SCHEME OF EXAMINATION

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SYLLABI

for

Bachelor of Computer Applications (BCA)
Scheme and Syllabus (w.e.f. AS 2021-22)

Offered by

University School of Information, Communication & Technology
GGSIPU at Affiliated Institutions of the University

**GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY**

GuruGobindSinghIndraprasthaUniversity
Sector 16C, Dwarka, Delhi – 110 078 [INDIA]
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Applicable from Batch Admitted in Academic Session 2021-22 Onwards

Approval History:

1. Scheme of study of first year, first year detailed syllabus and implementation rules approved by Board of Study of University School of Information, Communication and Technology on 31.10.2021.
2. Scheme of study, first year detailed syllabus and implementation rules approved by Academic Council Sub-committee on 22.11.2021.
3. Scheme of study, first year detailed syllabus and implementation rules approved by Academic Council on _____.
4. Scheme of study of second year, second year detailed syllabus and implementation rules approved by Board of Study of University School of Information, Communication and Technology on 10/09/22.
5. Scheme and syllabus of 3rd year approved by BoS on 24/08/2023 . And, the same approved in AC subcommittee on dt. 29/09/2023 for batch admitted in A.S. 2021 onwards.
6. 10. The marking scheme for all non-NUES papers (theory/practical) to be as:
7. 1. Teachers Continuous Evaluation: 40 marks
8. 2. Term end Theory Examinations: 60 marks
   w.e.f from the batch of A.S.: 2023-24 onwards. The syllabus remains the same. This provision was approved by the BoS on 24/08/2023. And, the same approved in AC subcommittee on dt. 29/09/2023 w.e.f. from A.S 2023-24.

Note: Year of implementation Academic Session 2021-22

Vision of the School

Create high-quality engineering professionals

Mission of the School

To serve humanity by creating professionally competent, socially sensitive engineers with high ethical values who can work as individuals or in groups in multicultural global environments.

I.   BACHELOR OF COMPUTER APPLICATIONS PROGRAMME DETAILS

1.   Aim

The programme covers rudimentary to advanced concepts in Computer Science and its applications in various domains. An exceptionally broad range of topics covering current trends and technologies in the field of information technology and computer science are included in the syllabus. The hands on sessions in Computer labs using various Programming languages and tools are also given to have a deep conceptual understanding of the topics to widen the horizon of students' self- experience.

Students, who choose BCA Programme, develop the ability to think critically, logically, analytically and to use and apply current technical concepts and practices in the core development of solutions in the multiple domains.

The knowledge and skills gained with a degree in Computer Application prepare graduates for a wide range of jobs in education, research, government sector, business sector and industry. In broader perspective the mission of teaching BCA is to produce employable IT workforce, that will have sound knowledge of IT and business fundamentals that can be applied to develop and customize solutions for various Enterprises.

2.   Programme Objectives

It is envisioned that the graduates passing out BCA degree, will achieve the following objectives and will be able to

Programme Objectives (POs)	Description
PO1	Understand the fundamental concepts of Computers, Software hardware and peripheral devices and evolution of computer technologies.
PO2	Familiarized with Business environment and Information Technology and its Applications in different domains.
PO3	Gain knowledge to identify, explain and apply functional programming and object-oriented programming techniques and use of databases to develop computer programs.
PO4	Analyze, design, implement and evaluate computerized solutions to real life problems, using appropriate computing methods including web applications.
PO5	Understand the front end and backend of software applications.
PO6	Gain expertise in at least one emerging technology.
PO7	Acquire knowledge about computer networks, network devices and their configuration protocols, security concepts at various level etc.
PO8	Apply techniques of software validation and reliability analysis to the development of computer programs.
PO9	Acquire Technical, Communication and management Skills to convey or present information, applications, instructions, policies, procedures, decisions, documentations etc. verbally as well as in writing.
PO10	Recognize the various issues related to society, environment, health and vivid cultures and understand the responsibilities to contribute in providing the solutions.
PO11	Acquire technical skills to lead a productive life in the society as a professional or as an entrepreneur.

3.   Programme Learning Outcomes

The completion of the BCA Programme shall enable a student to:

i. To design, implement, and evaluate computer-based system, process, component, or program to meet desired needs by critical understanding, analysis and synthesis

ii. Identify applications of Computer Science in other fields in the real world to enhance the career prospects

iii. Realize the requirement of lifelong learning through continued education and research.

iv. Use the concepts of best practices and standards to develop user interactive and abstract application

v. Understand the professional, ethical, legal, security, social issues and responsibilities.

The detailed list of programme learning outcomes is as follows:

PLO	Attribute	Description
PLO1	Communication Skills	The student should be able to communicate the technical information both orally and in writing professionally.
PLO2	Use of Software Tools	Create, select, adapt and apply suitable tools and technologies to a wide range of computational activities.
PLO3	Technical Skills	Acquire necessary knowledge of technical, scientific as well as basic managerial and financial procedures to analyze and solve real world problems within their work domain
PLO4	Domain Awareness	Clarity on both conceptual and application oriented skills in commerce, Finance & Accounting and it Applications in Business context.
PLO5	Technical Support	Must be able to provide technical support for various software applications.
PLO6	Analysis and investigation of Complex Computing Problems	Ability to analyze research and investigate complex computing problems through design of experiments, analysis and interpretation of data and synthesis of the information to arrive at valid conclusions.
PLO7	Design / Development of Solutions	Apply the knowledge gained in core courses to a broad range of advanced topics in computer science, to learn and develop sophisticated technical products independently.
PLO8	Imbibe Cyber Ethics	Awareness on ethics, values, sustainability and creativity aspects of technical solutions.

II.   CHOICE BASED CREDIT SYSTEM (CBCS)

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses.

1. Types of courses in Choice Based Credit System (CBCS)
1.1 Core Course: A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.
1.2 Elective Course: Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.
a)   **Discipline Specific Elective (DSE) Course:** Elective courses offered by the main discipline/subject of study are referred to as Discipline Specific Electives.
b)   **Project work/Dissertation** is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A candidate studies such a course on his own with an advisory support by a teacher/faculty member. The work done will have to be submitted in writing as a dissertation.
c)   **Generic Elective (GE) Course:** Elective courses that are generic or interdisciplinary by nature chosen from an unrelated discipline/ subject with an intention to seek exposure beyond discipline/s of choice are called Generic Electives. Students will have to choose one elective each in the third and fourth semester from the lists GE1 to GE2 given in this syllabus.

1.3 Ability Enhancement Courses (AEC): The Ability Enhancement (AE) Courses are the course that lead to Knowledge enhancement. These are of two types.
a)   **AE Compulsory Course (AECC):** Environmental Studies, English Communication/MIL Communication.
b)   **AE Elective Course (AEEC):** AEEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc. These courses / papers are to be chosen from a pool of courses designed to provide value-based and/or skill-based instruction.

III.PROGRAMME STRUCTURE

The BCA programme is a three-year course of 160 credits divided into six-semesters. A student is required to complete 150 credits for the completion of course and the award of degree.

	Academic Year	Odd Semester	Credits	Even Semester	Credits
Part – I	First Year	Semester I	26	Semester II	26
Part – II	Second Year	Semester III	27	Semester IV	27
Part – III	Third Year	Semester V	27	Semester VI	29
Total Credits – 162			80		82

Eligibility Criteria: The eligibility criteria for BCA programme for an academic session will be provided in the admission brochure (as for Academic Session (AS) 2021-22. The eligibility criteria of BCA programme for academic session 2022-23 onwards shall be as follows:

"Pass in 12th Class of 10+2 of CBSE or equivalent with a minimum of 50% marks in aggregate* with pass in English (core or elective or functional). Mathematics or (Computer Science / Informatics Practice / Computer Applications / Multimedia & Web Technology / Data Management Application / Web Application as compulsory subject of non-vocational stream with 50 theory and 50 practical ratio) or equivalent."

OR

"Three year Diploma in a branch of Engineering from a polytechnic duly approved by All India Council for Technical Education and affiliated to a recognized examining body with a minimum of 50% marks in aggregate."

Admission Criteria: Admission shall be based on the merit of the written test / Common Entrance Test Conducted by the University.

IV.INSTRUCTIONS FOR PAPER SETTERS

a)   Question Paper setter for each course must refer the instructions provided with the detailed syllabus of the specific courses.

b)   The question paper shall be preferably set from the prescribed text books and reference books, mentioned in the syllabus and should be at the level of the prescribed textbook(s).

V.CREDIT ALLOCATION (BCA PROGRAMME OF STUDY)

Course	Credits	
	Theory + Practical	**Theory + Tutorial**
	Core Course (6 credits) (12 papers)	**Core Course (4 credits) (7 papers)**
Core Course Theory 19 Papers	12x4=48	7x3=21
Core Course Practical / Tutorial* 19 Papers	12x2=24	7x1=7
Elective Course (4 Papers of 5 credits each, 5 Papers of 4 credits each and 7 Papers of 2 credits each)		
A.1. Discipline Specific Elective (4 Papers)	4x4 = 16	
A.2. Discipline Specific Elective Practical/Tutorial* (4 Papers)	1×4 = 04	
B.1. Generic Elective/ Interdisciplinary (2 Papers)		2x3 = 06
B.2. Generic Elective Practical/ Tutorial* (2 Papers)		2x1 = 02
1.Ability Enhancement Compulsory Courses(AECC) (3 Papers of 4 credit each and 1 Paper of 6 Credit including Minor & Major Project)	1x4 + 1x6= 10	2x4=8
2. Ability Enhancement Compulsory Courses(AECC) (2 Papers of 2 credit)		2x2 = 04
Skill Enhancement Courses (SEC) (5 Papers of 2 credit each)	5x2 = 10	
Co-Curricular Activities	2	
Total credit 162	**114**	**48**

*Wherever there is practical, there will be no tutorial and vice-versa.

V.   CBCS COURSE STRUCTURE FOR BCA PROGRAMME

1.   Semester wise placement of the courses

Semester	CORE COURSE (18)	Ability Enhancement Compulsory Course (AECC) (3)	Skill Enhancement Course (SEC) (2)	Elective: Discipline Specific (DSE) (5)	Elective: Generic (GE) (2)
I Total Credits 26	CC1 (4) Discrete Mathematics CC2 (4+2) Programming using 'C' Language CC3(4+2) Fundamentals of IT & Computers CC4 (4+2) Web Technologies	AECC 1 (4) Technical Communication			
II Total Credits 26	CC5 (4) Applied Mathematics CC6 (4+2) Web Based Programming CC7 (4+2) Data Structure And Algorithm Using 'C' CC8 108 (4+2) Database Management System	AECC2 (2) Environment Studies	SEC -1 (2)		
III Total Credits 27	CC9 (4) Computer Network CC10 (4) Computer Organization and Architecture CC11 (4+2) Object Oriented Programming with C++	AECC3 (2) Human Values and ethics	SEC -2 (2)	DSE- 1 (4+1)	Any course from the list GE-1(4)
IV Total Credits 27	CC12(4+2) Java Programming CC13 (4+2) Software Engineering	AECC4 (4) Introduction to Management & Entrepreneurship Development	SEC-3 (2) Personality Development Skills	DSE -2 (4+1)	Any course from the list GE-2 (4)
V Total Credits 27	CC14 (4+2) Operating System & Linux Programming CC15(4+2) Computer Graphics CC 16 (4) Cloud computing	AECC 5 Minor Project (4)	SEC-4 (2) Summer Internship	DSE -3 (4+1)	
VI Total Credits 29	CC17 (4) Datawarehousing and Data Mining CC18 (4) E-Commerce CC19 (4+2) Internet of Things	AECC 6 Major Project (6)	SEC-5 (2) Seminar/ Conference Presentation	DSE -4 (4+1)	
	NSS / NCC / Cultural Clubs / Technical Society / Technical Clubs	Mandatory (2)			

1.1 **Skill Enhancement Course 1 (SEC - 1)**
SEC 1 (choose one) Skill development course from the following
  (i)   MOOC course from SWAYAM / NPTEL of minimum 2 credits. Certificate is Mandatory for the credit acquisition.
  (ii)   Front End Design Tool VB.Net Lab
  (iii) Statistical Analysis using Excel

    (iv) Designing Lab Photoshop

SEC 2 (choose one)
- (i)   MOOC course From Swayam / NPTEL of minimum 2 credits. Certificate is Mandatory for the credit acquisition.
- (ii)   Designing Lab CorelDraw
- (iii)   ASP.Net
- (iv)   AR/VR
- (v)   Cyber Ethics

1.2   Discipline Specific Electives (DSE) (Choose any One Group of DSE)
Every institution shall offer at least to DSE groups to the students subject to conditions enumerated in this document.

DSE-A – Data Science & Analytics
1.   Basics of Python Programming
2.   Introduction to Data Science
3.   Data Visualization & Analytics
4.   Machine Learning with Python

DSE-B – Artificial Intelligence & Machine Learning
1.   Basics of Python Programming
2.   Introduction to Artificial Intelligence
3.   Machine Learning with Python
4.   Deep Learning with Python

DSE-C– Cyber Security
1.   Cyber Security
2.   Network Security
3.   Web Security
4.   IT Acts and Cyber Laws

DSE-D – Software Development
1.   Basics of Python Programming
2.   Web Development with Python
3.   Web Development with Java & JSP
4.   Mobile Application Development

1.3   Generic Elective (GE) for BCA Students

GE 1 (choose any One)
- (i)   Principles of Management & Organizational Behaviour
- (ii)   Any One Paper Offered as open elective by other School /Department / Programme to BCA students

GE 2 (choose any One)
- (i)   Digital Marketing
- (ii)   Principles of Accounting
- (iii)   Any One Paper Offered as open elective by other School / Department / Programme to BCA students

1.4 Generic (Open) Electives for other undergraduate programmes

The following Core courses of BCA programme may be offered as Generic Elective for other undergraduate programmes. Maximum number of students from other School / Department / Programme should not exceed 20% of total intake for the programme.

S.No.	Semester	Subject Code	Subject Name
1	I	BCA 105 BCA 173	Fundamentals of Computers & IT Practical – II IT Lab
2	I	BCA 107 BCA 175	Web Technologies Practical-III Web Tech Lab
3	II	BCA 108 BCA 176	Database Management System Practical – VI DBMS Lab
4	III	BCA 205 BCA 271	Object Oriented Programming using C++ Practical – VI C++ Lab
5	III	BCA 211	Basics of Python Programming
6	VI	BCA 304	E-Commerce

SEMESTER WISE EAMINATION SCHEME

Based on the above-mentioned course categories the semester wise Evaluation scheme of BCA Programme will be as follows:

FIRST SEMESTER EXAMINATION

Code No.	Paper	Course Category	L	T/P	Credits	Marks Internal	Marks External	Max Marks
Core Course Theory								
BCA 101	Discrete Mathematics	Core Course Theory	3	1	4	25	75	100
BCA 103	Programming Using 'C' Language	Core Course Theory	3	1	4	25	75	100
BCA 105#	Fundamentals of Computers & IT	Core Course Theory	3	1	4	25	75	100
BCA 107#	Web Technologies	Core Course Theory	3	1	4	25	75	100
Ability Enhancement Compulsory Course (AECC)								
BCA 109	Technical Communication	AECC	3	1	4	25	75	100
Core Course Practicals								
BCA 171	Practical – I 'C' Prog. Lab	Core Course Practical	0	4	2	40	60	100
BCA 173#	Practical – II IT Lab	Core Course Practical	0	4	2	40	60	100
BCA 175#	Practical-III Web Tech Lab	Core Course Practical	0	4	2	40	60	100
Bridge Course (Mandatory for Students from Non Mathematics background)								
BCA 181[+]	Bridge Course in Mathematics	Mandatory for Students from Non Mathematics background	2	0	0	Pass Grade	------	------
	Total Credits				**26**			**800**

[+] **Non Credit subject mandatory for the students who do not have mathematics in 12th Std. The student has to obtain at least 40 marks. The examination of this paper shall be conducted by the concerned teacher teaching the course / paper as Teacher's Continuous Evaluation for total 100 marks. Only the pass or fail status is to be specified on the marksheet of examination and the result of the student. Passing in this paper is mandatory for the student.**

 # Generic Elective (GE) for other undergraduate programmes

TOTAL MARKS: 800

THIRD SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal (T/P)	Marks External Th	Marks External Pr	Max Marks (T/P)
Core Course Theory									
BCA 201	Computer Network	Core Course Theory	3	1	4	25	75	0	100
BCA 203	Computer Organization and Architecture	Core Course Theory	3	1	4	25	75	0	100
BCA 205#	Object Oriented Programming with C++	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC) - Theory									
BCA-207	Human Values and Ethics	AECC	2	0	2	25	75	0	100
***Discipline Specific Elective (Choose any One) (Theory/Practical)**									
BCAT 211T#	Basics of Python Programming	DSE-1	4	0	4	25	75	0	100
BCAP 211#	Basics of Python Programming Lab	DSE-1	0	2	1	40	0	60	100
BCAT 213	Cyber Security	DSE-1	4	0	4	25	75	0	100
BCAP 213	Cyber Security Lab.	DSE-1	0	2	1	40	0	60	100
****Generic Elective (Choose any One) (Theory/Practical)**									
BCA 221	Principles of Management & Organizational Behaviour	GE-1	3	1	4	25	75	0	100
BCA 223	Open Elective offered by other Department/School /programme	GE-1	3	1	4	25	75	0	100
*****Skill Enhancement Course (AEEC) (Choose any One)**									
BCA 231	****MOOC course from SWAYAM / NPTEL	SEC-2	0	0	2	100	0	0	100
BCA 233	Designing Lab CorelDraw	SEC-2	0	4	2	100	0	0	100
BCA 235	ASP.Net	SEC-2	0	4	2	100	0	0	100
BCA 237	AR/VR	SEC-2	0	4	2	100	0	0	100
BCA 239	Cyber Ethics	SEC-2	2	0	2	100	0	0	100
Core Course Practical									
BCA 271#	Practical – VII C++ Lab #	Core Course Practical	0	4	2	40	0	60	100
	Total				**27**				**900**

 # Generic Elective (GE) for other undergraduate programmes
* First Subject from Discipline specific chosen group
** Choose one subject from list of GE-1
*** NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute), that is the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment.

**Instructions for MOOC course

1. MOOC Course should be done from SWAYAM/NPTEL as per the guidelines of UGC.
2. For securing the credits, the student is required to complete the assessment of the course and to provide the certificate of the course done from SWAYAM/NPTEL.
3. The fees (if any) for the registration and/or assessment of the MOOC course must be borne by the student only.
4. If the student secures more than 2 credits for the MOOC Course even then 2 credits shall be considered for this subject and the grade/marks provided by assessing authority shall be transferred to the university by the institution where the student is studying. The result of the MOOC courses shall be taken on record by the University's Examination Division and a result declared for these papers. The student must submit the result of such papers to their respective institutions. All results for the MOOC's course may be submitted before the completion of other requirements including credit requirements.
5. If the student secures more than 2 credits for the MOOC Course even then 2 credits shall be considered for this subject and the grade/marks provided by assessing authority shall be transferred to the university.

FOURTH SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External Th	Marks External Pr	Max Marks
Core Course Theory									
BCA 202	Java Programming	Core Course Theory	3	1	4	25	75	0	100
BCA 204	Software Engineering	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 206	Introduction to Management & Entrepreneurship Development	AECC	3	1	4	25	75	0	100
***Discipline Specific Elective (Choose any One)**									
BCAT 212	Introduction to Data Science	DSE-2	4	0	4	25	75	0	100
BCAP 212	Introduction to Data Science Lab.	DSE-2	0	2	1	40	0	60	100
BCAT 214	Introduction to Artificial Intelligence	DSE-2	4	0	4	25	75	0	100
BCAP 214	Introduction to Artificial Intelligence Lab.	DSE-2	0	2	1	40	0	60	100
BCAT 216	Network Security	DSE-2	4	0	4	25	75	0	100
BCAP 216	Network Security Lab.	DSE-2	0	2	1	40	0	60	100
BCAT 218	Web Development with Python and Django	DSE-2	4	0	4	25	75	0	100
BCAP 218	Web Development with Python and Django Lab.	DSE-2	0	2	1	40	0	60	100
****Generic Elective (Choose any One)**									
BCA 222	Digital Marketing	GE-2	3	1	4	25	75	0	100
BCA 224	Principles of Accounting	GE-2	3	1	4	25	75	0	100
BCA 226	Open Elective offered by other Department/ School /programme	GE-2	3	1	4	25	75	0	100
*****Skill Enhancement Course (AEEC)**									
BCA 232	Personality Development Skills	SEC-3	2	0	2	100	0	0	100
Core Course Practical									
BCA 272	Practical –XII Java Lab	Core Course Practical	0	4	2	40	0	60	100
BCA 274	Practical – IX SE Lab	Core Course Practical	0	4	2	40	0	60	100
	Total				**27**				**800**

* **Second Subject from Discipline specific chosen group**
** **Choose one subject from list of GE-2**
*** **NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute), that is the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment.**

Summer Training will be held for 4 weeks after the end of fourth semester.
Viva-Voce will be conducted in fifth semester.
TOTAL MARKS: 800

FIFTH SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External		Max Marks
							Th	Pr	
Core Course Theory									
BCA 301	Operating System & Linux Programming	Core Course Theory	3	1	4	25	75	0	100
BCA 303	Computer Graphics	Core Course Theory	3	1	4	25	75	0	100
BCA 305	Cloud Computing	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 307	Minor Project	AECC	0	8	4	40	0	60	100
***Discipline Specific Elective (Choose any One)**									
BCAT 311	Machine Learning with Python	DSE-3	4	0	4	25	75	0	100
BCAP 311	Machine Learning with Python Lab.	DSE-3	0	2	1	40	0	60	100
BCAT 313	Web Security	DSE-3	4	0	4	25	75	0	100
BCAP 313	Web Security Lab.	DSE-3	0	2	1	40	0	60	100
BCAT 315	Web Development with Java & JSP	DSE-3	4	0	4	25	75	0	100
BCAP 315	Web Development with Java & JSP Lab.	DSE-3	0	2	1	40	0	60	100
Skill Enhancement Course (AEEC)									
BCA 331	**Summer Training Project	SEC-4	0	0	2	100	0	0	100
Core Course Practical									
BCA 371	Practical – X Linux - OS Lab	Core Course Practical	0	4	2	40	0	60	100
BCA 373	Practical – XI CG Lab	Core Course Practical	0	4	2	40	0	60	100
	Total				**27**				**800**

* **Third Subject from Discipline specific chosen group**
** **NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute), that is the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment.**

TOTAL MARKS: 800

SIXTH SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External Th	Marks External Pr	Max Marks
Core Course Theory									
BCA 302	Data Ware Housing & Data Mining	Core Course Theory	3	1	4	25	75	0	100
BCA 304#	E- Commerce	Core Course Theory	3	1	4	25	75	0	100
BCA 306	Internet of Things	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 308	***Major Project	AECC	----	12	6	40	0	60	100
*Discipline Specific Elective (Choose any One)									
BCAT 312	Data Visualization & Analytics	DSE-4	4	0	4	25	75	0	100
BCAP 312	Data Visualization & Analytics Lab.	DSE-4	0	2	1	40	0	60	100
BCAT 314	Deep Learning with Python	DSE-4	4	0	4	25	75	0	100
BCAP 314	Deep Learning with Python Lab.	DSE-4	0	2	1	40	0	60	100
BCA 316	IT Act and Cyber Laws	DSE-4	4	1	5	25	75	-	100
BCAT 318	Mobile Application Development	DSE-4	4	0	4	25	75	0	100
BCAP 318	Mobile Application Development Lab.	DSE-4	0	2	1	40	0	60	100
**Skill Enhancement Course (AEEC)									
BCA 332	Seminar/ Conference Presentation	SEC – 5	0	0	2	100	0	0	100
Core Course Practical									
BCA 372	Practical – XII IOT Lab	Core Course Practical	0	4	2	40	0	60	100
BCA374	NSS / NCC / Cultural clubs / Technical Society / Technical club$	Mandatory	-	-	2	100	0	0	100
	Total				**29**				**800**

***Fourth Subject from Discipline specific chosen group**
** NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute), that is the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment. Evaluation will be based on the presentation on any latest technology/research article in in-house/external seminar/conference and will be conducted by the college committee only.
*** The student shall do the Major project in the Discipline Specific Area/Curriculum based subject /any emerging technology.
 # Generic Elective (GE) for other undergraduate programmes
$NUES : Comprehensive evaluation of the students by the concerned coordinator of NCC / NSS / Cultural Clubs / Technical Society / Technical Clubs, out of 100 as per the evaluation schemes worked out by these activity societies, organizations at the institution / University level; the co-ordinators shall be responsible for the evaluation of the same. These activities shall start from the 1st semester and the evaluation shall be conducted at the end of the 6th semester for students admitted in the first semester.
Note: Any Elective Subject will be offered if minimum 1/3 rd of the total strength of students in the class will opt for it.

