkysop.in/mod/book/view.php?id=433&chapterid=871
https://mthink.com/legacy/www.cfoproject.com/content/pdf/CFO1_wp_shank.pdf
https://pdfs.semanticscholar.org/fb0c/ac0d03b50116d48a43ece5f7c26d6f27b0bc.pdf

Instructions for paper setting: Seven questions are to be set in total. First question will be conceptual covering entire syllabus and will be compulsory to attempt. 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 20 marks. **Distribution of Continuous Evaluation Table**

Sessional I	30%
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Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-605 1.	1		2		2		1		2	1		2	2	3
BCA-DS-605 2.		2		1		1	2	1	1	3	2	1	1	1
BCA-DS-605 3.			3		1		2		2	3	3	2	1	1
BCA-DS-605 4.	2		2	2			3	2		2	3		2	3

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BCA-DS-606: MACHINE LEARNING

Periods/week Credits	Max. Marks : 200	
L: 3 T: 0 P : 0 3	Continuous Evaluation : 100	
Duration of Examination: 3 Hrs	End Semester Examination : 100	

Pre requisite: Artificial Intelligence

Course Type: Program Core

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

BCA-DS-606.1 Differentiate Machine Learning and Artificial Intelligence
BCA-DS-606.2 Explain the process and applications of Machine Learning
BCA-DS-606.3. Apply machine learning solutions to classification and clustering problems.
BCA-DS-606.4 Demonstrate the types of information that can be extracted from text.
BCA-DS-606.5. Understand how to evaluate models generated from data.
BCA-DS-606.6. Apply the machine learning algorithms to real-world problems.

UNIT 1: Mathematics in Machine Learning

    1.1 Calculus: Vector and Matrix calculus
    1.2 Measure of Central Tendency
    1.3 Probability: Basic Rules and Axioms
    1.4 Regression Lines

UNIT 2: Introduction to Machine Learning

    2.1 Definition of Learning Systems
    2.2 Machine Learning vs Artificial Intelligence
    2.3 Machine Learning vs Deep Learning
    2.4 Goals and Applications of Machine Learning
    2.5 Process of Machine Learning
    2.6 Types of Machine Learning
    2.7 Training and Testing Data

UNIT 3 : Supervised Learning

    3.1 Introduction to Supervised Learning
    3.2 Decision Trees
    3.3 K Nearest Neighbor (kNN) Algorithm
    3.4 Evaluating Classification Algorithms
    3.5 Usage of Classification Algorithms

UNIT 4: Unsupervised Learning

    4.1 Introduction to unsupervised Learning
    4.2 Clustering
    4.3 Types of Clustering
    4.4K-Means Algorithm
    4.5 Evaluating Clustering Algorithms

4.6   Usage of Clustering Algorithms

UNIT 5: Reinforcement Learning
      5.1 Reinforcement Learning vs supervised and Unsupervised Learning
      5.2 Components of Reinforcement Learning
      5.3 Approaches to Reinforcement Learning
      5.4 Applications of Machine Learning

UNIT 6: Introduction to Text Mining
      6.1   Structure of Text to the Machine and Human
      6.2   Cleaning Text
      6.3 Preparing Text for Machine Learning
      6.4   Natural Language Processing Methods to Text

Suggested Readings:

1)   Tom M Mitchell, Machine Learning, McGraw Hill Education
2)   Bishop, C., Pattern Recognition and Machine Learning, Berlin: Springer-Verlag.
3)   Duda, Richard, Peter Hart, and David Stork, Pattern Classification, WileyInterscience

4)   Tom M. Mitchell, Machine Learning, McGraw-Hill Series **Software Required / Web links:**

https://www.tutorialspoint.com/machine_learning_with_python/index.htm

https://www.kaggle.com/kanncaa1/machine-learning-tutorial-for-beginners

Note: Only latest editions of the books are recommended.

Distribution of Continuous Evaluation Table

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Sessional II	30%
Assignment	20%
Class Performance	10%
Attendance	10%

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
BCA-DS-606.1	1	1	1	1	1								1	1
BCA-DS-606.2	1	1	1	1	1								1	1
BCA-DS-606.3	1	1	1	1	1								1	1
BCA-DS-606.4	2	1	1	1	1								1	1
BCA-DS-606.5	2	2	2	2	2		2						2	2

Appendix-A

List of courses having relevance to the Local/Regional, National and Global Development needs.