Detailed Syllabus of 1st Year

Course Code: BCA 101   **L T C**
Course Name: Discrete Mathematics   **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.

3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

The objective of this course is to provide the learners with the following:
1. Knowledge about sets, relations and functions.
2. Make them familiar with basics of lattices and graphs.
3. Understanding of the concept of propositional logic.
4. Acquiring the insight of combinatorics and recurrence relations

PRE-REQUISITES: Basic Concepts of Mathematics

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Understand the basics conceptual math and relations.	BTL2	PO1, PO2, PO3, PO4
CO2	Understand and apply partial order and recurrence relation and their operations.	BTL3	PO1, PO2
CO3	Compare and design, sorting and hashing techniques.	BTL4	PO1, PO2, PO3, PO4,PO5
CO4	Appraise and determine the correct logic and solutions for any given real world problem.	BTL5	PO1, PO2, PO3, PO4, PO5

UNIT I

No. of Hours: 13 Chapter/Book Reference: TB1 [chapters 1, 2, 7], TB2 [chapters 1, 2, 4, 5], TB3 [chapters 1, 4]

SETS: Sets, Subsets, Equal Sets, Universal Sets, Finite and Infinite Sets, Operations on Sets: Union, Intersection difference and Complements of Sets, Algebra of sets, Cartesian product, Simple applications.

RELATION AND FUNCTIONS: Properties of Relations, Equivalence Relation, Partial Order Relation, Composition of relations, and Representation of relations using digraph and Matrix, Function: Domain and Range, onto, into and One to One Functions, Composite and Inverse Functions, Hashing functions, Recursive function.

PROPOSITIONAL LOGIC: Introduction, Proposition, First order logic, Basic logical operations, truth tables, tautologies, contradictions, Algebra of Propositions, logical implications, logical equivalence, predicates, Universal and existential quantifiers.

UNIT II

No. of Hours: 10 Chapter/Book Reference: TB2 [chapter 6] TB 3 [Chapter 6]

PARTIAL ORDER RELATIONS AND LATTICES: Partial Order Sets, Totally ordered set, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal elements, Greatest lower bound, least upper bound, Lattices and Algebraic Structure, Principle of Duality, Elementary Properties of Lattices, Atoms. Sub lattices, Bounded lattice, Distributed & Complemented Lattices, Isomorphic lattices. Boolean lattice.

UNIT- III
No. of Hours: 11 Chapter/Book Reference: TB1 [chapters 5, 6], TB2 [chapter 3], TB3 [chapters 2, 3],

COMBINATORICS: Introduction, Basic Counting Principles, Permutations, Permutations of things not all different, Circular Permutations, Combinations, Restricted Permutations and Combinations, Derangement, Pascal's Triangle, Binomial Theorem (only for natural Numbers)

RECURRENCE RELATIONS: Introduction, Order of Recurrence Relations, Degree of Recurrence Relations, Linear Homogeneous Recurrence Relations, Non Homogeneous Recurrence Relations, Solution of linear homogeneous and non-non homogeneous recurrence relations.

UNIT -IV
No. of Hours: 10 Chapter/Book Reference: TB1 [chapter 8], TB2 [chapter 8], TB3 [chapter 8]

GRAPHS: Introduction, Degree of a vertex of a graph, Handshaking Theorem, types of Graphs, sub graph, Matrix representation of a graph: adjacent and incidence matrices, Isomorphic graphs, path and circuit (Floyd's and Warshall algorithms), Connected graph, Hamiltonian graph, Euler graph, Graph coloring (Vertex, Edges and Map).

TEXT BOOKS:
TB1.   Rosen, K.H., Discrete Mathematics and its Applications, McGraw Hill Education, 8th edition 2021,
TB2. Kolman, Busby and Ross, "Discrete Mathematical Structures", Pearson, 10th edition 2015
TB3. Babu Ram, "Discrete Mathematics", Pearson Education, 1st edition 2010

REFERENCE BOOKS:
RB1.   D. S. Malik, M. K. Sen, "Discrete Mathematics" Cengage Learning, 2012
RB2. S.K. Sarkar "A Text Book of Discrete Mathematics" S. Chand Publications, 9th edition 2019
RB3. Singh J. P. "Discrete Mathematics for Undergraduates" ANE Books, 1st edition, 2013
RB4. Tremblay J.P. and Manohar, R., "Discrete Mathematical Structures with Applications to Computer Science" Tata McGraw Hill

Course Code: BCA103	L T C
Course Name: Programming Using 'C' Language	**3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.

3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

This course will provide the learners the following:-

1. Understanding of the syntax and the semantics of C programming language
2. Building of their logics for solving a given problem.

PRE-REQUISITES: None

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Develop programming skills by learning the fundamentals of structured programming using C Language.	BTL2	PO1, PO2, PO3
CO2	Design and develop programs using arrays, storage classes, functions and to understand memory management through pointers	BTL3	PO1, PO2, PO3
CO3	Critically analyze real world problems using structures, unions and develop applications for handling text and binary files.	BTL5	PO1, PO2, PO3, PO4, PO5
CO4	Explore the use of command line arguments, string manipulation and standard libraries.	BTL5	PO1, PO2, PO4,

UNIT – I

No. of Hours: 12 Chapter/Book Reference: TB1 [1,2,3,4,5,6,7]; TB2 [1,2,3,4,5,6,7]; TB3 [1,2,3,4,5,6]

C basics: C character set, Identifiers and keywords, Data types, constants, symbolic constants, variable declarations, structure of basic C program, writing and executing the first C program, #include Preprocessor directive, expression statements, compound statements, operators: Arithmetic, Unary, Relational, logical, assignment, shorthand assignment, conditional and bitwise, comma operator.

C control structures: if statement, if….else statement, else if ladder, while, do….while, for, and switch statement, nested control structure, break, labelled break, continue, labelled continue statement, exit statement, goto statement.

UNIT II

No. of Hours: 13 Chapter/Book Reference: TB1 [8,9,10,13,14]; TB2 [8,9,10,12]; TB3 [7,8, 9,10,11,12]

C Functions: Functions: declaration, definition & scope, recursion, call by value, call by reference. Preprocessor directive: #define, macros with arguments, nested macros, # and ## operators, conditional compilation.

Storage Classes: automatic, external (global), static & registers. Arrays: Arrays (1D, 2D), strings, pointers, array & pointer relationship, pointer arithmetic, dynamic memory allocation, pointer to arrays, array of pointers, pointers to functions, array of pointers to functions.

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1 [17,19,20,21]; TB2 [11,13,14]; TB3 [13,14,16]

Structures: Structures, unions, Enumeration, passing structure to functions, arrays and structures, typed of, difference between structure and union, self-referential structure, bit fields.

File handling [text (ASCII), binary]: file input output operations, file access modes, file pointers, file Positioning functions (fseek, ftell, rewind etc.)

UNIT – IV

No. of Hours: 08 Chapter/Book Reference: TB1 [15,22]; TB2 [9]; TB3 [8]

Standard library functions from stdio.h, stdlib.h, conio.h, ctype.h, math.h, string.h, process.h., Usage of command line arguments.

TEXT BOOKS:

TB1. Yashwant Kanetkar, "Let us C" 17th edition, 2020.
TB2. E. BalaGuruswamy, "Programming in ANSI C", 8th edition, 2019.
TB3. Ashok N. Kamthane, "Programming in C", Pearson Education, 3rd Edition, 2015

REFERENCE BOOKS:

RB1. K R Venugopal, Sudeep R Prasad, "Mastering C", McGraw Hill Education; 2nd edition, 2017
RB2. V Rajaraman , "Computer Programming in C", 2nd Edition, 2019
RB3. Kernighan and d. Ritchie, "The ANSI C Programming Language", 2015
RB4. Stephen Prata, "C Primer Plus" 6th Edition, 2014
RB5. Schaum's Outline Series, "Programming with C", 4th Edition, 2018
RB6. Reema Thareja, Programming In C" , Oxford University Press, September 2018

Course Code: BCA 105   **L T C**
Course Name: Fundamentals of Computers and IT   **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.

3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

The objectives of this course is to provide the learners:

1. Awareness of evolution of Computers, various types of computers its characteristics, usage, and limitations.
2. Identification of different categories of computers, their peripherals and memory.
3. Knowledge about operating system, their types, MS-Office various software.
4. Understanding of computer network fundamentals and various communication networks.
5. Overview of emerging technologies in IT i.e. AI and Machine Learning, IOT, Data Analytics etc.

PRE-REQUISITES: None

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Describe computer with its characteristics, its usage, limitations and benefits, Computer Memories and its type, Software and its type	BTL2	PO1, PO2, PO3
CO2	Acquire knowledge about Number Systems, various computer languages and operating system DOS	BTL2	PO1, PO2, PO3
CO3	Attain skills in Application Software used for word processing, spreadsheet and presentation	BTL4	PO1
CO4	Understand network fundamentals and various communication network, Advance trends in IT	BTL3	PO1, PO2, PO3, PO4, PO5

UNIT – I

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters:1,2,7,8,9], TB2:[Chapters:1,2,3,4];RB1[Chapters:6,7], RB3[Chapters:1a,1b,2a,2b,4a,5a],

Fundamentals of Computers:
Definition and Characteristics of Computer System. Computer Generation from First Generation to Fifth Generation. Classifications of Computers: Micro, Mini, Mainframe and super computers.

Computer Hardware: Major Components of a digital computer, Block Diagram of a computer, Input-output devices, Description of Computer Input Units, Output Units, CPU.

Computer Memory: Memory Hierarchy, Primary Memory – RAM and its types, ROM and its types, Secondary Memory, Cache memory. Secondary Storage Devices - Hard Disk, Compact Disk, DVD, Flash memory.

UNIT – II

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters: 10,12,14]; TB2 [Chapters:6,7]; RB1[Chapters:6A, 6B, 12A,12B], RB3 [Chapters: 8, 9]
Interaction with Computers:

Computer Software: System software: Assemblers, Compilers, Interpreters, linkers, loaders. Application Software: Introduction to MS Office (MS-Word, MS Power point, MS-Excel).

Operating Systems: Elementary Operating System concepts, Different types of Operating Systems. **DOS:** Booting sequence; Concepts of File and Directory, Types of DOS commands.

Computer Languages: Introduction to Low-Level Languages and High-Level Languages.

UNIT – III

No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters:3,5,4]; TB2 [Chapters:5]; RB1[Chapter:2]

Computer Number System: Positional and Non-positional number systems, Binary, Decimal, Octal and Hexadecimal Number Systems and their inter-conversion.

Binary Arithmetic: Addition, subtraction, multiplication and division. Use of complement method to represent negative binary numbers, 1's complement, 2's complement, subtraction using 1's complement and 2's complement. Introduction to Binary Coded Decimal (BCD), ASCII Codes, EBCDIC codes.

UNIT – IV

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters:17,18]; TB2 [Chapters:9,10]; RB3[7A,7B,8A,8B]

Computer Network & Internet: Basic elements of a communication system, Data transmission modes, Data Transmission speed, Data transmission media, Digital and Analog Transmission, Network topologies, Network Types (LAN, WAN and MAN), Basics of Internet and Intranet.

Internet: Terminologies related to Internet: Protocol, Domain name, Internet Connections, IP address, URL, World Wide Web. Introduction to Client-Server Model, Search Engine, Voice over Internet Protocol (VOIP), Repeater, Bridge, Hub, Switch, Router, Gateway, Firewall, Bluetooth technology.

Advanced Trends in IT Applications – Brief Introduction to Cloud Computing, Internet of Things, Data Analytics, AI and Machine Learning.

TEXT BOOKS:

TB1.   P. K. Sinha & Priti Sinha, "Computer Fundamentals", BPB Publications, 1992.
TB2.   Anita Goel "Computer Fundamentals", Pearson.

REFERENCE BOOKS:

RB1.   B.Ram Computer fundamentals Architecture and Organization, New Age Intl.
RB2.   Alex Leon & Mathews Leon, "Introduction to Computers", Vikas Publishing.
RB3.   Norton Peter, "Introduction to computers", 4th Ed., TMH, 2001.
RB4.   Vikas Gupta, "Comdex Computer Kit", Wiley Dreamtech, Delhi, 2004.

Course Code: BCA 107   **L T C**
Course Name: Web Technologies   **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.

3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
The objective of this course is to provide the learners the following:

1. Knowledge about the semantic structure of HTML, Javascript, CSS, XML and bootstrap.
2. Ability to compose forms and tables using HTML, Javascript, CSS and Bootstrap.
3. Expertise to design static web pages
4. Skills to create dynamic user interface and perform Client-Side validations using JavaScript

PRE-REQUISITES: None

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Develop static web pages through HTML, JavaScript, CSS and Bootstrap.	BTL6	PO4, PO5
CO2	Implement different constructs and programming techniques provided by JavaScript.	BTL3	PO4, PO8
CO3	Adapt HTML, Javascript, CSS and Bootstrap syntax and semantics to build web pages.	BTL1, BTL2	PO4
CO4	Develop Client-Side Scripts using JavaScript to display the contents dynamically	BTL3, BTL6	PO4,PO5

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters: 1-3]; TB2 [Chapters: 2]; TB3 [Chapters: 1-4]

World Wide Web: Introduction, Web page, Home page, Web site, Static and Dynamic website, Client Server computing concepts. Web Client and Web Server, Web Browser, Client Side and server side Scripting Languages.
HTML Overview: Introduction to HTML, HTML Document structure tags, HTML comments, Text formatting, inserting special characters, anchor tag, adding images and Sound, lists types of lists, tables, frames and floating frames, Developing Forms, Image maps.

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters: 4-5]; TB2 [Chapters: 3-5]; TB3 [Chapters: 5-12]; TB4 [Chapters 1-3]

Cascading Style Sheet: Types of Style Sheets – Internal, inline and External style sheets, creating styles, link tag, CSS Properties, CSS Styling, Style Selector- Id, class name and Pseudo Class.
BootStrap Basics: Introduction to Bootstrap, Responsive web design, Linking with Bootstrap, container class, grids, tables, images, buttons, typography classes, jumbotron, glyphicons,

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UNIT – III

No. of Hours:11 Chapter/Book Reference: TB1 [Chapters: 4-5]; TB2 [Chapters: 3-5]; TB3 [Chapters: 5-12]

Introduction to Java Script: Data Types, Control Statements, operators, dialog boxes, Built in and User Defined Functions, Objects in Java Script, Handling Events, basic validations, Document Object Model, Browser Object Model.

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters]; TB2 [Chapter: 7, 9]; TB3 [Chapter: 1]

XML: Introduction, Features, XML Naming rules, Building block of XML Document, Difference between HTML & XML, XML Parser, DTD's Using XML with HTML and CSS.
Web Hosting Concepts: Concept of domain- Physical domain, virtual domain, registering a domain, need of IP addressing, Web Hosting and Publishing Concepts

TEXT BOOKS:

TB1. The complete reference HTML and CSS, by Thomas A powell, TMH publication.
TB2. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson
TB3. Internet and World Wide Web Deitel HM, Deitel ,Goldberg , Third Edition.
TB4. Bootstrap: Responsive Web development, Jake Spurlock, O'reilly, First Edition

REFERENCE BOOKS:

RB1. HTML Black Book , Stephen Holzner, Wiley Dreamtech.
RB2. Rajkamal, "Web Technology", Tata McGraw-Hill, 2001.
RB3. Jeffrey C. Jackson, "Web Technologies : A Computer Science Perspective", Pearson.
RB4. XML How to Program by Deitel Deitel Nieto.

Course Code: BCA 109   **L T C**
Course Name: Technical Communication   **3 1 4**

> **INSTRUCTIONS TO PAPER SETTERS:**
> 1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
> 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
> 3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
This course will provide the learners the following:
1. Understanding of the correct use of English Language.
2. The student will improve in oral as well as written communication skills.

PRE-REQUISITES: Nil

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	The student will become familiar with the basics of communication and its importance in the organizational world.	BTL1	PO9, PO11
CO2	To improve the business writing skills also will become well aware how to write effective resume to enter the global world.	BTL2 & 3	PO9, PO11
CO3	To improve the listening skills by knowing well how to negotiate and give effective presentations.	BTL5	PO9, PO11
CO4	To make use of effective business language and give a professional look to oneself.	BTL6	PO9, PO11

UNIT – I

No. of Hours: 10 Chapter/Book Reference: TB1, TB2, TB3, TB4

Concepts and Fundamentals: Introduction to Technical Communication, Need and importance of communication, channel, Distinction between general and technical communication, nature and features of technical communication, Seven Cs of communication, Types of Technical communication, style in technical communication, technical communication skills, Language as a tool of Communication, History of development of Technical Communication, Computer Aided Technical Communication

UNIT-II

No. of Hours: 12 Chapter/Book Reference: TB1, TB2, TB3

Oral Communication: Principles of effective oral communication, Introduction of Self and others, Greetings, Handling Telephone Calls Interviews**:** Meaning & Purpose, Art of interviewing, Types of interview, Interview styles, Essential, Techniques of interviewing, Guidelines for Interviewer, Guidelines for interviewee. Meetings**:** Definition, Kind of meetings, Agenda, Minutes of the Meeting, Advantages and disadvantages of meetings/ committees, Planning and organization of meetings. Project Presentations: Advantages & Disadvantages, Executive Summary, Charts, Distribution of time (presentation, questions & answers, summing up), Visual presentation, Guidelines for using visual aids, Electronic media (power-point presentation). The technique of conducting Group Discussion and JAM session.

UNIT-III

No. of Hours: 12 Chapter/Book Reference: TB1, TB2, TB3, TB4

Written Communication: Overview of Technical Writing: Definition and Nature of Technical Writing, Basic Principles of Technical Writing, Styles in Technical Writing,
Note – Making, Notice, E-mail Writing
Writing Letters: Business letters, Persuasive letters- Sales letters and complaint letters
Office memorandum, Good news and bad news letters
Report Writing**:** Definition & importance; categories of reports, Elements of a formal report, style and formatting in report
Special Technical Documents Writing: Project synopsis and report writing, Scientific Article and Research Paper writing, Dissertation writing: Features, Preparation and Elements
Proposal Writing: Purpose, Types, characteristics and structure
Job Application**:** Types of application, Form & Content of an application, drafting the application, Preparation of resume.

UNIT-IV

No. of Hours: 10 Chapter/Book Reference: TB3, RB1, RB3

Soft Skills: Business Etiquettes – Professional Personality, Workplace Protocols, Cubicle.
Non-Verbal Communication: Kinesics and Proxemics, Paralanguage
Interpersonal Skills
Language Skills: Improving command in English, improving vocabulary, choice of words, Common problems with verbs, adjectives, adverbs, pronouns, tenses, conjunctions, punctuations, prefix, suffix, idiomatic use of prepositions. Sentences and paragraph construction, improve spellings, common errors and misappropriation, Building advanced Vocabulary (Synonyms, Antonyms), introduction to Business English.

TEXTBOOKS:

TB1. Kavita Tyagi and Padma Misra , "Advanced Technical Communication", PHI, 2011
TB2. P.D.Chaturvedi and Mukesh Chaturvedi, "Business Communication – Concepts, Cases and Applications", Pearson, second edition.
TB3. Rayudu, "C.S- Communication", Himalaya Publishing House, 1994.
TB4. Asha Kaul , "Business Communication", PHI, second edition.

REFERENCES:

RB1. Raymond Murphy, "Essential English Grammar- A self study reference and practice book for elementary students of English" , Cambridge University Press, second edition.
RB2. Manalo, E. & Fermin, V. (2007). Technical and Report Writing. ECC Graphics. Quezon City.
RB3. Kavita Tyagi and Padma Misra , "Basic Technical Communication", PHI, 2011.
RB4. Herta A Murphy, Herbert W Hildebrandt and Jane P Thomas, "Effective Business Communication", McGraw Hill, seventh edition.

			L	**T/P**	**C**
Course Code: BCA 171			**0**	**4**	**2**
Course Name: Practical -1 'C' Prog. Lab					

LEARNING OBJECTIVES:
This course will provide the learners the following:-
1. Understanding of the syntax and the semantics of C programming language
2. Building of their logics for solving a given problem.

PRE-REQUISITES: None

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Develop programming skills by learning the fundamentals of structured programming using C Language.	BTL3	PO1, PO2, PO3
CO2	Design and develop programs using arrays, storage classes, functions and to understand memory management through pointers	BTL4	PO1, PO2, PO3
CO3	Critically analyze real world problems using structures, unions and develop applications for handling text and binary files.	BTL5	PO1, PO2, PO3,PO4, PO5
CO4	Explore the use of command line arguments, string manipulation and standard libraries.	BTL5	PO1, PO2, PO4,

List of Practicals		
S. No.	**Detailed Statement**	**Mapping to CO #**
Core Practicals (Implement minimum 8 out of 10 practical)		
1.	Write a program to convert temperature from Celsius to Fahrenheit by taking input from the user.	CO1
2.	Write a program to find the greatest number among 3 numbers given by the user.	CO1
3.	Write a program to check if a given number is a prime number or not.	CO1
4.	Write a program to display the following pattern upto N rows, taking the value of N from the user: 1 2 3 4 5 6 7 8 9 10	CO1
5.	Write a program to input marks of 50 students using an array and display the average marks of the class.	CO2
6.	Write a program to search for a number entered by the user in a given array and display the array in ascending order.	CO2
7.	Write a program to check if a string is palindrome or not.	CO2
8.	Write a program to add, subtract, multiply and divide two numbers using pointers.	CO2
9.	Write a program to create a structure for employees containing the following data members: Employee ID, Employee Name, Age, Address, Department and Salary. Input data for 10 employees and display the details of the employee from the employee ID given by the user.	CO3
10.	Write a program to create two files with names EvenFile and OddFile. Input 20 numbers from the user and save even numbers in EvenFile and odd numbers in OddFile.	CO3
Application Based Practicals (Implement minimum 5 out of 10 practical)		
11.	Write a menu driven program to construct a calculator for following arithmetic operations: addition, subtraction, multiplication, division, average and	CO1

	percentage.	
12.	Write a menu driven program to perform the following operations: (i) Print armstrong numbers upto N, (ii) Display prime numbers between 1 to N, (iii) Reverse of an integer	CO1
13.	Write a program to convert a hexadecimal number into a binary number.	CO1
14.	Write a program to calculate factorial of a number and display fibonacci series upto N terms using recursive functions.	CO2
15.	Write a program to perform matrix addition, (ii) matrix multiplication, and (iii) Matrix transpose) on 2D arrays.	CO2
16.	Write a program to make use of arrays with structures in the following ways: (i) Use array as a structure data member (ii) Create array of structure variables	CO3
17.	Write a program to compare the contents of two files by taking names of the files through command line arguments.	CO3, CO4
18.	WAP to perform I/O and make use of file positioning functions on Binary files. (using fseek, ftell, rewind functions)	CO4
19.	Write a menu driven program to implement the following string operations: (i) Calculate length of a string (ii) Concatenate at the end of a given (iii) Copy one string to another (iv) Compare contents of two strings (v) Copy nth character string to another	CO4
20.	Write a program to read time in string format and extract hours, minutes and second also check time validity	CO4
Note: **1. In total 15 practical to be implemented. 2 additional practical may be given by the course instructor.** **2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**		

Course Code: BCA 173	**L**	**T/P**	**C**
Course Name: Practical – II IT Lab	0	4	2

LEARNING OBJECTIVES:
The objective of this course is to provide the learners :
1. Basic knowledge of computers Software and Hardware
2. Expertise in using DOS Commands.
3. Attain proficiency in using application software for Word Processing, Spreadsheet and Presentation.

PRE-REQUISITES: Nil

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Work with basic DOS Commands and Windows Explorer.	BT3	PO1, PO2
CO2	Create Word Documents using advanced features of MS Word.	BT3	PO1,PO2
CO3	Create Worksheet using advanced features of MS Excel.	BT3	PO1,PO2
CO4	Create interactive Presentation using advanced features of MS Power-point.	BT3	PO1, PO2
List of Practicals			
S. No.	Detailed Statement		Mapping to CO #
Core Practicals (Implement minimum 10 out of 15 practical)			
1.	To explore the System settings - Personalisation, System, Devices, Apps, Network & Internet.		CO1
2.	To practice basic DOS commands like cd, md, dir, erase, cls, copy, date etc.		CO1
3.	To explore Windows Explorer functionalities like create, rename, move, delete folder and files etc.		CO1
4.	To practice the use of basic formatting features - Format Painter, Indentation, Line spacing, background color, find, replace, dictate commands.		CO2
5.	To practice the use of Bullets, numbering, multilevel lists and use of Table Feature-Insert table with rows and columns, draw tables, excel spreadsheet and quick tables etc.		CO2
6.	To practice the use of Insert Features – add picture, Chart, SmartArt, WordArt, Equation, Symbols, Header and Footer, Page Numbering etc. and the use of Design Features – Watermark, Page color, Page Border, Themes implementation etc.		CO2
7.	To practice the use of Layout Features – Margins, Orientation, Size, Columns, Indent, Spacing etc.		CO2
8.	To practice the use of Mail Merge Feature to generate Envelops and Labels.		CO2
9.	To practice the use of Excel basic formatting features – Wrap Text, Insert and Delete (Cells, Sheet, Row or Column), Format – Cell Height, Cell Width, Hide, Un Hide Cell, Protection, Freeze and Unfreeze panes, Macros etc.		CO3
10.	To practice the use of Insert Features- Pivot Table, Pivot Chart, Picture, Chart and its formatting and Design and the use of Page Layout Features- Margins, Orientation, Page Break , Background, Height and Width of Cells.		CO3
11.	To practice the use of Formula Features – user defined function, predefined functions – Logical, Date, Time, Maths and the use of Data Manipulation Features – Sort, Filter, Advanced Filters, Whatif analysis.		CO3
12.	To practice the creation of Blank presentation and Selecting Themes and the use of the basic design features – Adding New Slides, Reuse slides, Slides layout etc.		CO4

13.	To practice the use of Insert Features – add pictures, screenshots, shapes, wordart, audio, video, date-time etc. and use of Design Features- Changing the theme of presentation, format background and design ideas.	CO4
14.	To practice the use of Transition features to be applied on Slides content, setting sound, duration etc. and the use of Animation Features to be applied on presentation of Slide, set animation timings and rehearse etc.	CO4
15.	To practice the use of Slide Show Features – Custom Slide Show, Rehearse Timing etc.	CO4
Application Based Practicals (Implement minimum 5 out of 8 practical)		
16.	Create a Folder by your name in your system, store all the work done in this semester inside that folder.	CO1
17.	Create your Resume using basic formatting features like : table, bullets, wordart etc	CO2
18.	Design an Invitation to Birthday Party using mail merge features send the invitation to 10 friends.	CO2
19.	Write an Article for Magazine with 3 columns and hyperlink.	CO2
20.	Create your own marksheet using basic formatting features.	CO3
21.	Create a list of marks of 10 students create charts and pivot table.	CO3
22.	Prepare a Sales summary and use features like sort, filter etc. to manipulate the data.	CO3
23.	Create a Power Point Presentation on any topic of your choice using animation and transition features.	CO4
Note: **1. In total 15 practical to be implemented. 2 additional practical may be given by the course instructor.** **2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**		

Course Code: BCA 175   **L   T/P   C**
Course Name: Practical-III Web Tech Lab   **0   4   2**

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to:
1. Apply the Semantic Structure of HTML, javascript, CSS, bootstrap and XML
2. Design forms and tables using HTML, CSS and bootstrap.
3. Design Client-Side programs using JavaScript
4. Design and develop static Web page.

PRE-REQUISITES: None.

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Develop static web pages through HTML, CSS, JavaScript, bootstrap and XML.	BTL3	PO4, PO5
CO2	Implement different constructs and programming techniques provided by JavaScript.	BTL1,BTL3	PO4, PO8
CO3	Adapt HTML, CSS, javascript, bootstrap and XML syntax and semantics to build web pages.	BTL1,BTL5	PO4
CO4	Develop Client-Side Scripts using JavaScript to display the contents dynamically	BTL3	PO4,PO5
List of Practicals			

S. No.	Detailed Statement	Mapping to CO #
Core Practicals		

1.	Make following five different web pages:
	     i. Formatting Styles and Headings: Include Bold, italics, Underline, Strike, Subscript, superscript and all six type of headings
	     ii. Font Styles and Image tag
	    iii. Marquee: Move text, image and hyperlink
	    iv. Other tags: br, hr, pre, p
	 Include following specifications:
	 ● In all these web pages only mention about use, attributes apply them.
	 ● Insert a background image on home page
	 ● Make all the topics as hyperlinks and go to some other page for description
	 ● Insert a marquee showing HTML Tutorial as moving text.
	 ● Use different font style for different topics
	 ● On every page, make a hyperlink for going back to home page and internal link also.
		CO1, CO3

2.	Create an unordered list nested inside ordered list and apply the following : ● Insert an image of Main item on top right corner of web page. ● Display heading as a marquee. ● Use different font styles and colors for different ordered list items. ● Insert horizontal line after each ordered item.	CO1, CO3
3.	Design a table with row span and column span and make use of attributes colspan, rowspan, width, height, cellpadding, cellspacing etc.	CO1, CO3
4.	Design following frame: MAIN MENU Explanation Topic 1 - - - - - - - - - - Topic 2 - - - - - - - - - - Topic 3 View Example Example	CO1, CO3
5.	Make an image map showing the usage of shape, coords, href attributes in map definition. Link each hotspot to their respective details. All the web pages should be designed with proper background color, images, font styles and	CO1, CO3

	headings.	
6.	Design Student registration form for admission in college.	CO1, CO3
7.	Create a webpage and show the usage of inline and internal style sheet and external style sheet?	CO1, CO3
8.	Create a webpage containing a background image and apply all the background styling attributes?	CO1, CO3
9.	Create a web page showing the usage of font styling attributes	CO1, CO3
10.	Create a web page and apply all Text styling attributes use Id and class selector.	CO1, CO3
11.	Create a webpage and implement all list styling attributes.	CO1, CO3
12.	Create a Webpage with three equal columns.	CO1, CO3
13.	Create a webpage containing bootstrap table.	CO1, CO3
14.	Create a webpage containing various types of images.	CO1, CO3
15.	Create a webpage containing various types of buttons	CO1, CO3
16.	Create a webpage containing various, typography classes.	CO1, CO3
17.	Create a webpage containing to display the heading using. Jumbotron.	CO1, CO3
18.	Write a program to show the usage of inbuilt functions and dialog boxes.	CO2
19.	Write a program to show the usage of alert box and confirm box	CO2
20.	Write a program to implement event handling using onclick, onmouseover and onmouseout events.	CO2
21.	Write a program to show the usage of all the date, math and string object functions	CO2
22.	WAP to display the bookstore details in XML with CSS and internal DTD.	CO1, CO3
23.	WAP to format the Teacher details in XML with CSS using external DTD	CO1, CO3
Application Based Practical		
24.	Design the registration form for a web site and when the user clicks on submit button the login form should be appeared on the screen (use external javascript file).	CO4
25.	Design a website and apply all the features of HTML, css, javascript and bootstrap to make the website attractive.	CO4
26.	Write a JavaScript function that creates a table, accept row, column numbers from the user, and input row-column number as content (e.g. Row-0 Column-0) of a cell.	CO2
27.	Zebra-striped Tables: Setting different background colors for alternate rows is a popular technique to improve the readability of tables that has large amount of data. This is commonly known as zebra-striping a table. Make use of pseudo classes to create zebra stripped Table.	CO2
28.	Create a Questionnaire related to any topic of your choice by using Form Elements.	CO4
Note:		
1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor.		
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

Course Code: BCA 181+   **L T C**
Course Name: Bridge Course in Mathematics   **2 0 0**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

Aim: To build mathematical aptitude of the students for understanding the basic concepts of core courses of mathematics of the programme.

LEARNING OBJECTIVES:

The objectives of this course is to provide the learners

- The knowledge about the matrices, determinants and limits.
- Familiarity with basic concepts of differential and integral calculus.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Understand the various approaches dealing the data using theory of matrices	BTL2	PO1, PO2, PO3, PO4
CO2	Understand and apply the concepts of determinants	BTL3	PO1, PO2
CO3	Understand the concept of calculus such as limit, continuity and differentiability.	BTL4	PO1, PO2, PO3, PO4,PO5
CO4	Appraise and determine the correct logic and solutions for any given real world problem using application of integration& integral calculus.	BTL5	PO1, PO2, PO3, PO4, PO5

UNIT-I

No. of Hrs. 10 Chapter/Book Reference: TB2 [chapters 8, 9, 10 24, 25, 26, 27], TB3 [chapter 1]

MATRICES: Concept, notation, order, equality, types of matrices, zero and identity matrix, transpose of a matrix, symmetric and skew symmetric matrices. Operations on matrices: Addition, multiplication and multiplication with a scalar. Simple properties of addition, multiplication and scalar multiplication, invertible matrix.
DETERMINANTS: Determinant of a square matrix (up to 3 x 3 matrices), properties of determinants, minors, co-factors and applications of determinants in finding the area of a triangle. Adjoint and inverse of a square matrix, solving system of equations using matrix method, Cramer rule (only two and three unknown).
INTRODUCTION TO TRIGONOMETRIC FUNCTIONS: Degree and radian measurements of an angle, Quadrant system, allied angles, and Simple problems based: on Sum/difference of angles of t functions,   C and D Formulae, t functions of multiple angles.

UNIT-II

No. of Hrs. 12 Chapter/Book Reference: TB1 [chapters 4, 12] TB2 [chapters 29, 30, 35, 36] TB3 [3, 4, 5, 13]

LIMITS, CONTINUITY AND DIFFERENTIABILITY: : Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions(simple problems only) , derivative of implicit functions. Concept of exponential and logarithmic functions. Derivatives of logarithmic and exponential functions. Logarithmic differentiation, derivative of functions expressed in parametric forms. Second order derivatives (simple problems only)

INTEGRATION: Integral as Limit of Sum, Riemann Sum, Fundamental Theorem of Calculus, Indefinite Integrals, Simple problems based on Methods of Integration Substitution, By Parts, Partial Fractions, Integration of Algebraic and transcendental Functions.

TEXT BOOKS:
TB1. Mathur A B, Jaggi V P "A Textbook of Engineering Mathematics" Khanna Publishers, 3rd edition, 2000
TB2. Dass H K "Applied Mathematics for polytechnics" CBS publishers, 10th edition, 2010
TB3. Singh J P "Calculus" ANE Books, 2nd edition 2012

REFERENCE BOOKS:
RB1. Kresyig E., "Advanced Engineering Mathematics", 5th Edition, John Wiley & Sons, 1999
RB2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company, Latest Edition.
RB3. Grewal B S, "Elementary Engineering Mathematics", 34th Edition. 1998.

Course Code: BCA 102   **L T C**
Course Name: Applied Mathematics   **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

The objectives of this course are to provide the learners with the following:

1. The Knowledge of mathematical probability
2. Understanding of various numerical techniques
3. Familiarity with the Linear Programming and it's applications

PRE-REQUISITES: Basic Concepts of Mathematics

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Understand the various approaches dealing the data using theory of Probability	BTL2	PO1, PO2, PO3, PO4
CO2	Understand various numerical techniques and apply them to solve real life problems	BTL3	PO1, PO2
CO3	Analyse and evaluate the accuracy of common Numerical Methods	BTL4,5	PO1, PO2, PO3, PO4,PO5
CO4	Develop a mathematical model for real life situation and solving it Using Linear programming technique	BTL5	PO1, PO2, PO3, PO4, PO5

UNIT -I
No. of Hrs. 12 Chapter/Book Reference: TB2 [chapters 3, 4], TB3 [chapters 2, 3, 4, 5, 6]
PROBABILITY: Introduction, Axiomatic definition of Probability, Addition Theorem, Multiplication theorem, Conditional Probability, Baye's Theorem and its applications
PROBABILITY DISTRIBUTIONS: Random Variable, Probability Mass function, Probability density function, Mathematical Expectations of a Random Variable, Binomial Distribution, Poisson distribution, Normal Distribution.
UNIT -II
No. of Hrs. 10 Chapter/Book Reference: TB1 [chapters 2, 3], TB3 [chapters 7, 8, 9]
INTERPOLATION: Operators: Shift; Forward Difference, Backward Difference Operators and their Inter-relation, Interpolation Formulae-Newton's Forward, Backward and Divided Difference Formulae: Lagrange's Formula
SOLUTIONS OF NON LINEAR EQUATIONS: Bisection Method, False Position Method, Newton – Raphson Method for Solving Equation Involving One Variable only.

UNIT -III
No. of Hrs. 10 Chapter/Book Reference: TB1 [chapters 5, 6], TB3 [chapters 10, 11]
SOLUTION OF LINEAR SIMULTANEOUS EQUATIONS: Gaussian Elimination Method with and without Row Interchange: LU Decomposition: Gauss - Jacobi and Gauss-Seidel Method; Gauss – Jordan Method and to find Inverse of a Matrix by this Method.
NUMERICAL DIFFERENTIATION: First and Second Order Derivatives at Tabular and Non-Tabular Points,
NUMERICAL INTEGRATION: Trapezoidal Rule, Simpsons 1/3 Rule: Error in Each Formula (without proof.)

UNIT -IV
No. of Hrs. 12 Chapter/Book Reference: TB4 [Chapters 2, 3, 4, 9, 10]

LINEAR PROGRAMMING: Formulation of linear Programming model, Graphical method of solving linear Programming problem, Simplex Method (Maximization and Minimization)
TRANSPORTATION & ASSIGNMENT PROBLEM: General structure of transportation problem, solution procedure for transportation problem, methods for finding initial solution, test for optimality. Maximization of transportation problem, unbalanced transportation problem, Assignment problem approach of the assignment model, solution methods of assignment problem, maximization in an assignment, unbalanced assignment problem, restriction on assignment

TEXT BOOKS:

TB1. S.S. Sastry, "Numerical Analysis"; Prentice Hall of India, 1998.
TB2. Johnson, R., Miller, I. and Freunds, J., Miller and Freund's "Probability and Statistics for Engineers, Pearson Education (2005) 7th Ed.
TB3. Singh J P "Probability and Numerical Methods" ANE Books, 4th Edition 2019
TB4. Sharma, J.K.; Operations Research: problems & solutions; Macmillan India

REFERENCE BOOKS:

RB1. Grewal B S "Numerical Methods in Engineering and Science" Khanna Publishers, 2012
RB2. Walpole, Ronald E., Myers, Raymond H., Myers, Sharon L. and, Keying Ye, Probability and Statistics for Engineers and Scientists, Pearson Education (2007) 8th Ed.
RB3. Gupta S C, Kapoor V K "Fundamental of Mathematical Statistics" Sultan Chand and Sons 11th edition 2002
RB4. Manmohan, Gupta, P K, Kanti Swarup "Introduction to Management science operations research" Sultan Chand and Sons

Course Code: BCA 104   **L T C**
Course Name: Web Based Programming   **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
The objectives of this course are to provide the learners expertise in the following:-
1. Understanding of the syntax and semantics of PHP language
2. Ability to design and develop web applications using PHP as a server side language.
3. Performing CRUD operations in the database

PRE-REQUISITES:
1. Basic knowledge of HTML, CSS and Javascript.
2. Skills to Design static Webpage.

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Design and develop dynamic web pages with good aesthetic sense of designing and latest technical know-how's.	BTL3, BTL4	PO1, PO2, PO3, PO7
CO2	Have a good understanding of Web Application Terminologies	BTL1, BTL2	PO1, PO2, PO3, PO7, PO10
CO3	Learn how to link and publish web sites	BTL1, BTL2	PO1, PO2, PO3, PO4

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters 1-3, 5]

Introduction to web applications, Client Side Scripting Vs Server Side Scripting, Web Servers : Local Servers and Remote Servers, Installation Process - WAMP, LAMP, XAMPP & MAMP Server, Static website vs Dynamic website development.
Introduction to PHP: Data types, Variables, Super Global Variables, Constants, Comments, Operators and Expressions, Regular Expression, Advantages of PHP
Control statements: Conditional Statement -if else, if elseif else, nested if, switch case, PHP Loops – for, while, do while and foreach loop
Arrays: Indexed Array, Associate Array, Multi-dimensional Array, Array pre-defined Functions

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter 7]
Functions: Defining and Calling Functions, Passing by Value and passing by references, Inbuilt Functions, variable scope, Mail function, PHP Errors
Working with Forms: Get and Post Methods, HTML form controls and PHP, State Management: Cookies, Session, Query String, Hidden Field.

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter 6]

Working With Files: Opening and Closing Files, creating directories and files, Reading and Writing to Files, file inclusion, file uploading and downloading, Getting Information on Files.
Object Oriented Features: Classes and Objects, Building Classes, Access Modifiers, Reusability, Constructors, Destructor.

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter 8]

PHP Database Connectivity: Using PHP to Access a Database, Relational Databases and SQL, PHP Data Objects, MySQLi Object Interface, SQLite, MongoDB
Introduction to MYSQL, Creating database and other operations on database, Querying a MySQL database with PHP database, connecting to a database, Parsing of the query results, Checking data errors.

TEXT BOOKS:

TB1.   Programming PHP: Creating Dynamic Web Pages, Kevin Tatroe. Peter Macintyre, Rasmus Lerdorf, O'Reilly, Third Edition

REFERENCE BOOKS:

RB1.   Professional PHP Programming,Jesus Castagnetto,Harish Rawat, Sascha Schumann,Chris Scollo,Deepak Veliath - Wrox Publications
RB2.   PHP 5 Advanced, Larry Ullman, Peachpit Press
RB3.   Core PHP Programming. Leon Atkinson (Prentice Hall, ISBN 0130463469).
RB4.   Beginning PHP5 and MySQL: From Novice to Professional, W. Jason Gilmore, 2004,Apress, ISBN: 1-893115-51-8

Course Code: BCA 106   **L T C**
Course Name: Data Structure and Algorithm Using C   **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be provided expertise in

1. Understanding of the basic concepts of data structures and their operations like, insertion, deletion, searching and sorting
2. Design algorithms and pseudo codes of various linear and non-linear data structures

PRE-REQUISITES:

1. C Programming Skills
2. Discrete Mathematics

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Familiarize the basics of data structures and algorithms.	BTL2	PO1, PO2, PO3, PO4
CO2	Understand and apply linear and nonlinear data structures and their operations.	BTL3	PO1, PO2, PO3, PO4, PO5
CO3	Compare and implement searching, sorting and hashing techniques.	BTL5	PO1, PO2, PO3, PO4,PO5
CO4	Appraise and determine the correct data structure for any given real world problem.	BTL5	PO1, PO2, PO3, PO4, PO5

UNIT – I

No. of Hours: 14 Chapter / Book Reference: TB1 [Chapters 1, 4, 9], TB2 [Chapters 1, 6, 7], TB3 [Chapters 1, 2,6,10]
Linear Data Structures- Static: Introduction to Algorithms- Attributes, Design Techniques, Time Space Trade Off, Data Structures, Classification and Operations of Data Structures.
 Arrays: Single Dimension, Two-Dimension and Introduction to Multi Dimensions, Memory Representation, Address Calculation, Sparse Matrices- Types, Representation.
Searching and Sorting: Linear and Binary Search, Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Elementary Comparison of Searching and Sorting Algorithms.
Hashing: Hash Table, Hash Functions, and Collision Resolution.

UNIT – II

No. of Hours: 10 Chapter / Book Reference: TB1 [Chapter 5], TB2 [Chapter 4], TB3 [Chapter 3]
Linear Data Structures- Dynamic
Introduction: Dynamic Memory Allocation**,** Dynamic Memory versus Static Memory Allocation.
Linked List Types: Singly Linked List, Doubly Linked List, Header Linked List, Circular Linked List**.**
Operations: Creation, Insertion, Deletion, Modification, Searching, Sorting, Reversing, and Merging.

UNIT – III
No. of Hours: 09 Chapter / Book Reference: TB1 [Chapter 6], TB2 [Chapters 2, 4], TB3 [Chapters 4, 5]
Abstract Data Types:
Stacks: Introduction, Static and Dynamic Implementation, Operations, Applications- Evaluation and Conversion between Polish and Reverse Polish Notations.

Queues: Introduction, Static and Dynamic Implementation, Operations, Types- Linear Queue, Circular Queue, Doubly Ended Queue, Priority Queue.

UNIT – IV
No. of Hours: 11 Chapter / Book Reference: TB1 [Chapters 7, 8], TB2 [Chapters 5, 8], TB3 [Chapters 7, 8]
Non Linear Data Structures:
Introduction to Graphs: Notations & Terminologies, Representation of Graphs- Adjacency Matrix, Incidence Matrix and Linked Representation.
Trees: Notations & Terminologies, Memory Representation, Binary Trees Types- Complete, Full, Strict, Expression Binary Tree, Tree Traversals (Recursive), Binary Search Tree and Basic Operations
Introduction and Creation (Excluding Implementation): AVL Tree, Heap Tree, M- Way Tree, and B Tree.

TEXT BOOKS:

TB1. Schaum's Outline Series, "Data Structures", TMH, Special Indian Ed., Seventeenth Reprint, 2014.
TB2. Y. Langsam, M. J. Augenstein and A.M. Tanenebaum, "Data Structures using C and C++", Pearson Education India, Second Edition, 2015.
TB3. D. Samanta, "Classic Data Structures", PHI, Second Edition, 2009.
REFERENCE BOOKS:

RB1. Ashok N kamthane "Introduction to Data Structures in C", Pearson**,** Third Edition, 2009.
RB2. E. Horowitz and S. Sahni, "Fundamentals of Data Structures in C". Universities Press, Second edition, 2008.
RB3. D. Malhotra and N. Malhotra, "Data Structures and Program Design using C", Laxmi Publications, Indian adapted edition from Mercury Learning and Information-USA, First edition, 2018.
RB4. Y. Kanetkar " Data Structures through C", BPB Publication, Third Edition, 2019.
RB5. R.F Gilberg, and B A Frouzan- "Data Structures: A Pseudocode Approach with C", Thomson Learning, Second Edition, 2004.
RB6. A. K. Rath, and A.K. Jagadev, "Data Structures and Program Design Using C", Scitech Publications, Second Edition, 2011.

Course Code: BCA 108   **L T C**
Course Name: Database Management System   **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
The paper aims to introduce the concept of Back end, data storage in computers, design of a DBMS, Queries to construct database, store and retrieve data from the database. The objective of this course is to provide the learners expertise in the following:
1. Understanding of the requirement of database management System for storing data and its advantages over file management system.
2. Designing the database conceptually, physically and finally implementing the creation of database for any application.
3. Learning of queries in SQL for creating database and performing various operations for manipulating data in the database.
4. Knowledge of database utilities i.e. backup, recovery, transaction processing.

PREREQUISITE: Basic knowledge of data storage and file management system

COURSE OUTCOMES (COS):
 After completion of this course, the learners will be able to: -

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Understand the DBMS concepts with detailed architecture, characteristics.Describe different database languages and environment and learn various data models, along with the related terminologies	BTL1	PO1, PO2, PO3, PO7
CO2	Explore Structure Query Language, a brief on NOSQL, Query By Example.Also understand the overview of SQL, and try to implement DDL, DML and DCL along with operators, use of joins, nested query, use of views and Indexes Discuss Integrity Constraints	BTL3	PO1, PO2, PO3, PO7
CO3	Describe Relational Data Model, explain Codd's Rules, Relational Algebra, Set theory operations and the concept of functional dependencies and normalization	BTL4	PO1, PO2, PO3, PO4
CO4	Acquire Knowledge about Transaction Processing, concurrency problems, and its controlling techniques, Database backup and recovery and security.	BTL2	PO2, PO3, PO4, PO7, PO8

UNIT-I

[No. of Hrs.: 10] Chapter/Book Reference: TB1 [Chapter 2]; TB2 [Chapter 1]

Introduction: An overview of database management system, Characteristics of database approach, DBMS architecture, client/server, data Models, Introduction to Distributed Data processing, schema and instances, data independence,
Data Modelling using Entity Relationship Model: Basic introduction about the terminologies like Entity, Entity types, entity set, notation for ER diagram, attributes and keys, Types of attributes (composite, derived and multivalued attributes) and keys (Super Key, candidate key, primary key), relationships, relation types, weak entities, enhanced E-R, specialization and generalization.

UNIT – II

[No. of Hrs.: 13] Chapter/Book Reference: TB1 [Chapter 8]; TB2 [Chapter 2];

Introduction to SQL: Overview, Characteristics of SQL. Advantage of SQL, SQL data types and literals.
Types of SQL commands: DDL, DML, DCL. Basic SQL Queries.
Logical operators: BETWEEN, IN, AND, OR and NOT
Null Values: Disallowing Null Values, Comparisons Using Null Values
Integrity constraints: Primary Key, Not NULL, Unique, Check, Referential key
Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators, Aggregate Operators: The GROUP BY and HAVING Clauses,
Joins: Inner joins, Outer Joins, Left outer, Right outer, full outer joins.
Overview of other SQL Objects: Views, Sequences, Indexes, Triggers and stored procedure.