Course Code	Course Name	Regional	National	Global
BCA-DS-101	Elements of Mathematics	√		
BCA-DS-102	Hardware Interfaces		√	
BCA-DS-103	Logical Organization of Computer		√	
BCA-DS-104	Introduction to IT & Programming in C		√	
BCA-DS-105	Database Management System			√
BCA-DS-106	Business Communication			√
BCA-DS-154	C Programming Lab		√	
BCA-DS-155	Database Management System Lab			√
BCA-DS-201	Data Structures using C		√	
BCA-DS-202	Internet Technologies			√
BCA-DS-203	Software Engineering			√
BCA-DS-251	Data Structures Lab		√	
BCA-DS-252	Internet Technology Lab			√
CH-202B	Environmental Studies		√	
BCA-DS-301	Object Oriented Programming using C++			√
BCA-DS-302	Introduction to Operating System			√
BCA-DS-303	Mathematical Foundation of Computer Science		√	
BCA-DS-351	C++ Lab			√
BCA-RIC-I	Research Innovation Catalyst-I			√
BCA-DS304	Web Applications Development			√
BCA-DS-309	Soft Skills and Aptitude Development-I			√

BCA-DS-306	Shell Programming			√
BCA-DS354	Web Applications Development Lab			√
BCA-DS-356	Shell Programming Lab			√

BCA-ED-301	Azure Fundamentals			√
BCS-DS-376	Azure Data Fundamentals			√
BCS-DS-375	Azure AI Fundamentals			√
BCA-DS-401	Numerical Analysis and Statistical Techniques		√	
BCA-DS-402	Programming in Java			√
BCA-DS-406	Computer System Architecture			√
BCA-DS-452	Java Lab			√
BCA-DS-453	Vocational Training		√	
BCA-RIC-II	Research Innovation Catalyst –II			√
BCA-DS404	System Programming			√
BCA-DS-405	Fundamentals of Artificial Intelligence			√
BCS-DS-490	Azure Database Administrator Associate			√
BCA-ED-402	Azure Cosmos DB developer specialty			√
BCA-EC-401	Security Operations Analyst Associate			√
BCA-EC-402	Security, Compliance and Identity Fundamentals			√
BCS-DS-489	Azure Developer Associate			√
BCA-DS-501	Data Communication & Networking		√	
BCA-DS-502	RDBMS using Oracle			√
BCA-DS-503	Python Programming			√
BCA-DS-552	Oracle Lab			√
BCA-DS-553	Python Programming Lab			√

Course Code	Course Name			
BCA-RIC-III	Research Innovation Catalyst-III			√
BCA-DS-504	Fundamentals of Object-Oriented Analysis & Design			√
BCA-DS-505	Introduction to Cloud Computing			√
BCS-DS-593	Azure Data Engineer Associate			√
BCA-ED-502	Customer Data platform speciality			√
BCA-EC-501	Azure Security Engineer Associate			√
BCA-EC-502	Identity and access Administrator Assocaite			√
BCS-DS-592	Azure AI Engineer Associate			√
BCA-DS-601	Programming in .NET using C#			√
BCA-DS-651	Programming in .NET using C# Lab			√
BCA-DS-652	Project based on a programming language		√	√
BCA-DS-606	Machine Learning			√
BCA-DS-603	Security of Information System		√	
BCA-DS-604	Multimedia & Animation			√
BCA-DS-605	Basics of MIS & ERP		√	
BCS-DS-692	Azure Data Scientist Associate			√
BCS-DS-693	Azure Enterprise Data Analyst Associate			√
BCA-EC-601	Information protection Administrator Associate			√
BCA-EC-602	Cyber Security Architect Expert			√
				√

Appendix B: List of courses having focus on Employability, Entrepreneurship and Skill Development

Course Code	Course Name	Employability	Entrepreneurship	Skill development

BCA-DS-154	C Programming Lab	√		√
BCA-DS-155	Database Management System Lab	√		√
BCA-DS-251	Data Structures Lab	√		√
BCA-DS-252	Internet Technology Lab	√		√
BCA-DS-351	C++ Lab	√		√
BCA-DS-354	Web Applications Development Lab	√		√
BCA-DS-356	Shell Programming Lab	√		√
BCA-DS-452	Java Lab	√		√
BCA-DS-453	Vocational Training	√		√
BCA-DS-552	Oracle Lab	√		√
BCA-DS-553	Python Programming Lab	√		√
BCA-DS-651	Programming in .Net using C# lab	√	√	√
BCA-DS-652	Project based on a programming language	√	√	√

Appendix C: List of courses and proposed activities relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability

	Environment and Sustainability	Professional Ethics	Human Values	Gender Equality
Environmental Studies CH 202B	√			
Activity on Gender Sensitization				√