UNIT – III

[No. of Hrs.: 12] Chapter/Book Reference: TB1 [Chapter 7 & 15]; TB2 [Chapter 3];

Relational Data Models: Relational model terminology domains, Attributes, Tuples, Relations, characteristics of relations, relational constraints domain constraints, key constraints and constraints on null, relational DB schema. Codd's Rules
Relational algebra: Basic operations selection and projection,
Set Theoretic operations: Union, Intersection, set difference and division (Order, Relational calculus: Domain, Tuple, Well Formed Formula, specification, quantifiers)
Join operations: Inner, Outer, Left outer, Right outer, and full outer join
ER to relational mapping: Steps to map ER diagram to relational schema
Data Normalization: Functional dependencies, Armstrong's inference rule, & Normalization (Upto BCNF)

UNIT – IV

[No. of Hrs.: 9] Chapter/Book Reference: TB1 [Chapter 19 & 20]; TB2 [Chapter 5];

Transaction Processing: Definition of Transaction, Desirable ACID properties
Database recovery and Database Security: System failure, Backup & recovery Techniques, Authentication, Authorization.
Overview of Query by Language, NoSql databses

TEXT BOOKS:

TB1. R. Elmarsi and SB Navathe, "Fundamentals of Database Systems", Pearson, 5th Ed.
TB2. Singh S.K., "Database System Concepts, design and application", Pearson Education [TB3] **TB3.** Ramakrishnan and Gherke, "Database Management Systems", TMH.
TB4. Bipin Desai, "An Introduction to Database Systems", Galgotia Publications, 1991.

REFERENCE BOOKS:
RB1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 6th Edition, McGraw Hill, 2010.
RB2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.
RB3. A. K. Majumdar, P. Battacharya, "Database Management Systems', TMH, 2017.

~~Course Code: BCA 110~~ **L T C**

Course Name: Environmental Studies   **2 0 2**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. Development of critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development.
2. Acquisition of values and attitudes towards understanding complex environmental economic- social challenges, and active participation in solving current environmental problems and preventing the future ones.
3. Encouraging adoption of sustainability as a practice in life, society, and industry.

PRE-REQUISITES: Basic awareness about the natural environment.

COURSE OUTCOMES (COs): After completion of this course, the learners will be able to:

CO#	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Gain in-depth knowledge on natural processes and resources that sustain life and govern economy.	BTL1,2	PO10
CO2	Understand the consequences of human actions on the web of life, global economy, and quality of human life.	BTL3	PO10
CO3	Develop critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development.	BTL3	PO10
CO4	Acquire values and attitudes towards understanding complex environmental economic-social challenges, and active participation in solving current environmental problems and preventing the future ones.	BTL4	PO10
CO5	Adopt sustainability as a practice in life, society, and industry.	BTL5	PO10

UNIT–I

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters 1, 6]; TB2 [Chapters 8, 11, 25]; TB3 [Chapters 1, 35]

Introduction to Environmental Studies
- Multidisciplinary nature of environmental studies; components of environment: atmosphere, hydrosphere, lithosphere, and biosphere.
- Scope and importance; Concept of sustainability and sustainable development
- Emergence of environmental issues: Climate change, Global warming, Ozone layer depletion, Acid rain etc.
- International agreements and programmer: Earth Summit, UNFCCC, Montreal and Kyoto protocols, Convention on Biological Diversity(CBD), Ramsar convention, The Chemical Weapons Convention (CWC), UNEP, CITES, etc

UNIT–II

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters 2, 3]; TB2 [Chapters 2, 15, 16, 17]; TB3 [Chapters 2, 7, 11, 12]

Ecosystems and Natural Resources
- Definition and concept of Ecosystem
- Structure of ecosystem (biotic and abiotic components); Functions of Ecosystem: Physical (energy flow), Biological (food chains, food web, ecological succession), ecological pyramids and homeostasis.
- Types of Ecosystems: Tundra, Forest, Grassland, Desert, Aquatic (ponds, streams, lakes, rivers, oceans, estuaries); importance and threats with relevant examples from India
- Ecosystem services (Provisioning, Regulating, Cultural, and Supporting); Ecosystem preservation and conservation strategies; Basics of Ecosystem restoration
- Energy resources: Renewable and non-renewable energy sources; Use of alternate energy sources; Growing energy needs; Energy contents of coal, petroleum, natural gas and bio gas; Agro-residues as a biomass energy source

UNIT–III

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter 4]; TB2 [Chapters 4, 5, 6]; TB3 [Chapters 22, 23, 24]

Biodiversity and Conservation
- Definition of Biodiversity; Levels of biological diversity: genetic, species and ecosystem diversity
- India as a mega-biodiversity nation; Biogeographic zones of India; Biodiversity hotspots; Endemic and endangered species of India; IUCN Red list criteria and categories
- Value of biodiversity: Ecological, economic, social, ethical, aesthetic, and informational values of biodiversity with examples.
- Threats to biodiversity: Habitat loss, degradation, and fragmentation; Poaching of wildlife; Man-wildlife conflicts; Biological invasion with emphasis on Indian biodiversity; Current mass extinction crisis
- Biodiversity conservation strategies: in-situ and ex-situ methods of conservation (National Parks, Wildlife Sanctuaries, and Biosphere reserves.
- Case studies: Contemporary Indian wildlife and biodiversity issues, movements, and projects (e.g., Project Tiger, Project Elephant, Vulture breeding program, Project Great Indian Bustard, Crocodile conservation project, Silent Valley movement, Save Western Ghats movement, etc)

UNIT–IV

No. of Hours: 9 + 5 for field visit Chapter/Book Reference: TB1 [Chapter 5]; TB2 [Chapters 7, 20, 21, 23]; TB3 [Chapters 25, 26, 27, 28, 30, 31]

Environmental Pollution and Control Measures
- Environmental pollution (Air, water, soil, thermal, and noise): causes, effects, and controls; Primary and secondary air pollutants; Air and water quality standards
- Nuclear hazards and human health risks
- Solid waste management: Control measures for various types of urban, industrial waste, Hazardous waste, E-waste, etc.; Waste segregation and disposal
- Environmental Impact Assessment and Environmental Management System
- **Field work/ Practical's (any one)**
- Field visit to any of the ecosystems found in Delhi like Delhi Ridge/ Sanjay lake/Yamuna river and its floodplains etc., or any nearby lake or pond, explaining the theoretical aspects taught in the class room
- Visit to any biodiversity park/ reserve forest/ protected area/ zoo/ nursery/ natural history museum in and around Delhi, such as Okhla bird sanctuary/ Asola Bhatti Wildlife Sanctuary/ Yamuna Biodiversity Park/ Sultanpur National Park, explaining the theoretical aspects taught in the classroom
- Visit to a local polluted site (urban/rural/industrial/agricultural), wastewater treatment plants, or landfill sites, etc

TEXT BOOKS:

TB1.   Sanjay Kumar Batra , Kanchan Batra ,Harpreet Kaur; Environmental Studies; Taxmann's, Fifth Edition.
TB2.   M.M. Sulphey; Introduction to Environment Management; PHI Learning, 2019
TB3.   S.P. Mishra, S.N. Pandey; Essential Environmental Studies; Ane Books Pvt. Ltd. ; Sixth Edition.

REFERENCE BOOKS:

RB1.   Asthana, D. K. (2006).Text Book of Environmental Studies. S. Chand Publishing.
RB2.   Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India
RB3.   Bharucha, E. (2013). Textbook of Environmental Studies for Undergraduate Courses. Universities Press.
RB4.   Mahapatra, R., Jeevan, S.S., Das, S. (Eds) (2017). Environment Reader for Universities, Centre for Science and Environment, New Delhi.
RB5.   Masters, G. M., & Ela, W. P. (1991).Introduction to environmental engineering and science. Englewood Cliffs, NJ: Prentice Hall.
RB6.   Odum, E. P., Odum, H. T., & Andrews, J. (1971).Fundamentals of ecology. Philadelphia: Saunders.
RB7.   Sharma, P. D., & Sharma, P. D. (2005).Ecology and environment. Rastogi Publications

		L	T/P	C
Course Code: BCA 134		**0**	**4**	**2**
Course Name: Front End Design Tools VB.NET				

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.

3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

PRE-REQUISITES: Prior knowledge of programming language is beneficial but not mandatory.
COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Design Console application using basic programming concepts.	BT3	PO3, PO5
CO2	Design Windows application using control.	BT3	PO3,PO5
CO3	Understand and use of different Data Structures, Exception Handling	BT2	PO3,PO5
CO4	Learn basic concepts of OOPS. Design classes and interfaces.	BT2	PO3, PO5

SYLLABUS
UNIT I

Introduction to Visual Basic .Net Framework - .Net Architecture, Features of .Net, Advantages of .Net, .Net Framework, CLR, CTS, CLS, Assemblies, Memory management issues – Garbage Collector and collection process.
Introduction to Visual Basic.Net IDE: Creating a project, Types of project in .Net, Exploring and coding a project, Solution explorer, toolbox, properties window, Output window, Object Browser.
Programming Basics: Variable, Data Types, Conditional Constructs, Loop Statements, Creating Console Application.

UNIT II

Introduction to GUI Environment and understand the working of commonly used controls - their properties, methods and events.

UNIT III

Introduction to Data Structures: Array, ArrayList, Structure and Enumeration.
Introduction of Exception handling - structured and unstructured.

UNIT IV

Procedure and function. Introduction to Object Oriented Programming : OOPS Concepts, Creation of Class, Interface and Namespace.

	List of Practicals	
S. No.	**Detailed Statement**	**Mapping to CO #**
	Core Practicals (Implement minimum 10 out of 15 practicals)	
1.	Create console application showing the use of conditional constructs - if, if-else, if-elseif-else, nested if, select case.	CO1
2.	Create console application showing the use of loops –Do While..Loop, Do Until … Loop, While... Wend, For … Next, For Each … Next.	CO1
3.	Create a simple windows application showing the use of TextBox, Button, Label Controls, Radio Button, Check Box, Combo Box and List Box Controls.	CO2
4.	Create a windows application showing the use of Image, Timer, Panel, Scroll bar, Status Bar Controls.	CO2
5.	Create an MDI application showing the use of multiple forms, toolbar, menu, status bar, RichText Box, Dialog Controls.	CO2
6.	Create console/windows application to showing the use of Structured Exception handling- try..end try, catch, finally.	CO3

7.	Create console/windows application to showing the use of Unstructured Exception handling- On Error, Resume Next etc.	CO3
8.	Create console/windows application showing the use of Array class - its methods and properties.	CO3
9.	Create console/windows application showing the use of Array List - its methods and properties.	CO3
10.	Create console/windows application showing the use of Enumeration, Constants and Structures.	CO3
11.	Create console/windows application showing the declaration and use of user defined functions.	CO3
12.	Create console/windows application showing the use of different argument passing mechanism – ByVal, ByRef, Optional and Paramarray.	CO3
13.	Create console/windows application showing the declaration and use of Class with Data members, Function Member, Constructor Member, Destructor Member, Event Member, Property Member, Shared Member, Type Member.	CO4
14.	Create console/windows application showing the implementation of Inheritance.	CO4
15.	Create console/windows application showing the use of Polymorphism.	CO4
Application Based Practicals (Implement minimum 5 out of 10 practicals)		
16.	Write a Program to find diameter, circumference and area of circle using procedure.	CO1
17.	Write a Program to find maximum between three numbers using select case and if--else.	CO1
18.	Create Basic calculator with all the functionalities.	CO2
19.	Create a basic Digital or Analog Clock using Timer, Image, Button, ComboBox and other relevant controls.	CO2
20.	Write a Program to find second largest element and second smallest element in an array.	CO3
21.	Write a program to create an arraylist of 10 elements. Create a procedure to add new element at the specific location in the arraylist and display the updated arraylist.	CO3
22.	Write a program to validate the username and password entered by user and create userdefined exception to prompt message on three consecutive wrong password entries.	CO3
23.	Create a Class Box with following private data members length, breadth, height and function getVolume, and public member functions input and output. Create an object of class and call appropriate functions.	CO4
24.	Create a class Rectangle, with protected members width and height, public procedure setWidth and setHeight, getArea. Inherit it in another Class ShrinkRectangle with a data member shrink factor. Create object of the class and call appropriate member functions. Create appropriate class to demonstrate overloading of function 'area' for finding area of a circle, square, rectangle and a triangle.	CO4
25.	Create a class Book with data members: BookId, BookName, Cost, Pages. Member property to add data to all its data members, function to find cost per page. Create five objects of 5 books and find total cost.	CO4

Note:
   1. **In total 15 practical's to be implemented.**
   2. **Two additional practical may be given by the course instructor.**
   3. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

Course Code: BCA 136

L T C

Course Name: Statistical Analysis using Excel

0 4 2

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to apply the concepts pertaining to the following:-
1. The understanding of the basic concepts of statistics
2. Using Excel for applying the Statistical concepts in day to day operations

PRE-REQUISITES:
1. The student must be adequate knowledge of working in MS Excel
2. The student must be well versed in the basic concepts of Statistics

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the basic concepts of statistics and its application in the real life scenarios	BTL2	PO1, PO2, PO3
CO2	Understand the means and mechanisms for applying the various skills used in the process of generating various statistical concepts by using MS Excel software	BTL3	PO1, PO2, PO3, PO5, PO8
CO3	Developing the skills needed for understand the various features of MS Excel software which assist the user in the process of deriving statistical measures	BTL3	PO1, PO2, PO3, PO4, PO5, PO7
CO4	Understand the skill needed to draw various forms of graphical representation based on statistical data	BTL4	PO2, PO3, PO4, PO6
CO5	Understand the various features of MS Excel involved in the process of compilation and summarizing of Statistical data and the skills needed to interpret the statistical data	BTL5	PO2, PO3, PO4, PO5, PO6, PO7, PO8
CO6	Understand the skills needed to ensure the process of integrating data from multiple in MS Excel	BTL6	PO2, PO3, PO5, PO6, PO7, PO8

UNIT – I
Chapter/Book Reference: TB1 [Chapters 1, 2]; TB2 [Chapters 1, 3];
Introduction to Statistics: Defining statistics, Importance of Statistics, application of statistics in real life scenarios. The skills and characteristics needed to deal with the data. The importance of IT tools in the usage of statistical data. MS Excel as the IT tool for dealing with statistical data. Features of MS Excel

UNIT – II
Chapter/Book Reference: TB1 [Chapter 6]; TB2 [Chapter 7]
Introduction to MS Excel. Basic structure of MS Excel. Cells, range, Tabs and the importance of formulae in MS Excel for dealing with statistical data. Introduction to Data analysis tab and the various statistical features available in data analysis tab. Installing Data analysis tab. using statistical functions of MS Excel for data analysis

UNIT – III
Chapter/Book Reference: TB1 [Chapter 7]; TB2 [Chapter 9]
The application of Measures of central tendency by using MS Excel. Frequency distribution, Graphical representation of data along with formatting features of various graphs. Measures of Central Tendency with its illustration in MS Excel

UNIT – IV
Chapter/Book Reference: TB1 [Chapter 8]; TB2 [Chapter 11]
The measures of Dispersion by using MS Excel. The consolidation of data by using Pivot table, The Data table, Scenarios and Goal seek functions by using data to predict future scenarios. The illustration of cro-relation and regression in predicting

TEXT BOOKS:

TB1. Understanding Educational Statistics Using Microsoft Excel and SPSS. Edition No. 1, Martin Lee Abbott, John Wiley and Sons. Ltd, 2011
TB2. Statistics For Management Using Microsoft Excel, Ash Narain Sah, John Wiley, 2018

REFERENCE BOOKS:
RB1. Statistics with Microsoft Excel by Dretzke, Beverly Jean, Prentice Hall, 2019
RB2. Applied Statistics with Microsoft Excel, Gral Keller, Cengage, 2015

List of Practical		
S. No.	**Detailed Statement**	**Mapping to CO #**
1.	Enter the marks of 20 students in the given order • Serial number • Name of the student • Name of the college • Class • Subject-1 • Subject -2 • Subject -3 • Subject -4 In a separate columns, perform the following operations Calculate the following a. Total marks of all the subjects b. Percentage of marks for each of the students c. Allotment of grades based on the criterion. • If the marks are more than 75% then the result is "Pass" else "Fail" d. Now in other column allot the grades based on the following criterion • If the marks are more than 90% then grade is "A" • If the marks are more than or equal to 75 and less than 90% then the grade is "B" else the grade if "C" provided that the result is "Pass"	CO1

2.	From the following table, calculate the following			CO2
	City	Number of Schools	Number of candidates	
	New Delhi	300	30000	
	Mumbai	450	45000	
	Bengaluru	500	48000	
	Chennai	480	67000	
	Trivandrum	459	77000	

- The average number of students in the entire distribution
- The standard deviation of the distribution
- The correlation coefficient between the number of schools and the number of candidates
- The regression equation between number of students and number of candidates

3.	From the following data calculate the					CO4, CO5
	Base City	**Department**	**Client**	**Location**	**Nationality**	
	New Delhi	Marketing	Adidas	New York	American	
	Mumbai	Advertising	Hilfiger	London	English	
	Bengaluru	Human Resource	Woodland	Paris	Spanish	
	Chennai	Human Resource	Nike	Sydney	Dutch	
	Trivandrum	Advertising	Allen Solley	Frankfurt	Japanese	
	New Delhi	Quality Control	Adidas	New York	American	
	Mumbai	Advertising	Hilfiger	Seoul	Korean	
	Bengaluru	Human Resource	Woodland	Paris	Spanish	
	Chennai	Human Resource	Nike	Sydney	Dutch	
	Trivandrum	Advertising	Armani	Frankfurt	Russian	
	New Delhi	Marketing	Adidas	New York	American	
	Mumbai	Production	Hilfiger	Copenhagen	English	
	Bengaluru	Human Resource	Woodland	Paris	Spanish	
	Chennai	Human Resource	Nike	Sydney	Russian	
	Trivandrum	Advertising	Gucci	Frankfurt	Japanese	
	New Delhi	Quality Control	Adidas	New York	American	
	Mumbai	Advertising	Hilfiger	London	Korean	
	Bengaluru	Human Resource	Woodland	Paris	Spanish	
	Chennai	Human Resource	Nike	Sydney	Dutch	
	Trivandrum	Advertising	Allen Solley	Frankfurt	Japanese	

Using Pivot table, determine
- The number of Nationality per Location
- The number of Department / location / client
- The number of client / location / nationality

4.	A finance company wants to publish the following table					CO5
	Qty ↓ / Price →	**10**	**20**	**30**	**40**	
	25	250	500	750	1000	
	35	350	700	1050	1400	
	45	450	900	1350	1800	
	55	550	1100	1650	2200	
	65	650	1300	1950	2600	

Using Data table, prepare the above tabular distribution

5	Using the Goal seek function of Excel, prepare the following table for calculating the amount based on the simple interest formula.		CO1
	Principle Amount		
	Rate		

Time		**2**
Amount		**1040**
Simulate the amount by differing values of - Principle amount - Rate - Time		

Course Code: BCA 138

Course Name: Designing Lab Photoshop

L	T/P	C
0	4	2

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to:

1. Knowledge of Tools in Photoshop.
2. Exporting images & pdf.
3. Uses of gif & digital enhancement in images.

PRE-REQUISITES:

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Explain the basics of graphics designing & Adobe suite	BTL1	PO6, PO11, PO14, PO20
CO2	Exploring the Raster designing tools in Adobe Photoshop.	BTL3 BTL5	PO1, PO2, PO3, PO4, PO5, PO8, PO11-PO20
CO3	Exploring the Vector designing tools in Adobe Photoshop.	BTL3 BTL5	PO6, PO7, PO9, PO13, PO11-PO20
CO4	Exploring the image filters & adjustments in Adobe Photoshop.	BTL3 BTL5	PO10, PO11-PO20

UNIT – I

No. of Hours: 11

Introduction to graphic designing, Input/Output Technologies, Color Coding: RGB, CMYK, Grayscale, Bitmap, Color Channel, Resolution, Printing Templates, Raster Images, Vector Images, Measurement Units & Conversion, Introduction to Adobe suite & Photoshop.

UNIT – II

No. of Hours: 11

Introduction to Layers, Groups & Smart Objects, Color Picker, Selection Tools & Marquee Tool, Crop Tool, Brush Tool, Clone & Patch Tools, Eraser Tools, Coloring Tools, Text Tools, Hand & Zoom Tools, Background & Foreground Colors, Image Mask, Alignment Controls, Transform Controls, Importing Images in Photoshop.

UNIT – III

No. of Hours: 11

Introduction to Shapes & Shape Tools, Path & Direct Selection Tools, Pen Tool, Image Editing Tools, Layers Style, Filters, Blend Modes, Image Adjustment Options, Window Menu Options, Layer Mask.

UNIT – IV

No. of Hours: 11

Introduction to Photoshop Filter: Blur, Distort, Noise, Render, Sharpen, Stylize, Exporting Images & PDF, Introduction to GIF & Timeline Window, Importing/Exporting CorelDraw Files from Photoshop.

TEXT BOOKS:

TB1. Faulkner Andrew (Author), Chavez Conrad (Author), "Adobe Photoshop CC Classroom in a Book" Adobe Press.

TB2. DT Editorial Services, "Photoshop CC in Simple Steps" Dream Tech. Press.

REFERENCE BOOKS:

RB1. Lisa DaNae Dayley, Brad Dayley, "Photoshop Bible", John Wiley & Sons, Inc.

RB2. Glyn Dewis, "The Photoshop Workbook: Professional Retouching and Compositing Tips, Tricks, and Techniques", Peachpit Press.

RB3. Peter Bauer, "Adobe Photoshop CC For Dummies", John Wiley & Sons, Inc.

S. No.	Detailed Statement	Mapping to CO #
List of Practicals		
Core Practicals (Implement minimum 8 out of 10 practicals)		
1.	Create a file to demonstrate the use of layers, groups & smart objects.	CO2
2.	Create a photo frame in Photoshop.	CO2
3.	Take an image of basic shape (square, triangle, circle, rectangle and parallelogram) in Photoshop & extract these shapes from the image to different layers using marquee tools.	CO2
4.	Create a custom brush preset in Photoshop.	CO2
5.	Create a custom pattern preset in Photoshop.	CO2
6.	Create a visiting card for yourself in Photoshop. (size=3.5 x 2 inch., color coding: CMYK)	CO1, CO3,
7.	Create a file having two images (rename the layer as foreground & background image) in two different layers. Blur the background image & place the foreground image over the background image in a way both layers are visible.	CO3,
8.	Create a border design using a brush tool.	CO2
9.	Create basic shapes (square, triangle, circle, rectangle and parallelogram) in Photoshop on a single layer using the shape tools.	CO3,
10.	Create a simple GIF in Photoshop.	CO4
Application Based Practicals (Implement minimum 5 out of 10 practicals)		
11.	Create a digital invitation card in Photoshop and export it in PDF Format. Use the Photograph (Practical 7) or GIF (Practical 10) and border (Practical 8) along with other features of Photoshop as per your requirements. (size=A8 or A4, color coding: RGB)	CO1, CO2, CO3, CO4
12.	Create a custom Desktop background in Photoshop.	CO2, CO3, CO4
13.	Create a water drop and heart shape in Photoshop using the shapes tools or Pen Tool.	CO3
14.	Create a "Save Water" Poster from the shapes created in Practical 13. (size=A8 or A4, color coding: CMYK)	CO1, CO2, CO3, CO4
15.	Perform Digital Makeup on the Photograph of some celebrity in Photoshop.	CO2, CO3, CO4
16.	Create a cartoon character in Photoshop using the Shape and Pen Tools.	CO2, CO3, CO4
17.	Create a chocolate bar with the brand name in Photoshop. The individual cube of the chocolate must have a 3D Visual Effect.	CO2, CO3, CO4
18.	Create your company logo in Photoshop.	CO2, CO3, CO4
19.	Create a magazine Cover in Photoshop.	CO2, CO3, CO4
20.	Create a Thanks Giving card & export it in Pdf (size=A8 or A4, color coding: RGB)	CO1, CO2, CO3, CO4

Note:
1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Course Code: BCA 172 **L T/P C**
Course Name: Practical-IV WBP Lab **0 4 2**

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to:
1. Understand the syntax and semantics of PHP language
2. Design and develop web applications using PHP as a server side language
3. Perform database connectivity using MYSQL as database server.

PRE-REQUISITES:
1. Knowledge of HTML, CSS, Javascript, bootstrap and XML.
2. Able to Design Static Website.

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Design and develop dynamic web pages with good aesthetic sense of designing and latest technical know-how's.	BTL3	PO1, PO2, PO3,PO7
CO2	Have a good understanding of Web Application Terminologies	BTL1, BTL2	PO1, PO2, PO3,PO7, PO10
CO3	Learn how to link and publish web sites	BTL1, BTL2	PO1, PO2, PO3,PO4
List of Practicals			
S. No.	Detailed Statement		Mapping to CO #
Core Practicals			
1.	Write regular expressions including modifiers, operators, and metacharacters.		CO1, CO2
2.	Write a program to show the usage of nested if statement.		CO1, CO2
3.	Write a Program in PHP for type Casting Of a Variables		CO1, CO2
4.	Write a program to create a menu driven program and show the usage of switch-case.		CO1, CO2
5.	Write a program to show the usage of for/while/do while loop		CO1, CO2
6.	Write a program to perform all four types of sorting		CO1, CO2
7.	Write a program to implement Array-pad(),aaray_slice(),array_splice(),list() functions.(use foreach wherever applicable)		CO1, CO2
8.	Write a program to show the application of user defined functions.		CO1, CO2
9.	Write a program that Passes control to another page (include, require, exit and die functions)		CO1, CO2
10.	Write a program to validate the form data using Filter_var() function.		CO1, CO2
11.	Write a program to show the usage of Cookie.		CO1, CO2
12.	Write a program to show the usage of Session		CO1, CO2
13.	Write a program to implement oops concepts.		CO1, CO2
14.	Do Form handling In PHP Design a personal Information form , then Submit & Retrieve the Form Data Using $_GET(), $_POST() and $_REQUEST() Variables		CO1, CO2
15.	Design A Login Form and Validate that Form using PHP Programming		CO1, CO2
16.	Create Admin Login ,Logout form using session variables		CO1, CO2
17.	Write a program to create a file.		CO1, CO2
18.	Write a program that use various PHP library functions, and that manipulate files and directories.		CO1, CO2
19.	Write a program to read and display the content of previously created file.		CO1, CO2
20.	Write a program to modify the content of an existing file.		CO1, CO2
21.	Create a web page and which provides File uploading and downloading a file.		CO1, CO2
22.	Design a from which upload And Display Image in PHP		CO1, CO2
23.	Use phpMyAdmin and perform the following: import, review data and structure, run SQL statements, create users and privileges		CO1, CO2
24.	Write a program to create a mysql database.		CO1, CO2
25.	Write a program to create a table and insert few records into it using form.		CO1, CO2
26.	Write a program to select all the records and display it in table.		CO1, CO2
27.	Write a program to modify (delete/modify/add) a table.		CO1, CO2

28.	Write a PHP script, to check whether the page is called from 'https' or 'http'.	CO1, CO2
Application Based Practical		
29.	Write a program to verify text data as per the pattern.	CO3
30.	Create a dynamic website by incorporating the following functionalities: • Implement a basic registration and login system, with styling, • Make the database connection • Make a connection to a MySQL database, and log in with valid credentials. • Create Dynamic, interactive and database - Driven web application using php & mysql • Perform some validation check. If any of these operations cause an error, stop execution and print the error message. The script should respond differently depending on the situation. Add a "Log Out" button to logout from the system	CO3
Note: **1. In total 15 practical's to be implemented. 2 additional practical may be given by the course instructor.** **2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**		

Course Code: BCA 174   **L T/P C**
Course Name: Practical-V DS Lab   **0 4   2**

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to:
1. Implement various types of data structures using C
2. Implement different operations on linear and non-linear data structures

PRE-REQUISITES:
C Programming Skills

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Implement basic operations on static linear data structures.	BTL3	PO1, PO2,PO3, PO4
CO2	Implement various operations on dynamic linear data structures.	BTL6	PO1, PO2,PO3, PO4,PO5
CO3	Implement basic operations on non-linear data structures	BTL3	PO1, PO2,PO3, PO4, PO5
CO4	Implement searching techniques on linear and non- linear data structures.	BTL4	PO1, PO2,PO3, PO4
CO5	Implement sorting techniques on one dimensional array.	BTL4	PO1, PO2,PO3, PO4

S. No.	Detailed Statement	Mapping to CO #
	List of Practical	
	Core Practicals (Implement minimum 8 out of 10 practicals)	
1.	WAP to implement following operation on one dimensional array (i) Insertion (ii) Deletion (iii) Traversal (iv) Reverse (v) Merge	CO1
2.	WAP to Sort an array using menu driven: (i) BUBBLE SORT (ii) MERGE SORT(iii) INSERTION SORT (iv) SELECTION SORT	CO1, CO5
3.	WAP to implement a Singly Linked List.	CO2
4.	WAP to implement a Circular Linked Lists	CO2
5.	WAP to implement Doubly Linked Lists	CO2
6.	Write a menu driven program to implement (i) Static Stack (ii) Dynamic Stack.	CO1, CO2
7.	WAP to implement a (i) Static (ii) Dynamic Circular Queue	CO1, CO2
8.	WAP to implement a (i) Static (ii) Dynamic De-Queue.	CO1, CO2
9.	Implement recursive algorithms for the following operations on Binary Search Tree a) Insertion b) Searching	CO1, CO2, CO3, CO4
10.	Implement recursive algorithms for BST traversal- Inorder, Preorder, Postorder.	CO2, CO3
	Application Based Practical (Implement minimum 5 out of 10 practical)	
11.	WAP to search & display the location of an element specified by the user, in an array using (i) Linear Search (ii) Binary Search technique.	CO1, CO4
12.	WAP to accept a matrix from user, find out matrix is sparse or not and convert into triplex matrix.	CO1
13.	WAP to implement Polynomial addition operation using linked list.	CO2
14.	Write a C program to create two linked lists from a given list in following way INPUT List:- 1 2 3 4 5 6 7 8 9 10 OUTPUT:- First List:- 1 3 5 7 9 Second List:- 2 4 6 8 10	CO2

15.	WAP to implement Student Database using Linked List with the following structure • Name • Rollno • Marks of 5 subjects • Average • Result, If the average < 50, then print 'Fail', otherwise 'Pass'	CO2
16.	Write a program to convert Infix to equivalent (i) Prefix expression (ii) Postfix expression	CO1
17.	Write a program to evaluate (i) Prefix Expression (ii) Postfix Expression using stack.	CO1
18.	Let us assume a Patient's coupon generator for the Doctors' clinic. The patients are given the coupons on first-come-first-serve basis. After the visit of a patient, patient-ID is kept stack-wise. At the end of the day, the count is generated from the stack. Construct a menu-based program for patients' coupons generator using an appropriate data structure.	CO1, CO2
19.	WAP to implement an expression tree. (For example: (a + b / (c * d) – e))	CO3
20.	Sometimes a program requires two stacks containing the same type of items. Suppose two stacks are stored in separate arrays, then one stack might overflow while there is considerable unused space in the other. A neat way to avoid this problem is to put all spaces in one stack and let this stack grow from one end of the array, and the other stack starts from the other end and grows in the opposite direction, i.e., toward the first stack. In this way, if one stack turns out to be large and the other small, then they will still both fit, and there will be no overflow until all space is used. Declare a new structure that includes these two stacks and perform various stack operations.	CO1
Note: **1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor.** **2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**		

Course Code: BCA 176	**L T/P C**
Course Name: Practical-VI DBMS Lab	**0 4 2**

LEARNING OBJECTIVES:

The course is to provide the basics of SQL. To understand RDBMS and construct queries using SQL to design a database and manipulate data in it.

PRE-REQUISITES: NIL

COURSE OUTCOMES:
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Understand the structure and design of relational databases.	BT2	PO3
CO2	Write DDL statements in SQL to create, Modify and remove database objects	BTL1, BTL3, BTL4	PO3, PO5
CO3	Use constraints for the database	BTL1, BTL2, BTL3	PO3,PO5
CO4	Write DML statements in SQL to insert, Modify and remove data from database	BTL4	PO3,PO5
CO5	Write SQL statements to retrieve data based on the conditions provided by the user	BTL1, BTL2, BTL3	PO3,PO5
CO6	Use index and Views in database	BTL2	PO3,PO5
CO7	Use structured query language (SQL) to an intermediate/advanced level	BTL5, BTL6	PO4

List of Practicals		
S. No.	**Detailed Statement**	**Mapping to CO #**
Core Practicals (Implement All the mentioned practicals)		
The following are two suggestive databases. The students may use any one or both databases for their core practicals. However, the instructor may provide any other databases for executing these practical. **1. COLLEGE DATABASE**: STUDENT (USN, SName, Address, Phone, Gender) SEMSEC (SSID, Sem, Sec) CLASS (USN, SSID) SUBJECT (Subcode, Title, Sem, Credits) IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA) **2.COMPANY DATABASE:** EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo) DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION (DNo,DLoc) PROJECT (PNo, PName, PLocation, DNo) WORKS_ON (SSN, PNo, Hours)		
1	Draw an E-R diagram from given entities and their attributes	CO1

2	Convert the E-R diagram into a Relational model with proper constraints.	CO1

3	Write queries to execute following DDL commands :
	CREATE :Create the structure of a table with at least five columns
	ALTER:Change the size of a particular column.
	      Add a new column to the existing table.
	      Remove a column from the table.
	DROP: Destroy the table along with its data.
		CO2

4	Write queries to execute following DML commands : INSERT: Insert five records in each table. UPDATE: Modify data in single and multiple columns in a table DELETE: Delete selective and all records from a table	CO4
5	Write queries to execute following DML command : SELECT: Retrieve the entire contents of the table. Retrieve the selective contents (based on provided conditions) from a table. Retrieve contents from a table based on various operators i.e. string operators, logical operators and conditional operators,Boolean operators. Sort the data in ascending and descending order in a table on the basis of one column or more than one column.	CO5
6	Create table using following integrity constraints: Primary Key Unique Key Not Null Check Default Foreign Key	CO3
7	Write queries to execute following Aggregate functions Sum,Avg,Count,Minimum and Maximum value of a numeric column of a table using aggregate function	CO7
8	Retrieve data from a table using alias names .	CO5
9	Retrieve data of a table using nested queries.	CO5
10	Retrieve data from more than one table using inner join, left outer, right outer and full outer joins	CO5
11	Create view from one table and more than one table.	CO6
12	Create index on a column of a table.	CO6
Application Based Practicals		

13	Consider the Insurance company's Database given below. The primary keys are underlined and the data typesare specified.
	PERSON(driver_id# : string, name : string, address : string)
	CAR(regno : string, model : string, year : int)
	ACCIDENT(report_number : int, acc_date : date, location : string)
	OWNS(driver_id# : string, regno : string)
	PARTICIPATED(driver_id# : string, regno : string, report_number : int, damage_amount :number(10,2))
	    (i) Create the above tables by properly specified the primary key and the foreign key
	    (ii) Enter at least five tuples for each relation
	    (iii) Demonstrate how you can
	        a. Update the damage amount for the car with a specific regno, the accident with report number 12 to 25000.
	        b. Add a new accident to the database.
	    (iv) Find the total number of people who owned cars that were involved in accident in2002.
	    (iv) Find the number of accident in which cars belonging to a specific models were involved
		CO7

14	Consider the following schema of a library management system.Write the SQL queries for the questions given below; **Student(Stud_no : Integer, Stud_name: string)**	CO7

	Membership(Mem_no: integer, Stud_no: integer) **Book_(book_no: integer, book_name:string, author: string)** **lss_rec_(iss_no:integer, iss_date: date, Mem_no: integer, book_no: integer)** (i) Create the tables with the appropriate integrity constraints (ii) Insert around 10 records in each of the tables (iii) Display all records for all tables (iv) List all the student names with their membership numbers (v) List all the issues for the current date with student and Book names (vi) List the details of students who borrowed book whose author is Elmarsi & Navathe (vii)Give a count of how many books have been bought by each student (viii) Give a list of books taken by student with stud_no as 1005 (ix) Delete the List of books details which are issued as of today (x) Create a view which lists out the iss_no, iss _date, stud_name, book name	
15	Use the relations below to write SQL queries to solve the business problems specified. CLIENT (clientno#,name, client_referred_by#) ORDER (orderno#, clientno#, order_date, empid#) ORDER_LINE (orderno#, order line number#, item_number#, no_of_items, item_ cost,shipping_date) ITEM (item_number#, item_type, cost) EMPLOYEE (empid#, emp_type#, deptno, salary, firstname, lastname) Notes: a. Column followed by # is the primary key of the table. b. Each client may be referred by another client. If so, the client number of the referring client is stored in referred_by. c. The total cost for a particular order line = no_of_items * item_cost.c. Write queries for the following (i) Create all the above tables. (ii) Insert at least five records. (iii) Display all the rows and columns in the CLIENT table. Sort by client name in reverse alphabetical order. (iv) Display the item number and total cost for each order line (total cost = no of items X item cost). Name the calculated column TOTAL COST. (v) Display all the client numbers in the ORDER table. Remove duplicates. (vi) Display the order number and client number from the ORDER table. Output the result in the format. Client <clientno> ordered <orderno> (vii) Display full details from the ORDER_LINE table where the item number is (first condition) between 1 and 200 (no > or < operators) OR the item number is greater than1000 AND (second condition) the item cost is not in the list 1000, 2000, 3000 OR the order number is not equal to 1000. (viii) Display the client name and order date for all orders. (ix) Repeat query (6) but also display all clients who have never ordered anything. (x) Display the client name and order date for all orders using the join keywords. (xi) Display the client name and order date for all orders using the JOIN method. (xii) Display the client number, order date and shipping date for all orders where the shipping date is between three and six months after the order date. (xiii) Display the client number and name and the client number and name of the person who referred that client. (xiv) Display the client name in upper case only and in lower case only. (xv) Display the second to fifth characters in each client name.	CO7

Note:
1. In total 15 practicals to be implemented.
2. This is a suggestive list of practicals. However, the instructor may add or change any other database for executing queries as per the requirement.
REFERENCE BOOKS:

RB1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 6th Edition, McGraw Hill, 2010.
RB2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.
RB3. A. K. Majumdar, P. Battacharya, "Database Management Systems', TMH, 2017.
RB4. Bipin Desai, "An Introduction to Database Systems", Galgotia Publications, 1991.

Detailed Syllabus of 2nd Year

Course Code: BCA 201
Course Name: Computer Networks

L	T	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following: -
1. To study different types of media, multiplexing, switched networks, the Internet, TCP/IP suite, fiber-optic communications and the state-of-art networking applications.
2. To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.
3. Identify and discuss the underlying concepts of IPv4 & IPv6 protocols, along with their characteristics and functionality.
4. Details of IP operations in the Internet and associated routing principles
5. Analyzing various layering protocols in computer networks.

PRE-REQUISITES:
1. Fundamentals of Computers and IT

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to: -

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Utilize the fundamentals of data communication and networking to identify the topologies and connecting devices of networks.	BTL1 BTL2	PO1, PO2, PO3, PO7,PO8
CO2	Understand and describe the layered protocol model (OSI and TCP/IP model)	BTL2	PO1, PO2, PO3, PO7
CO3	Analyze the elements and protocols for peer – peer and communication between layers.	BTL3 BTL4	PO1, PO2, PO3, PO4, PO6, PO7
CO4	Evaluate and implement routing algorithms and Router basic configuration.	BTL3 BTL5	PO1, PO2, PO3, PO4, PO7, PO8
CO5	Evaluate the protocols and Principles in computer networking	BTL5 BTL6	PO1, PO2, PO3, PO4, PO5, PO6, PO7

UNIT – I

No. of Hours: 10   **Chapter/Book Reference: TB1[Chapter-1], TB2[Chapter-1, 2]**

Basic Concepts: Components of data communication, distributed processing, Line configuration, topology, transmission mode, and categories of networks. **OSI and TCP/IP Models:** Layers and their functions, comparison of models. **Transmission Media:** Guided and unguided, Attenuation, distortion, noise, throughput, propagation speed and time, wavelength, Shannon Capacity.

UNIT – II

No. of Hours: 12   **Chapter/Book Reference: TB1[Chapter-2, 3], TB2[Chapter-3, 9]**

Telephony: Multiplexing, WDM, TDM, FDM, circuit switching, packet switching and message switching. **Data Link Layer:** Types of errors, Framing (character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- NARQ, Selective repeat ARQ.

UNIT – III

No. of Hours: 12   **Chapter/Book Reference: TB1[Chapter-5], TB2[Chapter-18, 19, 20, 22]**

Network Layer: Internetworking & Devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway, Modems; Addressing: IPv4 and IPv6 addressing, IPv4 subnetting; Routing: Unicast Routing Protocols: RIP, OSPF, BGP;
Routing: Routing Methods- Static and Dynamic Routing, Routing basic commands, Distance vector protocol, Link state protocol

UNIT – IV

No. of Hours: 10   **Chapter/Book Reference: TB1[Chapter-6,7], TB2[Chapter-23, 24,25]**

Transport and upper layers in OSI Model: Transport layer functions and Protocols, connection management, functions of session layers, Presentation layer, and Application layer.

TEXT BOOKS:
TB1. A. S. Tenanbaum, "Computer Networks"; Pearson Education Asia, 4th Ed., 2003.
TB2. Behrouz A. Forouzan, "Data Communication and Networking", 2nd edition, Tata Mc Graw Hill.

REFERENCES:
RB1. D. E. Comer, "Internetworking with TCP/IP", Pearson Education Asia, 2001.
RB2. William Stallings, "Data and computer communications", Pearson education Asia, 7th Ed., 2002.
RB3. Leinwand, A., Pinsky, B. (2001). Cisco router configuration. United Kingdom: Cisco Press.

Course Code: BCA 203   **L   T   C**
Course Name: Computer Organization and Architecture   **3   1   4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. To study the various logic gates and design principles of different digital electronic circuits
2. To design different combinational and sequential circuits.
3. Identify the functional units of the processor and the factors affecting the performance of a computer
4. To learn about the Input –Output organization of a typical computer

PRE-REQUISITES:
Fundamentals of Computer

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to: -

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Able to understand the fundamentals of digital principles and able to design digital circuits by simplifying the Boolean functions	BTL2 BTL3 BTL5	PO1, PO7, PO11
CO2	Implement the combinational and sequential circuits for the given specifications	BTL3 BTL6 BTL1	PO1, PO4, PO7, PO11
CO3	Able to trace the execution sequence of an instruction through the processor	BTL1 BTL2	PO1, PO7, PO11
CO4	Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.	BTL2 BTL4	PO1, PO4, PO7, PO11
CO5	Demonstrate the ability to classify the addressing modes, instructions set	BTL2 BTL5	PO1, PO4, PO7, PO11

UNIT – I
No. of Hours: 11   Chapter/Book Reference: TB2[Chapter-2, 4], RB1 [Chapter-5, 6]

Boolean Algebra and Logic: Basics Laws of Boolean Algebra, Logic Gates, Simplifications of Boolean equations using K-maps SOP and POS, Don't Care condition.

Arithmetic Circuits: Adder, Subtractor, Parallel binary adder/Subtractor.

UNIT – II
No. of Hours: 11   Chapter/Book Reference: TB2 [Chapter-5, 6], RB1[Chapter-6,7]

Combinational Circuits: Multiplexers, De-Multiplexers, Decoders, Encoders.
Flip-flops: S-R, D, J-K, T, Clocked Flip-flop, Race around condition, Master slave Flip-Flop, Realisation of one flip-flop using other flip-flop, Applications of flip flop: Latch, Registers, Counters (elementary treatment to be given).

UNIT – III
No. of Hours: 11   Chapter/Book Reference: TB1[Chapter-5, 9], RB3[Chapter-11]

Data Transfer Operations: Register Transfer, Bus and Memory Transfer, Registers and micro-operations.

Basic Computer Organizations and Design: Instruction Codes, Computer Registers, Instruction Cycle, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes,

UNIT – IV

No. of Hours: 11 **Chapter/Book Reference: TB1[Chapter-12, 13], RB3[Chapter-7]**

Input-Output Organization: Peripheral Devices, Input-Output Interfaces, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA)

Memory Organization: Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

TEXT BOOKS:

TB1. Morris Mano, Computer System Architecture, 3rd Edition, Prentice-Hall of India Private Limited, 1999.

TB2. Moris Mano, "Digital Logic and Computer Design", PHI Publications, 2002

REFERENCES:

RB1. R. P. Jain, "Modern Digital Electronics", TMH, 3rd Edition, 2003.

RB2. WIliam Stallings, Computer Organization and Architecture, 4th Edition, Prentice Hall of India Private Limited, 2001

RB3. Subrata Ghosal," Computer Architecture and Organization", Pearson 2011

RB4. Malvino, "Digital Computer Electronics: An Introduction to Microcomputers", McGraw Hill

Course Code: BCA 205　　　　　　　　　　　　　　　　　　　　　**L　T　C**
Course Name: Object Oriented Programming with C++　　　　　　**3　1　4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. Gain knowledge and develop a broad understanding of bottom up approach
2. Construct object oriented solutions for real world scenarios

PRE-REQUISITES:
1. Knowledge of C programming
2. Basic Programming Skills

COURSE OUTCOMES (COs):
　　　After completion of this course, the learners will be able to: -

CO#	Detailed Statement of the CO	BT Level	Mapping to PO#
CO1	Understand the basic principles of Object-Oriented Programming	BTL2	PO2, PO3
CO2	Apply OOPs principles using C++ constructs	BTL3	PO3
CO3	Develop expertise in classification hierarchies and polymorphism using C++	BTL3	PO3, PO4
CO4	Comprehend the working of files and generic programming	BTL5	PO3, PO4

UNIT – I
No. of Hours: 10　　　　**Chapter/Book Reference: TB1 [Chapters 1, 2], TB2 [Chapters 1, 2, 3]**

Object Oriented Paradigm: Procedural vs. object-oriented development, basic concepts of object-oriented programming, applications and benefits of OOP, comparison between C and C++.

Beginning with C++: Stream based I/O, literals- constant qualifiers, operators in C++, reference variable, functions, default arguments, parameter passing by value, reference and pointer, inline functions, type conversion, basic C++ programs, new, delete operators- basic use and dynamic memory allocation for arrays.

UNIT – II
No. of Hours: 11　　　　**Chapter/Book Reference: TB1 [Chapters 10, 11], TB2 [Chapters 5, 6]**

Classes and Objects: C++ class declaration, access specifiers, member functions, arrays within a class, array of objects, memory allocation of objects, passing objects as arguments, returning objects from functions, function overloading, static data and member functions, friend function and friend class, this pointer

Constructors & Destructors: Introduction to constructor and destructor, parameterized constructor, constructor with default arguments, multiple constructors in a class, copy constructor.

UNIT – III
No. of Hours: 12　　　　**Chapter/Book Reference: TB1 [Chapters 13, 14, 15], TB2 [Chapters 7, 8, 9]**

Inheritance: Types of inheritance, derivation – public, private & protected, ambiguity resolution (function overriding), aggregation, composition v/s classification, virtual base class, constructor and destructor in derived classes.
Polymorphism: Types of polymorphism, early v/s late binding, **Virtual Functions**: Need for virtual functions, pointer to derived class objects, pure virtual functions, abstract classes.
Operator Overloading: Overloading unary operators, nameless objects, overloading binary operators, overloading with friend functions, conversion between basic types and user-defined types.

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UNIT – IV
</div>

No. of Hours: 11   **Chapter/Book Reference: TB1 [Chapters 16, 17, 18, 19], TB2 [Chapters 11, 12, 13]**

Parametric polymorphism: Generic Programming with Templates, Introduction, function templates/generic functions, characteristics, overloading of template functions, class templates, template arguments.
Exception Handling: Exception-handling model, types of exception, catching and handling exceptions, generic catch, rethrowing an exception, specifying exceptions for a function.
Streams & Files: C++ Streams, basic stream classes, C++ predefined streams, I/O operations, unformatted console I/O operations, manipulators, opening and closing a file- different modes and methods, error handling during file operations, file pointers and their manipulations, sequential access to file, random input and output operations, persistent objects, command line arguments.

TEXT BOOKS:
TB1.   K.R. Venugopal, Rajkumar, T. Ravishanker, "Mastering C++", TMH
TB2.   E. Balagurusamy, "Object Oriented Programming with C++", McGraw-Hill Education

REFERENCE BOOKS:
RB1.   Ashok N. Kamthane, "Object-Oriented Programming with ANSI And Turbo C++", Pearson Education.
RB2.   Schildt Herbert, "C++: The Complete Reference", Tata McGraw Hill.
RB3.   R. Lafore, "Object Oriented Programming using C++", Galgotia Publications.

Course Code: BCA 207
Course Name: Human Values and Ethics

L	T	C
2	0	2

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. To distinguish between values and skills, and understand the significance of values in personal and professional life
2. To understand harmony at all the levels of human living, and live accordingly.
3. To understand the role of a human being in ensuring harmony in society and nature.
4. To apply the understanding of harmony in existence in their profession and lead an ethical life

PRE-REQUISITES:
None

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to: -

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Identify and evaluate personal ethical values and their implications in various social situations	BTL1	PO10
CO2	Recognize the multiple ethical interests at stake in a real-world situation	BTL2	PO10
CO3	Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research	BTL3	PO10
CO4	Instill Moral and Social Values and Loyalty and appreciate the rights of others	BTL4	PO10
CO5	Comprehend the concept of harmony at all the levels of society and readiness to contribute towards harmony at all levels.	BTL5	PO10

UNIT – I

No. of Hours: 10   Chapter/Book Reference: TB1 [Chapters-1, 2], TB2 [Chapters-1]

Introduction to human values:

- Understanding the need, basic guidelines, process of value education
- Understanding the thought provoking issues- continuous happiness and prosperity
- Right understanding- relationship and physical facilities, choice making- choosing, cherishing and Acting
- Understanding values- Personal Values, Social values, Moral values and spiritual values, Self-Exploration and Awareness leading to Self-Satisfaction; Tools for Self-Exploration.

UNIT-II

No. of Hours: 10   Chapter/Book Reference: TB2 [Chapters 5-10]

Harmony and role of values in family, society and human relations

- Understanding harmony in the Family- the basic unit of human interaction; Understanding values in human-human relationship; Understanding harmony in the society-human relations.
- Interconnectedness and mutual fulfilment; Coexistence in nature.
- Holistic perception of harmony at all levels of existence-universal harmonious order in society.
  Visualizing a universal harmonium order in society- undivided society (Akhand Samaj), universal order (Sarvabhaum Vyawastha)- from family to world family.

UNIT-III

No. of Hours: 11   Chapter/Book Reference: TB1 [Chapters-2, 3]

Coexistence and role of Indian Ethos:

- Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature
- Ethos of Vedanta; Application of Indian Ethos in organizations in management;
  Relevance of Ethics and Values in organizations in current times.

UNIT-IV

No. of Hours: 11   Chapter/Book Reference: TB1 [Chapters-4, 5], TB2 [Chapters-12, 13]

Professional ethics

- Understanding about Professional Integrity, respect and equality, Privacy, Building Trusting relationships, Co-operation, respecting the competence of other profession.
- Understanding about taking initiative, promoting the culture of openness, depicting loyalty towards goals and objectives.
- Ethics at the workplace: - cybercrime, plagiarism, sexual misconduct, fraudulent use of institutional resources, etc.;
  Ability to utilize the professional competence for augmenting universal human order.

TEXT BOOKS:

TB1.   A Textbook on Professional Ethics and Human Values by R S Naagarazan.
TB2.   A Foundation Course in Human Values and Professional Ethics by R.R. Gaur, R. Sangal, G.P. Bagaria.
TB3.   Indian Ethos and Modern Management by B L Bajpai New Royal Book Co., Lucknow., 2004, Reprinted 2008.

REFERENCE BOOKS:

RB1.   A N Tripathy, 2003, Human Values, New Age International Publishers
RB2.   Human Values and Professional Ethics by Vaishali R Khosla, Kavita Bhagat
RB3.   I.C. Sharma. Ethical Philosophy of India Nagin & co Julundhar

Course Code: BCAT 211　　　　　　　　　　　　　　　　　　　　　　**L T/P C**
Course Name: Basics of Python Programming　　　　　　　　　　**4 0 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be

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In this course, the learners will be able to develop expertise related to the following: -
1. To understand Python programming fundamentals
2. To define the structure and components of a Python program.
3. To apply fundamental problem-solving techniques using Python
4. To design and program applications using Python.

PRE-REQUISITES:
1. **Computer Fundamentals**

COURSE OUTCOMES(COs):
After completion of this course, the learners will be able to: -

CO#	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Demonstrate knowledge of basic programming constructs in python.	BTL2	PO1, PO2, PO3,PO7
CO2	Illustrates string handling methods and user-defined functions in python	BTL3	PO1, PO2, PO3,PO7, PO10
CO3	Applying data structures primitives like List, Dictionary and tuples.	BTL2	PO1, PO2, PO3,PO4
CO4	Identify the commonly used operations involved in file handling	BTL3	PO1, PO2, PO3, PO4, PO7
CO5	To understand how python can be used for application development	BTL2	PO1, PO2, PO3, PO4, PO11

UNIT–I
No. of Hours: 11　　　　**Chapter/Book Reference: TB1[Chapters 1, 2], TB2[Chapters 1, 3, 6]**

Basic Introduction: Origin, Need of Python Programming, Features, program structure, identifiers, reserved words, escape sequences, IDLE-Python Interpreter
Python Programming Introduction: Variables and assignment statements, data types, **Operators**: Assignment, Unary, Binary, Arithmetic, Relational, Logical, Bitwise Operator and membership operator
Control Structures: if-conditional statements, if –else condition, if-elif-else condition, nested if-elif-else condition, Iteration (for Loop and while loop), Nested Loops, break and continue statement.
Strings: Slicing, Membership, Built in functions (count, find, capitalize, title, lower, upper and swap case, replace, join, isspace (), isdigit(), split(), startswith(), endswith()).

UNIT–II
No. of Hours: 11　　　　**Chapter/Book Reference: TB1[Chapter 3], TB2[Chapters 7, 12]**

Mutable and Immutable objects: List: creating, initializing, accessing, slicing, and traversing List. List operations: length, concatenation, repetition, in, not in, max, min, sum, all, any. List methods: append, extend, count, remove, index, pop, insert, sort, reverse.

Tuples: creating tuples, Tuple operations: length, concatenation, repetition, membership, maximum, minimum, tuple methods: count, index.

Dictionary: creating, accessing values, adding, modifying and deleting items in dictionary, Dictionary methods: len, str, clear, copy, get, update, copy. Difference between list and dictionary

UNIT–III
No. of Hours: 11   **Chapter/Book Reference: TB1 [Chapters 5], TB2[Chapters 2, 8]**

Concept of Functions: Functions: Defining, Calling and Types of Functions, Arguments and Return Values, Formal vs. Actual Arguments, Scope and Lifetime, Keyword Arguments, Default Arguments, Recursion.

Modules: importing Modules, Math and Random Module, creating your own modules, and concept of Packages

UNIT–IV
No. of Hours: 11   **Chapter/Book Reference: TB2[Chapter 9], TB1[Chapters 5, 7]**

NumPy Library: introduction to NumPy, Creation of One-Dimensional Arrays, Re-shaping of an Array, Element-wise Operations, Aggregate Operations, Array indexing, Array Slicing, insert Row/Columns, Append Row/Columns, Array Manipulation Operations.

Introduction to matplotlib: Bar Graphs , pie charts

File handling: Types of Files (Text file, Binary Files, CSV file), Creation, writing, appending, Insertion, deletion, updating, modification of Data in into the files.

TEXTBOOKS:
TB1.   Programming in Python 3: A Complete Introduction to the Python Language (2nd Edition), Mark Summerfield.
TB2.   Python Programming: A Modular Approach by TanejaSheetal, Kumar Naveen, Eleventh Impression, Pearson India Education Services Pvt. Ltd.
TB3.   Agile tools for real world data: Python for Data Analysis by Wes McKinney, O'Reilly
REFERENCE BOOKS:
RB1.   Let Us Python 2Nd Ed: Python Is Future, Embrace It Fast (Second Edition): YashvantKanetkar.
RB2.   Programming Python, 4th Edition by Mark Lutz Released December 2010 Publisher(s): O'Reilly Media, Inc.
RB3.   Python: The Complete Reference by Martin Brown.

Course Code: BCAP 211   **L   P   C**
Course Name: Basics of Python Programming   **0   2   1**

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

List of Practicals

S.No.	Problem Statement	Mapping to CO #
	Implement Minimum 10 out of 15 Practicals	
1	Write a program to enter two integers, two floating numbers and then perform all arithmetic operations on them.	CO1
2	Write a program to check whether a number is an Armstrong number or not.	CO1
3	Write a program to print the sum of all the primes between two ranges.	CO1
4	Write a program to swap two strings.	CO1
5	Write a menu driven program to accept two strings from the user and perform the various functions using user defined functions.	CO1, CO2
6	Write a program to find smallest and largest number in a list	CO2, CO3
7	Create a dictionary whose keys are month names and whose values are the number of days in the corresponding months. • Ask the user to enter a month name and use the dictionary to tell them how many days are in the month. • Print out all keys in the alphabetically order • Print out all the months with 31 days	CO2, CO3

	• Print out the key value pairs sorted by number of days in each month	
8	Make a list of first 10 letters of the alphabet, then use the slicing to do the following operations: • Print the first 3 letters of the list • Print any 3 letters from the middle Print the letter from any particular index to the end of the list	CO2, CO3
9	Write a program that scans an email address and forms a tuple of user name and domain.	CO2, CO3
10	Write a program that uses a user defined function that accepts name and gender (as M for Male, F for Female) and prefixes Mr./Ms. on the basis of the gender.	CO2, CO3
11	Write a program to display Bar graphs or Pie chart using Matplotlib.	CO2, CO3
12	Write a program that defines a function large in a module which will be used to find larger of two values and called from code in another module	CO2, CO3
13	Write a program to know the cursor position and print the text according to specifications given below: ● Print the initial position ● Move the cursor to 4th position ● Display next 5 characters ● Move the cursor to the next 10 characters ● Print the current cursor position ● Print next 10 characters from the current cursor position	CO2, CO3
14	Create a binary file with roll number, name and marks. Input a roll number and perform the following operations: • update the marks. • Delete the record • Display the record • Append the record • Search the record	CO4
15	Write a program to Create a CSV file by entering user-id and password, read and search the password for given user id	CO5
Note: 1. In total 10 practicals to be implemented. **2. This is a suggestive list of practicals. However, the instructor may add or change any other database for executing queries as per the requirement.**		

Course Code: BCAT 213 **L T C**
Course Name: Cyber Security **4 0 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

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1. Students will be able to understand and learn the concept, layers of Cyber Security.
2. Students will be able to learn about cybercrime and types of attack.
3. Students will be able to learn about how many tools and methods available of cybercrime.
4. To study about cybercrime real life examples and cases.
5. Students will be able to understand and learn about Ethical Hacking.
6. Students will be able to understand and learn about Cyber Forensics.

PRE-REQUISITES:
1. Fundamentals of Information Technology

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to: -

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Define the basic concept of Cyber Security, Cybercrime and Cybercriminals. Identify and understand about Cyber Threats.	BTL1 BTL2	PO1,PO2,PO3, PO7
CO2	Describe briefly types of criminal attack and classification of Cybercrimes. Describe Steganography.	BTL2	PO1,PO3, PO7
CO3	Identify and apply the Cybercrime Tools and Methods. Identify and apply the underlying concepts of Symmetric-key and Asymmetric-key Cryptography along with Digital Signature.	BTL1, BTL2, BTL3	PO1,PO3,PO6, PO8
CO4	Implement security for HTTP applications, Emails. Apply Firewall in your system.	BTL4	PO1,PO3,PO5, PO7
CO5	Implement, evaluate Keyloggers. Implement and evaluate different cyber security algorithms with the help of program.	BTL3, BTL5	PO1, PO4, PO6, PO7, PO8
CO6	Design and create security mechanisms to protect computer systems.	BTL6	PO1, PO4, PO6, PO7, PO8

UNIT – I
No. of Hours: 12   **Chapter/Book Reference: TB1 [Chapters – 1, 2], TB2[Chapters - 1, 2]**

Introduction to Cyber Security: Basic Cyber Security Concepts, Layers of Cyber Security, Cybercrimes, Cybercriminals, Cyberspace, Cyber threats, Cyberwarfare, Classification of Cybercrimes, Categories of Cyber Crime, Types of criminal attack, cyberstalking, botnet, cybercrime and cloud computing.

UNIT – II
No. of Hours: 10   **Chapter/Book Reference: TB1 [Chapters – 2, 3], TB2 [Chapter - 3, 4, 11]**

Cybercrime attacks on Mobile/Cell Phones, Introduction to Cybercrime Tools and Methods: phishing and its working, password cracking and its types, Keyloggers and its types, viruses, Trojan horse and backdoor, steganography, DoS & DDoS attack,

UNIT – III
No. of Hours: 10   **Chapter/Book Reference: TB1 [Chapter – 4], TB3 [Chapter - 2, 21]**

Cryptography: Introduction to Cryptography, Symmetric-key Cryptography, Asymmetric-key Cryptography, User Authentication, Password Authentication, Message Authentication, Digital Signature.
Securing Web Application, Services: Introduction, Basic security for HTTP Applications, Email Security, Backup issues, Identity Management and Web Services, Authorization Patterns, Firewall

UNIT – IV
No. of Hours: 12   **Chapter/Book Reference: TB1 [Chapter – 6], TB2 [Chapter - 7]**

Introduction to Cyber Forensics: Need of Cyber Forensics, Digital Evidence and its rules, RFC2822, Life cycle of Digital Forensics, process of Digital Forensics, Phases of Computer Forensics/Digital Forensics, Computer Forensics Investigation, Computer Forensics and Steganography, OSI 7-layer model to Computer Forensics.

TEXT BOOKS:
TB1. Supriya Madan and Rajan Gupta, "Security in Cyber Space and its Legal   Perspective", 1st Edition, AGPH Books.
TB2. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley.
TB3. Kevin Beaver, Hacking for Dummies Wiley Publishing, Inc.
TB4. Stallings and Brown, Computer Security: Principles and Practice, Fourth Edition, Publisher: Pearson, 2018.

REFERENCE BOOKS:
RB1. Cyber Security Essentials, James Graham, Richard Howar and Ryan Otson, CRC Press.
RB2. Introduction to Cyber Security: Jeetendra Pande.
RB3. Certified Ethical Hacker STUDY GUIDE Kimberly Graves Sybex.

Course Code: BCAP 213   **L**   **P**   **C**
Course Name: Cyber Security   **0**   **2**   **1**

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

List of Practicals

S.No.	Problem Statement	Mapping to CO #
1	Install and configure any Antivirus software on System	CO1
2	Implement prevention mechanisms to protect PC from Cyber Attack	CO1
3	Implement Steganography Algorithms	CO2
4	Implement and install the keyloggers to understand their working.	CO5
5	Implement hiding of Data in image using tools.	CO3
6	Apply security to Files/ Folder/ Application using access permissions	CO4
7	Study of System threat attacks - Denial of Services.	CO4

8	Study of Techniques uses for Web Based Password Capturing.	CO5
9	Study of Anti-Intrusion Technique – Honey pot.	CO6
10	Study of Sniffing and Spoofing attacks.	CO6

Note:
1. In total 10 practicals to be implemented.
2. This is a suggestive list of practicals. However, the instructor may add or change any other database for executing queries as per the requirement.

Course Code: BCA 221
Course Name: Principles of Management & Organizational Behaviour

L	T	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. To get the knowledge about the important management concepts and their applications.
2. To help the students to develop cognizance of the importance of management principles.
3. To have an insight of various functional departments in an organization.
4. To help the organization in understanding Organizational culture.

PRE-REQUISITES:
   None

COURSE OUTCOMES (COs):
   After completion of this course, the learners will be able to: -

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Develop basic knowledge about management, management process, managerial roles, skills and functions and management theories.	BTL2,1	PO1, PO2
CO2	To give knowledge about planning and decision making process. To describe about staffing and directing.	BTL2,4	PO2, PO1
CO3	To learn about the motivation theories and Leadership styles. To discuss about the Organizational behaviour and its application.	BTL4,6	PO3
CO4	To give basic knowledge people management, their personality and perception. To describe about the Organisational culture and its effects.	BTL5,2	PO3

UNIT – I
No. of Hours: 12   Chapter/Book Reference: TB1 [Chapters – 1, 2, 4]

Management: Meaning & concept, Management principles (Fayol & Taylor), Management process (in brief), Managerial levels, Skills, Roles and Functions of a manager, Management Theories (Classical, Neo classical, Behavioral, Systems & Contingency).

UNIT – II
No. of Hours: 10   Chapter/Book Reference: TB1 [Chapters – 7, 8, 10, 16, 17, 27, 28]

Planning: Meaning, Purpose & process, Decision making: Concept & process, Organizing: Process, Departmentation, Authority & Responsibility relationships, Decentralization.

Staffing: Concept, nature & importance of staffing and Directing.

UNIT – III
No. of Hours: 12   Chapter/Book Reference: TB1 [Chapters – 13, 18, 32, 33]

Motivation: concept & theories (Maslow's, Herzberg Two factor, McGregor's theory X & Y), Leadership: Concepts & styles. Controlling: Nature, Importance, significance & Process of control.

Organizational Behavior: concept and Nature of Organisational Behaviour, Importance, Challenges and Opportunities. Organizational culture: Meaning, importance and characteristics of organization culture.

UNIT – IV
No. of Hours: 10   Chapter/Book Reference: TB1 [Chapters –34, 35, 36, 40, 41]

Managing People - Meaning, Need of understanding human behavior in organization, Models of OB, Major concepts in OB (elementary) - Personality, Learning, concept of perception & perception theories, Attitude Building and Leadership.

TEXT BOOKS:
TB1. Dr. C.B Gupta "Management concepts & practices" S.Chand & Sons, 2009.

REFERENCES BOOKS:
RB.   Stoner, Freeman & Gilbert, "Management" 6th Edition, Pearson International.
RB2. Ankur Chhabra, "Organisational Behaviour", Sun India Publications, 2009
RB3. Robbins, Stephen P, "Organisational Behaviour". PHI, 2010

Course Code: BCA 233   **L T/P C**
Course Name: Designing Lab CorelDraw   **0 4 2**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following: -
1. Introduction to graphics designing.
2. Knowledge & hands-on on CorelDraw.

PRE-REQUISITES:
None

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to: -

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Explain the basics of graphics designing & CorelDraw suite.	BTL1	PO1, PO6
CO2	Exploring the vector & 3D tools in CorelDraw.	BTL3 BTL5	PO1, PO6
CO3	Exploring the custom shapes & basics of printing in CorelDraw.	BTL3 BTL5	PO1, PO6
CO4	Exploring the workspaces & objects in CorelDraw.	BTL3 BTL5	PO1, PO6

UNIT – I
Introduction to graphic designing, Input/Output Technologies, Color Coding: RGB, CMYK, Grayscale, Bitmap, Color Channel, Resolution, Printing Templates, Rastar Images, Vector Images, Measurement Units & Conversion, Introduction to CorelDraw.

UNIT – II
Introduction to Layers and Groups, Color Picker & Gradients, Status bar, Toolbar, Menu bar, Property bar, Shapes & Shape Tools, Pick & Transform Tools, 3-D Effects: Shadow, Bevel Effects, Extrusion Effects, Perspective Effects, Text Formatting, Colors Styles & Palette, Alignment Controls.**UNIT – III**
Blend Modes, Creating Custom Shapes, Shape Recognition Tool, Brush, Outline & Line Tools, Importing Images in CorelDraw, Transform Controls, Basics of Printing.

UNIT – IV
Generating Barcode & QR Code, Calendar, Web Objects, Workspace Customization, Importing/Exporting Objects, Quick Trace, Manual Image Tracing.

TEXT BOOKS:
TB1. Gary David Bouton, "CorelDRAW X7: The Official Guide", Corel Press.
TB2. DT Editorial Services (Author), "CorelDRAW 2018 in Simple Steps", Dreamtech Press.

REFERENCE BOOKS:
RB1. Prof. Satish Jain, M. Geetha, "CorelDRAW Training Guide", BPB Publication.
RB2. Deke McClelland, "CorelDRAW! 7 For Dummies", Hungry Minds Inc,U.S.
RB3. Roger Wambolt, "Bring It Home with CorelDRAW: A Guide to In-House Graphic Design", Delmar Cengage Learning.

List of Practicals

S. No.	Detailed Statement	Mapping to CO #
Core Practicals (Implement minimum 8 out of 10 practicals)		
1.	Create a file to demonstrate the use of layers, groups.	CO2
2.	Create a photo frame in CorelDraw.	CO2, CO3
3.	Take an image of basic shape (square, triangle, circle, rectangle and parallelogram) in CorelDraw & extract these shapes from the image to different layers.	CO2
4.	Create a QR Code in CorelDraw.	CO4
5.	Create a flower in CorelDraw with gradient. **Sample Output Image:**	CO2, CO3
6.	Create a visiting card for yourself in CorelDraw. (size=3.5 x 2 inch., color coding: CMYK)	CO1, CO2, CO3
7.	Create a Tri-Fold Brochure in CorelDraw for Tours & Travels Company.	CO1, CO2, CO3
8.	Create a border design in CorelDraw.	CO2, CO3
9.	Create basic shapes (square, triangle, circle, rectangle and parallelogram) in CorelDraw shape tools.	CO2, CO3
10.	Trace an image of some cartoon character in CorelDraw. (Do not use Quick Trace feature of CorelDraw)	CO4
Application Based Practicals (Implement Any one out of the following suggestive list)		
11.	Create a digital invitation card in CorelDraw Format. (size=A8 or A4, color coding: RGB)	CO1, CO2, CO3, CO4
12.	Create a banner for a college event in CorelDraw. (Size: A3, Color Code: CMYK)	CO1, CO2, CO3, CO4
13.	Create a Calendar for the current year in Corel Draw.	CO4
14.	Create a Book cover in CorelDraw.	CO1, CO4
15.	Create a Birthday Wishing card in CorelDraw (size=A8 or A4, color coding: RGB)	CO1, CO2, CO3, CO4
Note: **1. In total 10 practicals to be implemented. 2 additional practicals may be given by the course instructor.** **2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**		
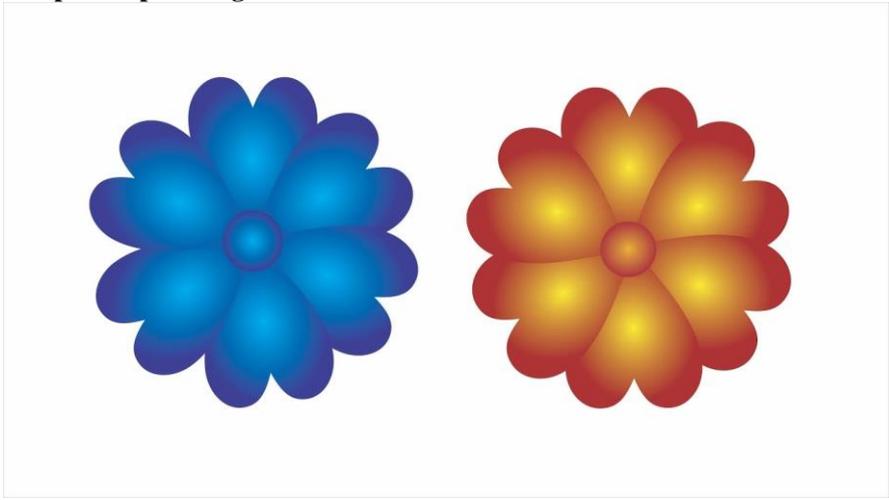
Course Code: BCA 235   **L T/P C**
Course Name: ASP.NET   **0 4 2**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO	BT Level	Mapping of PO#
CO1	Understand the designing and development of Web Application Components	BT2	PO2
CO2	Develop dynamic web pages using Web Server controls	BT4	PO4, PO5
CO3	Design and create web applications with Validation controls	BT3	PO6, PO7, PO8
CO4	Understand and Apply database connectivity to Web Applications	BT5	PO3

UNIT I

.NET Framework: Understand the .NET Platform, Components of .NET Framework: CLI, CTS, CLS, CLR and CLI. Understand the Assembly in .NET Framework.

UNIT II

Working with ASP.NET Forms: Building ASP.NET Page, Building Forms with Web Server Controls, Performing Form Validation and Validation Control, Advanced Control Programming

UNIT III

Working with ASP.NET Applications: Creating ASP.NET Application, Tracking User Sessions, Caching ASP.NET Application, Error Handling, Authentication and Authorization.

UNIT IV

Working with ADO.NET: Introduction to ADO.NET, Working with Data-Bound Controls, Working with Datasets

TEXT BOOKS:
TB1. Jason N. Gaylord, Christian Wenz, Pranav Rastogy, Todd Miranda, Scott Hanselman, "Professional ASP.NET 4.5 in C# and VB", Wrox Publication, Ist Edition, 2013
TB2. Stephen Walther, Kevin Hoffman, Nate Dudek, "ASP.NET 4.0 Unleashed", Pearson Education, Ist Edition 2010
TB3. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill
TB4. Malt. J. Crouch, "ASP.NET and VB.NET Web Programming", Pearson, 2002.

REFERENCE BOOKS:
RB1. T.M. Ramachandran, "Internet & Web Development", Dhruv
RB2. Kathleen Kalata, "Web Application using ASP.NET 2.0", 2nd Edition, 2009
RB3. K.K Sharma, "Web Technologies", A.B. Publication Delhi, First Edition, 2008
RB4. Jess Chadwick, Todd Snyder, Hrusikesh Panda, "Programming ASP.NET MVC 4", O'Reilly Media, Ist Edition, 2012

List of Practicals

S. No	Detailed Statement	Mapping of CO #

1	Create a simple Web Page showing the use of basic Web Controls of ASP.NET	CO1
2	Create a Web Page showing the integration of multiple forms in ASP.NET	CO1
3	Create a basic student registration form in ASP.NET	CO1, CO2
4	Create a Web Form to display all the validation controls of ASP.NET	CO2
5	Create a Cookie and set its expiry date. Demonstrate its application on Web form	CO3
6	Manage the state of a web form at global level and configure the states at application level	CO3
7	Apply the form-based authentication technique on web form in ASP.NET	CO2, CO3
8	Demonstrate a calendar control and a imagemap control on a Web Form	CO1
9	Create a web form to store the students' data in the database	CO4
10	Create a Web application for a Pizza Delivery using ASP.NET components	CO2, CO3, CO4

Note:
1. In total 10 practicals to be implemented. 2 additional practicals may be given by the course instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Course Code: BCA 237
Course Name: AR VR Development with Unity

L	T/P	C
0	4	2

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together,

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to: -

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Familiarize the basics of augmented, virtual and mixed reality.	BTL2	PO1, PO2, PO3, PO4
CO2	Understand and apply the game development basics.	BTL3	PO1, PO2, PO3, PO4, PO5
CO3	Compare and implement the various XR development techniques.	BTL5	PO1, PO2, PO3, PO4,PO5
CO4	Appraise the XR development using Unity Engine.	BTL5	PO1, PO2, PO3, PO4, PO5

UNIT-I
Chapter / Book Reference: TB1 [Chapters- 1,2,9,10], TB2 [Chapter- 1], TB3 [Chapters 1-5]
VR and AR Introduction:
Virtual Reality: VR Devices, Optics of VR,
Unity Introduction: Setting up Unity, Unity Hub, Managing different versions of Unity
Unity Interface: Interface Overview, Scene View, Game View, Hierarchy Window, Project Window, Inspector Window, Asset Store, Game Object

UNIT-II
Chapter / Book Reference: TB1 [Chapters 1,2,9,10], TB2 [Chapter- 1], TB3 [Chapters 1-5, 13-17]
Scripting in Unity: Order of Execution (Monobehavior), Transform and Vector3, Changing camera position, User input, Prefabs- Spawn Manager, Game Managers
Unity Physics Engine: Rigidbody, Force Modes, Raycasting, Collisions and Triggers, Physics Joints, Collision Physics
Effects and Animations: Introduction: Importance of animations, and Animator Controllers.
Particle Effects: Customize an explosion particle, Play the particle on collision.
Sound Effects: Add background music and Add audio clips on events.

UNIT-III
Chapter / Book Reference: TB1 [Chapter-8], TB2 [Chapters- 3-9,10-12,16-17]
VR Development: Setting Up, XR Package Manager, XR Interaction Toolkit, Different Controls
 (Gaze based, Controller based), World Space UI, Locomotion, Build and Run.

UNIT-IV
Chapter / Book Reference: TB1 [Chapters- 1,2,9,10], TB2 [Chapter-1]
Augmented Reality: Types of AR, Architecture of AR systems, AR Software Development Kits, AR Devices
AR Development: GIS Fundamentals, Sensor Data and plugins, Setting Up AR Foundation, AR Interaction, Plane Detection.

TEXTBOOKS:

TB1: William R. Sherman, Alan B. Craig "Understanding Virtual Reality", Science Direct, Second Edition, 2018.

TB2. Jesse Glover, Jonathan Linowes "Complete Virtual Reality and Augmented Reality Development with Unity", Packt, 2019.

TB3. Nicolas Alejandro Borromeo, "Hands-On Unity 2020 Game Development", Packt, 2020.

TB4. David Aversa, Aung Kyaw "Unity Artificial Intelligence Programming", Packt, Fourth Edition, 2018.

E-Resources:

E1. https://learn.unity.com/

List of Practicals

S. No	Detailed Statement	Mapping of CO
1	Create a new Unity Project and add three primitive 3D objects in a Scene	CO1,CO2
2	Create a 3D object 'Capsule' with following dimensions specified: i) Position (10,0,11) ii) Rotation (19,20,15) iii) Scale (3,3,4)	CO1,CO2
3	Using Primitive 3D objects create a prototype room environment in Unity with floor and walls	CO1,CO2
4	Create a prefab of a sphere and change its material	CO1,CO2
5	Write a script to instantiate 100 prefabs (of a 'sphere' 3D object) in the scene	CO1,CO2

6	In a Unity Scene,
	   1. Add a plane (as ground)
	   2. Add a cube with gravity turned on
	   3. Toggle gravity on/Off when button is clicked on-screen
		CO2,CO3

7	Create an Audio Manager in Unity
	   1. Add the capability to play different audio clips based on different conditions
	   2. Keep one background music on loop
		CO2,CO3

8	Use the Unity Asset Store to Import Starter Assets in Unity	CO1,CO2,CO3

9	In a Unity Scene,
	   1. Add a ground
	   2. Add a player
	   3. Add multi-movement for the player (using keyboard-mouse and touchscreen settings)
		CO1, CO2, CO3, CO4

10	Import XR Management and XR Input toolkit in Unity. Then,
	   1. Add a ray interactor
	   2. Add teleportation
	   3. Add grabbing
	   4. Add movement using touchpad/joypad
		CO1, CO2, CO3, CO4

Application Based Practical List (Unity Projects)		

1	Create a game in Unity called with following rules
	   1. Player can control a sphere's horizontal movement
	   2. Different coloured obstacles are incoming to the player
	   3. Player can only collide with obstacles with the same colour, once collided – colour of the player changes
	   4. Scoring based on time + bonus when colliding with same coloured obstacle
	   5. Game over when player collides with obstacle of different colour
		CO1, CO2, CO3, CO4

2	Create a game in Unity by setting up a top-down game with the objective of throwing food to hungry animals stampeding towards the player, before they can run through the boundary line. (Use assets available on the Unity Store to setup)	CO1, CO2, CO3, CO4
3	Create a program for setting up a game to test the player's reflexes, where the goal is to click and destroy objects randomly tossed in the air before they can fall off the screen.	CO1, CO2, CO3, CO4
4	Create a VR based First Person Shooter in Unity, where the player has to kill zombies present in the environment and reach the end of the environment to win. The player will play this game in an immersive VR headset and interact using controllers.	CO1, CO2, CO3, CO4
5	Create an AR project in Unity to detect a horizontal/vertical plane and then spawn an endless runner game on that recognised plane.	CO1, CO2, CO3, CO4

Note:

1. In total 10 practicals to be implemented. 2 additional practicals may be given by the course instructor. At least one application Based practical must be implemented.

2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Course Code: BCA-239
Course Name: Cyber Ethics

L T/P C
2   0   2

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

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2. Students will learn about impacting issues, laws, and developments that will help shape their future within the business community through technology
3. To facilitate students to grow and develop professionally and morally through readings, class participation, and course activities.

PRE-REQUISITES:
None
COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to: -

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Define cyber ethics and recognize cyber ethic issues	BTL1	PO10
CO2	Identify how security issues in cyberspace raise ethical concerns.	BTL3 BTL5	PO10
CO3	Recognize various types of cybercrime and its impact	BTL3 BTL5	PO10
CO4	Discuss ethical issues associated with the use of social networks and social media	BTL3 BTL5	PO10
CO5	Survey recent whistle-blowing cases focusing on associated ethical issues	BTL5	PO10

UNIT – I

No. of Hours: 05   Chapter/Book Reference: TB1 [Chapters – 1, 2,3]
Emergence of cyber space. Cyber Jurisprudence, Cyber Ethics, Ethics for IT Workers and IT Users, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions The Importance of Cyber Law, Significance of cyber Ethics, Need for Cyber regulations and Ethics.

UNIT – II
No. of Hours: 05   Chapter/Book Reference: TB1 [Chapters – 1, 2,3]
Cyberspace-Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access. Cyberattacks and Cybersecurity, Privacy Issues

UNIT – III
No. of Hours: 05   Chapter/Book Reference: TB1 [Chapters – 4,5,6]

Freedom of Expression, Intellectual Property Issues, Ethical Decisions in Software Development,

Social Media Ethical issues
Ethical Issues in AI and core Principles, Introduction to Block chain Ethics.

UNIT – IV

No. of Hours: 08   Chapter/Book Reference: TB1 / Online articles / News and legal case

Discussion on articles, companies, or legal cases that deal with an ethical issue. Students are required to analyze and present at least one multinational company and investigate its ethical policies and practices. These polices can normally be found using any search engine.

TEXT BOOKS:
TB1.   Cyber Ethics 4.0 Serving Humanity with Values Editors Christoph Stückelberger / Pavan Duggal e-book by Globalethics.net available for download from https://repository.globethics.net/handle/20.500.12424/169317
REFERENCE BOOKS:
The students may refer free e-books or online latest articles, news and legal cases dealing cyber ethical issues for understanding the importance of cyber ethics.

Course Code: BCA 271   **L   T/P   C**
Course Name: Practical – VII C++ Lab   **0   4   2**

LEARNING OBJECTIVES:
In this course, the learners will be able to:
1. Develop concepts related to Object Oriented Programming
2. Construct object oriented solutions in real world scenarios

PRE-REQUISITES:
1. Knowledge of C programming
2. Basics of Programming

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to: -

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Implement basic concepts of Object Oriented Programming	BTL 3	PO3
CO2	Implement the concept of Classes and Objects	BTL 3	PO2
CO3	Analyse and apply various polymorphism techniques to solve real life problems	BTL 4	PO2, PO4
CO4	Implement Generic Classes, Exception Handling and various file operations	BTL 4	PO4

List of Practicals		
S. No.	Detailed Statement	Mapping to CO #
Core Practicals (Implement minimum 8 out of 10 practicals)		
1	WAP to implement '*Inline function*'	CO1
2	WAP to implement call by reference and return by reference using class. [Hint. Assume necessary functions]	CO1
3	WAP to implement friend function by taking some real life example	CO2
4	WAP to implement '*Function Overloading'*	CO3
5	WAP to implement *Parameterized Constructor, Copy Constructor* and *Destructor*	CO2
6	WAP to show the usage of constructor in base and derived classes, in multiple inheritance	CO3
7	WAP to show the implementation of '*containership'*	CO3
8	WAP to show swapping using template function (Generic)	CO4
9	WAP to implement '*Exception Handling'*	CO4
10	WAP to read and write values through object using file handling	CO4

	Application Based Practicals (Implement minimum 5 out of 10 practicals)	
11	Create a class employee which have name, age and address of employee, include functions getdata() and showdata(), getdata() takes the input from the user, showdata() display the data in following format: *Name:* *Age:* *Address:*	CO2
12	Write a class called **CAccount** which contains two private data elements, an integer **accountNumber** and a floating point **accountBalance,** and three member functions: • A constructor that allows the user to set initial values for **accountNumber** and **accountBalance** and a default constructor that prompts for the input of the values for the above data numbers. • A function called **inputTransaction**, which reads a character value for **transactionType**('D' for deposit and 'W' for withdrawal), and a floating point value for **transactionAmount**, which updates **accountBalance**. A function called **printBalance**, which prints on the screen the **accountNumber** and **accountBalance.**	CO2
13	Define a class *Counter* which contains an int variable *count* defined as static and a static function Display () to display the value of *count*. Whenever an object of this class is created *count* is incremented by 1. Use this class in main to create multiple objects of this class and display value of count each time	CO2
14	WAP to add and subtract two complex numbers using classes	CO2
15	Write program to overload Binary + to add two similar types of objects. (Both with and without using friend functions)	CO3
16	WAP to implement += and = operator	CO3
17	Implement the following class hierarchy considering appropriate data members and member functions 	CO3
18	Implement the following hierarchy considering appropriate data members and member functions (use Virtual functions). 	CO3
19	WAP to convert meter to centimeter and vice versa, using data conversions and operator overloading	CO3
20	WAP to count digits, alphabets and spaces, stored in a text file, using streams	CO4
Note: **1. In total 15 practical to be implemented. 2 additional practical may be given by the course instructor.** **2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**		

Course Code: BCA 202
Course Name: Java Programming

L	T	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. Learn how to implement Object Oriented concepts through Java.
2. Identify and apply the Java thread model to program Java applications.
3. Develop GUI applications using Java swings

PRE-REQUISITES:
1. Programming fundamental
2. Object-Oriented concepts

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Illustrate the Object-Oriented paradigm and Java language constructs	BT2	PO3
CO2	To inculcate concepts of inheritance to create new classes from existing ones and design the Classes needed given a problem specification.	BT3	PO3
CO3	To familiarize the concepts of packages and interfaces.	BT3	PO4
CO4	To facilitate students in handling exceptions and defining their own exceptions.	BT4	PO4
CO5	To manage input output using console and files	BT4	PO4
CO6	To apply the Java Thread model to develop multithreading applications.	BT5	PO4
CO7	To understand and apply the concepts of GUI programming using swings.	BT6	PO5, PO6

UNIT–I
No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters – 1, 2, 3, 5, 6], TB2[Chapters - 2, 3, 4, 5, 6, 7, 8]

Java Basics: Java as Object-oriented Programming Language History of Java, Features of Java, Difference between Java and C++, Java Architecture (JDK, JVM, JRE), Java Tokens: Data types, Literals, Variables, Scope and lifetime of variables, Operators. Control Structures, Arrays.
Introducing Classes: Creating a Class: properties, methods and constructors. Object Access modifiers, Method Overloading, Garbage collection, this keyword, Static (variable, method, block), final keyword, Wrapper Classes, String class and methods.

UNIT – II
No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters – 7, 8, 9], TB2[Chapters - 9, 10, 11]

Inheritance: Types, Super keyword, method overriding, covariant return type, abstract class.

Interfaces and Packages: Creation and implementing an interface, difference between abstract class and interface, Packages, and importing a package.

Exception Handling: Exception Class, built-in checked and unchecked exceptions, user-defined exceptions, use of try, catch, throw, throws, finally

UNIT – III
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters – 11, 12], TB2[Chapters - 13]

Using I/O: Elementary concepts of Input/Output, using the byte streams, reading and writing using byte streams, automatically closing a file, using the character-based streams, File I/O using character streams (using a File Writer and using a File Reader)

Multi-threaded programming: Multithreading fundamentals, Thread class, and Runnable interface, the life cycle of thread, creation of single and multiple threads, implementation of Thread methods, Synchronization (using Synchronized methods, synchronized statement).

UNIT – IV
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters – 17, 18]

Swings Fundamentals: Components (JLabel and ImageIcon, using swing Buttons (JButton, JToggleButton, JCheckBox, JRadioButton), JTextField, JScrollPane, JList, JComboBox) and Containers, Layout managers, event delegation Model, event handling (event sources, event listeners, event classes and interfaces, adapter classes).

JDBC: JDBC Architecture, JDBC Drivers, Connection, Statement, Prepared Statement, Result set, Connecting to the Database using JDBC.

TEXT BOOKS:

TB1. Herbert Schildt, "Java 2 -The Complete Reference" – Tata McGraw Hill Education Private Limited, 2010

TB2. Trilochan Tarai, "Java Core Concepts and Applications", I.K. International Publishing house pvt. Ltd., 2015

REFERENCEBOOKS:

RB1. E.Balaguruswamy,"Programming with Java A Primer", McGraw Hill Education Private Limited, 5th Edition,2015.

RB2. Herbert Schildt, Dale Skrien, "Java Fundamentals A Comprehensive Introduction" – Tata McGraw Hill Education Private Limited, 2013

RB3. Cay S. Horstmann, "Core Java Volume 1 – Fundamentals", 10th edition, Pearson, 2017

RB4. Ken Arnold, Davis Holmes, James Gosling, Prakash Goteti, "The Java Programming Language", 3rd edition, Pearson, 2008.

	L	**T**	**C**
Course Code: BCA 204			
Course Name: Software Engineering	**3**	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
The paper aims to understand the importance, limitations and challenges of processes involved in software development.
In this course, the learners will be able to develop expertise related to the following:
1. To gain knowledge of various software models.
2. To gain knowledge of various software design activities.
3. To learn cost estimation, software testing, Maintenance and debugging.

PRE-REQUISITES:
NONE
COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	To evaluate languages to code front end and back end of a software	BTL2	PO5
CO2	Instantiating into the process of designing, coding and testing a software module.	BTL2	PO4
CO3	Organizing a software product along with its complete documentation.	BTL6	PO1
CO4	Implementing Software Development Cycle to develop a software module.	BTL5	PO4
CO5	To analyze the use of techniques, skills and modern engineering tools necessary for software development.	BTL2	PO6
CO6	Organizing a complete software module	BTL3	PO8

UNIT – I
No. of Hours: 12 Chapter/Book Reference: TB1 [Chapters - 1, 3], TB2 [Chapters - 3, 5]

Introduction of software engineering: Software Crisis, Software life cycle models, Waterfall, Prototype, Spiral Models, Agile model.
Software Requirements analysis & specifications: Requirement engineering, requirement elicitation techniques like FAST, QFD, Requirement analysis using (DFD use-case, sequence and class diagram (with case studies), ER Diagrams, Requirements documentation: SRS, Characteristics & organization of SRS
UNIT – II
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter - 1, 4]

Software Project Planning: Software Metrics-Definition and Need, Types of Metrics-Product, Process and Project Metrics, Size Estimation like lines of Code & Function Count, Halstead Software Science measure, Cost Estimation: Need, Models COCOMO: Basic model, Intermediate model
Risk Management: Software Risks, Types of risk, risk management activities: risk assessment, risk control.

UNIT – III
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter - 5, 6], TB2 [Chapter - 24]

Software Design: Cohesion & Coupling, Classification of Cohesiveness & Coupling,
Quality management: Quality concept, software quality assurance, Total Quality Management (TQM), software review, software inspection
Software Implementation: Structured coding techniques, coding style, Standards and guidelines, documentation guidelines. Reverse Engineering, Software Re-engineering, Configuration Management.

UNIT – IV
No. of Hours: 12 Chapter/Book Reference: TB1 [Chapter 8, 9], TB2 [Chapter 8]

Software Testing: Testing Process, Levels of Testing: Unit testing, Integration testing and system testing. Types of Testing: Manual testing, Automation Testing. Methods of Testing- , Black box, White box and Grey Box Testing. Validation, Verification, Alpha-Beta testing, Acceptance testing, Functional Testing and its types, Structural Testing Difference between: Testing and Debugging
Software Maintenance: Management of Maintenance, The Maintenance Process and Types of maintenance: Preventive, Perceptive, Adaptive and Corrective Maintenance.Maintenance tools and techniques.

TEXT BOOKS:
TB1. K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed., New Age International,   2005.
TB2. I. Sommerville, "Software Engineering", 9th Edition, Pearson Edu.

REFERENCE BOOKS:
RB1. Jibitesh Mishra and Ashok Mohanty, "Software Engineering", Pearson
RB2. R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.
RB3. James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach", John Wiley & Sons.

Course Code: BCA 206   **L T C**
Course Name: Introduction to Management and Entrepreneurship   **3 1 4**
          Development

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Development of critical thinking and to inspire students to developed an entrepreneurial mind-set.
2. Acquisition of values and attitudes towards understanding complex business problems
3. Promoting active participation in solving current business problems and preventing the future ones.
4. Encouraging students to understand the fundamentals of management

PRE-REQUISITES:

Basic awareness about the Entrepreneurship Development

COURSE OUTCOMES (COs):

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

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Gain in-depth knowledge on Entrepreneurial development in today's global scenario	BTL2	PO2, PO10, PO11
CO2	Understand the concept of entrepreneurs and to help the students to develop an entrepreneurial mind-set	BTL3	PO9, PO10, PO11
CO3	Develop critical thinking for shaping strategies and help them to become an successful entrepreneur	BTL3	PO3, PO5, PO11
CO4	Acquire values and attitudes towards understanding complex business problems, and active participation in solving current business problems.	BTL4	PO3, PO10, PO11
CO5	Understand the concept of the fundamentals of management	BTL5	PO2, PO5, PO10, PO11

UNIT–I
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters - 1, 2], TB2 [Chapters - 1, 2, 3], TB3 [Chapter - 1]

Introduction to Entrepreneurship: Meaning and concept of entrepreneurship, the history of entrepreneurship development, Role of entrepreneurship in economic development, General characteristics and personality traits of entrepreneurs. Factors affecting entrepreneurship, Agencies in entrepreneurship development in India.

UNIT–II
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter - 11], TB2 [Chapters - 6, 7], TB3 [Chapter - 4]

Creativity: Necessity of Creativity in the development of entrepreneur, Steps in Creativity, Defining Innovation, importance of innovation. Identification of opportunities for problem solving with innovation. Decision making and Problem Solving (steps indecision making). Example from industry, day to day operations

UNIT–III
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter - 7], TB2 [Chapters - 10, 2, 1]

Role of an Entrepreneur: The Entrepreneur's role in the context of contribution to society; Examples from industry; the role of changing the mindset and the development of out of box thinking. Introduction to Design Thinking. Entrepreneurs as role models, mentors and influencers. Entrepreneurial success stories.
Historical Perspective, Global Indian Entrepreneurs, Institutions, Modern Entrepreneurs

UNIT–IV
No. of Hours: 10   Chapter/Book Reference: TB3 [Chapters - 21, 22]
Fundamentals of Management: Meaning of Business and its management the role and importance of leadership in entrepreneurship. Difference between Management and Leadership. The importance of planning in entrepreneurship venture. The role and importance of business plan in entrepreneurship venture

TEXT BOOKS:
TB1. S.S Khanka, Entrepreneurship Development, S.Chand
TB2. Sangram Keshari Mohanty, Fundamentals of Entrepreneurship, PHI Learning Private Limited 2018
TB3. Abha Mathur; Entrepreneurship Development, Taxman, Fifth Edition
REFERENCE BOOKS
RB1. Srivastava S. B: A Practical Guide to Industrial Entrepreneurs; Sultan Chand and Sons, New Delhi.
RB2. Prasanna Chandra: Protect Preparation, Appraisal, Implementation; Tata McGraw Hill. New Delhi.
RB3. Chabbra, T.N, Entrepreneurship Development, Sun India

Course Code: BCAT 212   **L T C**
Course Name: Introduction to Data Science   **4 0 4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. Apply mathematical principles to the analysis of data.
2. Analyze data sets in the context of real world problems.
3. Develop and implement data analysis strategies base on theoretical principles, ethical considerations, and knowledge of the underlying data

PRE-REQUISITES:
None

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Basics of Data Science and Data Collection strategies	BTL2	PO1, PO2, PO3,PO7
CO2	Illustrating statistical analysis of data.	BTL3	PO1, PO2, PO3, PO7.
CO3	Working with the data structures of python like series and Data Frames	BTL3	PO1, PO2, PO3,PO4
CO4	Statistical analysis of data with the help of python	BTL3	PO1, PO2, PO3

UNIT–I
No. of Hours: 11   **Chapter/Book Reference: TB1 [Chapters - 1, 2]**
Introduction to data Science, Evolution of Data Science, Data Science Roles, Stages in a Data science Project, Applications of Data Science In various fields, Data security Issues.
Data Collection Strategies, Data Pre-processing overview- Data Cleaning- Data Integration and transformation- Data Reduction- Data Discretization.

UNIT–II
No. of Hours: 11   **Chapter/Book Reference: TB2 [Chapters - 4, 6, 7, 14]**
Statistics for Data Science: Describing a Single Set of Data, Central Tendencies and Dispersion.
Descriptive Statistics- Mean, standard Deviation, Skewness and Kurtosis, Box plots, Pivot Table, Linear Regression.

UNIT–III
No. of Hours: 11   **Chapter/Book Reference: TB1 [Chapter - 5, 6, 7]**
Why Python? - Essential Python libraries
Introduction to NumPy: NumPy Basics: Arrays and Vectorized Computation- The NumPyndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing
Data handling using Pandas in python: Series (creation from ndarray, dictionary; mathematical operations; Head and Tail functions), DataFrames (creation from dictionary of series, operations on rows and columns).
Statistical functions using pandas like min, max, count, sum, quartile, standard deviation, variance & DataFrame operations like aggregation, group by, Sorting, Deleting, Renaming Index, Pivoting.

UNIT–IV

No. of Hours: 11   Chapter/Book Reference: TB2 [Chapters - 15, 20, 23]

Case Studies: Checking different patterns in data, Forecasting demand, investigating clinical data

TEXT BOOKS:

TB1. McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly, 2nd Edition,2018

TB2. Agile tools for real world data : Python for Data Analysis by Wes McKinney, O'Reilly

TB1. Applying Data Science Business Case Studies Using SAS By Gerhard Svolba · 2017

REFERENCE BOOKS:

RB1. Python: The Complete Reference by Martin Brown

RB2. Programming Python, 4th Edition by Mark Lutz Released December 2010 Publisher(s): O'Reilly Media, Inc.

Course Code: BCAP 212		**L P C**
Course Name: Introduction to Data Science		**0 2 1**

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

List of Practicals		
S. No.	**Detailed Statement**	**Mapping to CO #**
1.	Create a pandas series from a dictionary of values and an ndarray.	CO1, CO3
2.	Create a Series and print all the elements that are above 75th percentile.	CO2, CO3
3.	Perform sorting on Series data and DataFrames	CO2, CO3
4.	Write a program to implement pivot() and pivot-table() on a DataFrame.	CO2, CO3, CO4
5.	Write a program to find mean absolute deviation on a DataFrame.	CO2, CO3, CO4
6.	Two Series object, Population stores the details of four metro cities of India and another object AvgIncome stores the total average income reported in four years in these cities. Calculate income per capita for each of these metro cities.	CO2, CO3, CO4
7.	Create a DataFrame based on E-Commerce data and generate mean, mode, median.	CO2, CO3, CO4
8.	Create a DataFrame based on employee data and generate quartile and variance.	CO2, CO3, CO4
9.	Program to implement Skewness on Random data.	CO2, CO3, CO4
10.	Create a DateFrame on any Data and compute statistical function of Kurtosis.	CO2, CO3, CO4
11.	Series objects Temp1, temp2, temp3, temp 4 stores the temperature of days of week 1, week 2, week 3, week 4. Write a script to:- a. Print average temperature per week b. Print average temperature of entire month	CO2, CO3, CO4
12.	Write a Program to read a CSV file and create its DataFrame.	CO2, CO3, CO4
13.	Consider the DataFrame QtrSales where each row contains the item category, item name and expenditure and group the rows by category, and print the average expenditure per category.	CO2, CO3, CO4
14.	Create a DataFrame having age, name, weight of five students. Write a program to display only the weight of first and fourth rows.	CO2, CO3, CO4
15.	Write a program to create a DataFrame to store weight, age and name of three people. Print the DataFrame and its transpose.	CO2, CO3, CO4
Note: **1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.** **2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**		

Course Code: BCAT 214

Course Name: Introduction to Artificial Intelligence

L	T	C
4	0	4

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. To learn the basics of designing intelligent agents that can solve general purpose problems.
2. To represent and process knowledge, plan and act, reason under uncertainty and can learn from experiences

PRE-REQUISITES:
Basic Programming Skills

COURSE OUTCOMES(COs):
After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	To understand elements constituting problems and learn to solve it by various uninformed and informed (heuristics based)	BTL1,BTL2, BTL3,	PO1, PO2,PO4
CO2	To understand formal methods for representing the knowledge and the process of inference to derive new representations of the knowledge.	BTL2, BTL3	PO1, PO2, PO4,
CO3	Analyze and apply the notion of uncertainty and some of probabilistic reasoning methods to deduce inferences under uncertainty	BTL3, BTL4	PO1, PO2, PO4,
CO4	Apply some mechanisms to create and improve AI system.	BTL3, BTL5	PO4, PO6, PO8

UNIT–I
No. of Hours: 12   Chapter/Book Reference: TB1 [Chapters - 1, 2, 3]; TB2 [Chapters- 1, 3, 4]
Overview of AI: Introduction to AI, Importance of AI, AI and its related field, AI techniques, Criteria for success.
Problems, problem space and search: Defining the problem as a state space search, Production Systems and its characteristics, Issues in the design of the search programs.
Heuristic search techniques: Generate and test, hill climbing, best first search technique, problem reduction, constraint satisfaction.

UNIT–II
No. of Hours: 12   Chapter/Book Reference: TB1 [Chapters - 5, 6]; TB2 [Chapters - 7, 8, 9, 10]
RB1 [Chapters - 5, 6, 7]

Knowledge Representation: Definition and importance of knowledge, Knowledge representation, various approaches used in knowledge representation, Issues in knowledge representation.
Logical Reasoning: Logical agents, propositional logic, inferences, Syntax and semantics of First Order Logic, Inference in First Order Logic Knowledge Base, forward chaining, backward chaining, unification, resolution, Expert system : Case study of Expert system in PROLOG

UNIT–III
No. of Hours: 10   Chapter/Book Reference: TB1 [Chapters - 7, 8, 15]; TB2 [Chapters - 13, 14]

Handling Uncertainty: Non-Monotonic Reasoning, Probabilistic reasoning, Bayes 'Theorem, Certainty factors and Rule-based Systems, Bayesian Networks, Dempster-Shafer Theory, Introduction to Fuzzy logic. Fuzzy set definition & types. Membership functions. Designing a fuzzy set for a given application

Natural Language Processing: Introduction, Syntactic Processing, Semantic Processing, Pragmatic Processing**.**

UNIT–IV
No. of Hours: 10   Chapter/Book Reference: TB1 [Chapter 17]; TB2 [Chapters - 18, 19]

Learning: Introduction to Learning, Rote Learning, learning by taking advice, learning in problem solving, learning from examples: Induction, Explanation-based Learning, Discovery, Analogy, Neural Networks, and Genetic Learning.

TEXT BOOKS:
TB1. Rich and Knight, "Artificial Intelligence", Tata McGraw Hill, 1992.
TB2. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Second Edition (Indian Reprint: Pearson Education)

REFERENCE BOOKS:
RB1. Ivan brakto :"Prolog Programming for AI ", Addison Wesley
RB2. George F.Luger Artificial Intelligence Pearson Education
RB3. Ben Coppin Artificial Intelligence Illuminated Jones and Bartlett Publisher

Course Code: BCAP 214   **L   P   C**
Course Name: Introduction to Artificial Intelligence   **0   2   1**

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

List of Practicals

S. No.	Detailed Statement	Mapping to CO #
1.	Write a program to implement Breadth First and Depth First Search	CO1
2.	Write a Program for the Best First Search and A* search algorithm	CO1
3.	Write a program to implement Water Jug Problem	CO1
4.	Write a program to implement 4-Queen Problem	CO1
5.	Write a program to implement AO* algorithm	CO1
6.	Write a program to implement hill climbing & steepest ascent hill climbing algorithm	CO1
7.	Write a program to implement Travelling Salesman Problem	CO1
8.	(a) Write a program to implement List operations (Nested List, Length, Concatenation, Membership, Iteration, Indexing and Slicing)? (b) Write a program to implement List methods (Add, Append, and Extend & Delete).	CO2
9.	Write a program to implement First Order Predicate using: a. Backward Chaining b. Forward Chaining	CO2
10.	(a) Write a program to remove stop words for a given passage from a text file using Natural Language Toolkit (NLTK)? (b) Write a program to implement stemming for a given sentence using NLTK? (c) Write a program to POS (Parts of Speech) tagging for the given sentence using NLTK? (d) Write a program to implement Lemmatization using NLTK?	CO3
11.	(b) Write a program for Text Classification for the given sentence using NLTK?	CO3
12.	Write a program to implement Artificial Neural Network (ANN) for Classification using a dataset	CO4
13.	Write a program to implement Genetic Algorithm for different types of gene representation	CO4
14.	Write a program to implement ANN for Bayesian networks	CO4
15.	Write a program to implement back propagation algorithm using ANN	CO4

Note:
1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Bachelor of Computer Applications programme offered by USICT at affiliated institutions.

Course Code: BCAT 216

Course Name: Network Security

L T C

4 0 4

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its sub parts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following: -
1. Students will be able to learn about basic security issues and concepts of Network Security.
2. Students will be able to understand the Describe briefly the use of Cryptography and Steganography.
3. To develop graduates that can identify, analyze, and remediate network security breaches.
4. To learn about Firewall and his principles.
5. Students will be able to understand the concept of Kerberos and use of this.
6. To Design and Implement different network security algorithm by using Program.
7. Students will be able to understand the computer network and secure network communication issues along with their remedies.
8. Students will be able to learn and evaluate the different algorithm by using Program.

PRE-REQUISITES:
1. Computer Network
2. C, C++ (Programming Knowledge of C/C++)

COURSE OUTCOMES(COs):

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

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Define and explain the issues and basic concepts of Network Security. To understand how to draw a network model.	BTL1, BTL2, BTL4	PO7
CO2	To Explain, understand and summarize the concepts, types and features of Firewall.	BTL2	PO1, PO7
CO3	Explain and implement working of authentication, authorization, Packet security, IP Security, Firewall by using some suitable examples.	BTL3, BTL2	PO3, PO4, PO7
CO4	Classify and organize the architecture of network security management.	BTL2, BTL4	PO7
CO5	Evaluate different Network Security algorithms with the help of program.	BTL5	PO3, PO4, PO7
CO6	Design and create a network security architecture for an organization.	BTL6	PO4, PO7, PO8

UNIT–I

No. of Hours: 12   **Chapter/Book Reference: TB2 [Chapters - 1, 2]**

Introduction to Network Security and related issues- authentication, confidentiality, integrity, anonymity, etc. Network Security Models, Network Security Threats, Secure socket layer (SSL)/ Transport layer security (TLS), Public Key Infrastructure, Digital Signature Schemes.

UNIT–II

No. of Hours: 11   Chapter/Book Reference: TB1 [Chapter - 5]

Firewalls: Overview, Types, Features, User Management, Intrusion Detection and Prevention Systems, Intruders, Viruses and Related Threats, Firewall Design Principles, Packet filtering firewall, VPN.

UNIT–III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 3, 4]

Authentication applications - Kerberos, X.509, E-Mail security, pretty good privacy (PGP), Secure Multipurpose Internet Mail Extensions (S/MIME), IP security overview, IP security policy, Encapsulating security payload (ESP).
Network Management Security: Overview of SNMP Architecture. Available software platforms/case tools, Configuration Management.

UNIT–IV

No. of Hours: 10   Chapter/Book Reference: TB2 [Chapter - 8]

Intrusion Detection: Intruders, Intrusion Detection, Host-Based Intrusion Detection, Distributed Host-Based Intrusion Detection, Network-Based Intrusion Detection, Distributed Adaptive Intrusion Detection, Intrusion Detection Exchange Format, Honeypots, Virtual Private Network

TEXT BOOKS:
TB1. Kaufman et al., Network Security, Second Edition, Publisher: Prentice Hall, 2002.
TB2. Stallings and Brown, Computer Security: Principles and Practice, Fourth Edition, Publisher: Pearson, 2018.

REFERENCE BOOKS:
RB1. Trappe and Washington, Introduction to Cryptography with Coding Theory, Third Edition, Publisher: Pearson, 2020.
RB2. Principles of Information Security: Michael E. Whitman, Herbert J. Mattord, CENGAGE Learning, 4th Edition.
RB3. Kaufman et al., Network Security, Second Edition, Publisher: Prentice Hall, 2002.
RB4. W. Mao, "Modern Cryptography – Theory and Practice", Pearson Education.

Course Code: BCAP 216	**L**	**P**	**C**
Course Name: Network Security	**0**	**2**	**1**

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

List of Practicals		
S. No.	**Detailed Statement**	**Mapping to CO#**
1	Implement Security Monitoring Tools	CO1, CO3
2	To study and implement Public Key cryptographic systems	CO1, CO3
3	Implement Digital Signatures.	CO1, CO3
4	Demonstrate any one honeypot tools for preventing intrusion detection.	CO1, CO5, CO6
5	Study and implement how you create an email policy for your organization.	CO1, CO3
6	Create and Implement Configure IP Address in a system in LAN	CO1, CO3
7	Implement S/MIME Policy.	CO1, CO3
8	Configure Mail server	CO1, CO3
9	Configuring Windows Firewall and implement user management	CO1, CO2
10	Implement network firewall security	CO1, CO2

Note:
1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Course Code: BCAT 218   **L P C**
Course Name: Web Development with Python and Django   **4 1 5**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
The students will be able to develop expertise related to the following:
1. Understand the model view controller (MVC) and Model View template (MVT) pattern and how it is implemented in Django
2. Create Django templates for easy-to-modify views
3. Map views to URLs
4. Take advantage of the built-in Admin interface
5. Provide HTML form processing
6. Integrate automated tests with your code

PRE-REQUISITES:
1. All students should have a working knowledge of HTML 5, and CSS.
2. All students should have a working knowledge of Python

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Install and Configure Python and Django in a development and production environment	BTL1, BTL2, BTL3	PO4,PO5, PO6, PO8
CO2	Understands the security implications of Django using templates and develop secure websites with Django	BTL2, BTL3, BTL4, BTL6	PO4, PO5, PO8
CO3	Utilize Django Models to build an interface with powerful relational databases	BTL3, BTL6	PO5,PO7,PO8
CO4	Design and develop forms (both ad-hoc and from Models and Data Models) and automate the validation and verification of data in those forms	BTL3, BTL4, BTL5, BTL6	PO6,PO8

UNIT – I
No. of Hours: 11   Chapter/Book Reference: TB1 [Chapters - 1, 2, 3]
Web development basics: Client server architecture, webserver, web browser, basic of HTML concept, basics of CSS, basics of JavaScript, Bootstrap.
Introduction to Django: Web Framework, The MVC and MTV Design Pattern, Difference between MVC and MTV design patterns, Django's History, Installation of Python, Installation of Django using PIP command, Understanding Django environment, Django Commands Overview

UNIT – II
No. of Hours: 11   Chapter/Book Reference: TB1 [Chapter - 4]
The Basics of Dynamic Web Pages: (Views and URLconfs): Creating View, Dynamic Content, Mapping URLs to Views, processing a Request, URL configurations and Loose Coupling, Creating View with Dynamic URLs, Django's Error Pages
The Django Template System:

Template System Basics, template language: variables, Boolean Operators, for loop, if, Basic Template Tags and Filters, Comments, Using Templates in Views, Template Loading, Template Inheritance Tags, Creating a Model Manipulating Data (CRUD) Linking Models

Django Forms: Creating a form using Django Forms, Render HTML Forms (GET & POST), Form Fields, form field custom widgets, Simple Validation

UNIT – III

No. of Hours: 11   Chapter/Book Reference: TB1 [Chapter - 5, 7]
Interacting with a Database: Models: Using Database Queries in Views (hard-coding the connection parameters), Configuring the Database, Creating First App , Defining Models in Python, Creating ,Installing the Model, Basic Data Access, Adding Model String Representations, Inserting and Updating Data, Selecting Objects, Filtering Data, Retrieving Single Objects, Ordering Data, Chaining Lookups, Slicing Data, Deleting Objects , Making Changes to a Database Schema , Basic model data types and fields list , Relationship Fields ,Field options, Adding Fields , Validation on Fields in a Model , using Django Field Choices, Removing Fields, Removing Many to Many Fields, Removing Models, creating forms using Models

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 6, 12, 14];
The Django Administration Site: Creating superuser for accessing the backend admin app, registering custom Django models with the admin site, customizing admin rendering of Django models, Customizing Django admin templates look and feel.
Deploying Django Project: Real time project: E-commerce domain applications Front-End Back-End HTML, CSS, BOOTSTRAP, DJANGO SQLite
Preparing Your Codebase for Production, implementing error Templates, Setting up Error Alerts
Sessions, Users, and Registration: Getting and Setting cookies, Setting Test Cookies Django's Session Framework: enabling sessions, using session in views, Using Sessions Outside of Views, destroying a session using flush
Security in Django: Cross site request forgery protection, Cryptographic Signing

TEXT BOOKS:
TB1. The Django Book freely available - https://django.book.readthedocs.io/en/latest/index.html
TB2. Django 3 By Example, 3rd Edition,By Antonio Mele

REFERENCE BOOKS:
RB1. https://docs.djangoproject.com/
RB2. Python Web Development with Django by Jeff Forcier , Paul Bissex , Wesley Chun
RB3. Django for Beginners: Build websites with Python and Django by William S. Vincent

Course Code: BCAP 218   **L   P   C**
Course Name: Web Development with Python and Django   **0   2   1**

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

S.No.	Detailed Statement	Mapping to CO #
	List of Practicals	
1.	Install Python including installation of pip, installation and setting up virtual environment, installation of Django	CO1
2.	Create a new django project using command line	CO3
3.	Create a "Hello World" App in Django	CO3
4.	Create a Django Form using forms.py	CO2
5.	Create a Django app Using Django Templates features i.e. Creating Template Objects , Rendering a Template , Multiple Contexts, Context Variable Lookup, Playing with Context Objects, Template Loading, include Template Tag,	CO2, CO3
6.	App to connect templates with models to serve data dynamically	CO4
7.	Creating and using CRUD class based view	CO2
8.	Rendering a model in Django Admin Interface	CO6
9.	Create a Dynamic Feedback form with validations	CO5
10.	Write a Django web app to use parameters in Views.py	CO2
11.	Write a Django web app using control statements (If, for etc.)	CO2
12.	Using blocks in Django Template and Extend base.html in Templates	CO3
13.	Work with Django humanize	CO2

	(https://docs.djangoproject.com/en/3.2/ref/contrib/humanize/)	
14.	Work with Django Template built in Tags and Filter (https://docs.djangoproject.com/en/3.2/ref/templates/builtins/)	CO2
15.	Handling 404, 502 pages in Django	CO2
Application Based Practicals (Implement Any one of the following App)		
1.	Quiz App	CO4
2.	To-do webapp using Django	CO4
3.	Weather app using Django	CO4
4.	Creating a Feedback Form with database submission	CO4
5.	Calorie Counter	CO4
Note: **(i) In total 10 practicals and one small App to be implemented.** **(ii) Additional practical may be given by the course instructor.** **(iii) This is a suggestive list of programs. However, the instructor may add or change programs as per the requirement of the course.**		

Course Code: BCA 222	**L T C**
Course Name: Digital Marketing	**3 1 4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following: -
1. Understand the basics of Digital Marketing.
2. Comprehend the importance of Digital Marketing Platforms.
3. Gain knowledge about the usefulness of Social Media Marketing (SMM) and Search Engine Optimization (SEO)

PRE-REQUISITES:
None
COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understanding the digital marketing concepts and its usefulness in business.	BTL2	PO2, PO4
CO2	Planning steps for digital marketing strategy and successfully executing it.	BTL3	PO2, PO4
CO3	Understand the importance of Social Media Platforms and Social Media Marketing for online communication.	BTL2	PO2, PO4, PO6
CO4	Applying Search Engine Optimization techniques (SEO) and Search Engine Marketing (SEM) to maximize reach and enhance engagement of users.	BTL3	PO2, PO4, PO6
CO5	Analyzing web using analytics tools and gaining insights to various tools for Social Media Marketing.	BTL4	PO2, PO4, PO6

UNIT – I
No. of Hours: 11   Chapter/Book Reference: TB1 [Chapter – 1, 2], TB2 [Chapter – 1, 4-9],
TB3 [Chapter –1]

Digital Marketing Basics: Digital Marketing meaning and its importance, Traditional vs Digital Marketing, Benefits of Digital Marketing, Internet Marketing basics, Digital Marketing channels, Types of Business models, Digital Marketing strategies (P.O.E.M framework), Inbound and Outbound marketing, Digital Transformation model, 4Cs of Digital Marketing

UNIT – II
No. of Hours: 11   Chapter/Book Reference: TB1 [Chapter –3, 4, 5, 6, 7, 8], TB2 [Chapter – 4], TB3 [Chapter – 8]

Social Media Marketing – Introduction, Social Media marketing strategies, Overview of Social media platforms – Instagram, Snapchat, Facebook, Mobile, Twitter, Content Planning and Strategy, Influential marketing, Content marketing, Digital Marketing campaign

UNIT – III

No. of Hours: 11   Chapter/Book Reference: TB1 [Chapter – 2, 3, 10]

Search Engine Optimization – Introduction to SEO, On-Page and Off-Page Optimization, Role of Keywords in SEO, Organic vs Non-Organic SEO, Blogging as marketing strategy, Types of Blogs
Search Engine Marketing – Introduction to Paid marketing, Google Adwords, Types of campaigns and Campaign creation

<p align="center">UNIT – IV</p>

No. of Hours: 11   Chapter/Book Reference: TB1 [Chapter – 1, 5, 11]

Tools for SMM and Marketing communication – Overview of Buffer, Hootsuite, Canva, Trello and Hot jar
Web Analytics: Meaning, Purpose and process, Types, Tools for analytics – Google analytics, Audience analytics, Acquisition analytics, Behavior analytics, Conversion analytics

TEXT BOOKS:
TB1.   Rajan Gupta, Supriya Madan, "Digital Marketing", BPB Publication, Ist Edition, 2022
TB2.   Seema Gupta, "Digital Marketing", McGraw Hill, 2nd Edition, 2018.
TB3.   Puneet Singh Bhatia, "Fundamentals of Digital Marketing", Pearson, 2nd Edition, 2020.

REFERENCE BOOKS:
RB1.   Ian Dodson, "The Art of Digital Marketing", Wiley, 2017.
RB2.   Nitin Kamat, Chinmay Nitin Kamat, "Digital Marketing", Himalaya Publishing House, 1st Edition, 2017.
RB3.   Vandana Ahuja, "Digital Marketing", Oxford University Press, 8th Edition, 2019.
RB4.   Judy Strauss, Raymond Frost, "E- Marketing", PHI learning, 5th Edition, 2009.
RB5.   Moutusy Maity, "Internet Marketing", Oxford University Press, 2018.
RB6.   Stephanie Diamond, "Digital Marketing", Wiley, 2019.
RB7.   T. N. Swaminathan, Karthik Kumar, "Digital Marketing From Fundamentals to Future", Cengage, 1st Edition, 2019.

Course Code: BCA 224
Course Name: Principles of Accounting

L	**T**	**C**
3	**1**	**4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. To get the knowledge about the important concepts & characteristics of accounting.
2. To study the application of accounting in the general business environment.

PRE-REQUISITES:
None.

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Basic accounting knowledge, accounting equations, accounting concepts & convention.	BTL1	PO3
CO2	Rules of debit & credit, journal, ledger, trial balance.	BTL2 BTL3	PO3
CO3	Final A/c's (Trading A/c, Profit & Loss A/c, Balance Sheet) without adjustment & with adjustment.	BTL3 BTL4	PO4
CO4	Sub division of Journal: Cash Journal, Petty Cash Book, Purchase Journal, Purchase Return Journal, Sales Journal, Sales Return Journal.	BTL4	PO4
CO5	Inventory valuation, Inventory System, Methods of valuation of Inventories (FIFO, LIFO & Weighted Average Method).	BTL5	PO4
CO6	Depreciation concept & causes, Method of recording depreciation & Method of providing depreciation.	BTL5 BTL6	PO5,PO6

UNIT–I
No. of Hours: 11 Chapter / Book Reference: TB2[Chapters - 1,2,3], RB4 [Chapters - 1, 2]

Meaning and nature of accounting, Scope of financial accounting, Interrelationship of Accounting with other disciplines, Branches of Accounting, Accounting concepts and convention, Accounting standards in India.

UNIT–II
No. of Hours: 11 Chapter / Book Reference: TB2 [Chapters - 6, 8], RB4 [Chapters - 5, 6]
Journal, Rules of Debit and Credit, Sub Division of Journal: Cash Journal, Petty Cash Book, Purchase Journal, Purchase Return, Sales Journal, Sales Return Journal, Ledger, Trial Balance.

UNIT–III
No. of Hours: 11 Chapter / Book Reference: TB2 [Chapter – 9], RB4 [Chapter – 8]
Preparation of Final Accounts, Profit & Loss Account, Balance Sheet-Without adjustments and with adjustments.

UNIT–IV
No. of Hours: 11 Chapter / Book Reference: TB2 [Chapters - 11, 12], RB4 [Chapters - 7, 10]
Meaning of Inventory, Objectives of Inventory Valuation, Inventory Systems, Methods of Valuation of Inventories-FIFO, LIFO and Weighted Average Method, Concept of Deprecation, Causes of Depreciation, Meaning of Depreciation Accounting, Method of Recording Depreciation, Methods of Providing Depreciation.

TEXT BOOKS:

TB1. Maheshwari, S.N. and Maheshwari, S. K., (2022) An Introduction to Accountancy,
Eighth Edition, Vikas Publishing House.
TB2. Tulsian, P.C., (2020) Financial Accountancy, 2nd edition, Pearson Education.
TB3. Goyal, Bhusan Kumar , Basic Financial Accounting,2020, International Book House Pvt. Ltd.

REFERENCE BOOKS:

RB1. Gupta R. L., & Gupta V.K., "Principles & Practice of Accounting", Sultan Chand & Sons, 1999.
RB2. Monga J R, "Introduction to Financial Accounting", Mayur Paperbacks, 2010.
RB3. Raja Sekaran/Lalitha, "Financial Accounting", Pearsons.
RB4. Goyal V.K. & Goyal Ruchi (2022) Financial accounting ,PHI

Course Code: BCA 232   **L   T   C**
Course Name: Personality Development Skills   **2   0   2**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
 In this course, the learners will be able to develop the following:
 1. To boost student's confidence through oral and written skills.
 2. To help students develop leadership skills and teamwork.
 3. To prepare students for work related challenges.

PRE-REQUISITES:
None.

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Learn Social Etiquettes and social conversation.	BTL1, BTL2, BTL3	PO9, PO11
CO2	Learn Leadership, Decision making and Team-building skills	BTL2, BTL3, BTL4	PO9, PO11
CO3	Improve confidence building skills	BTL2, BTL3, BTL4	PO9, PO11
CO4	Able to manage Stress and Time Management	BTL2, BTL3, BTL4	PO9, PO11

UNIT-I
No. of Hours: 5   Chapter / Book Reference: TB1 [Chapter - 6], TB2 [Chapters - 19, 20] RB2 [Chapter - 4]

Personality Development, Professional Etiquettes, Art of Social Conversation, Basic Body Language, Meeting and Greeting Skills
UNIT- II
No. of Hours: 5   Chapter / Book Reference: TB3 [Chapter - 6], TB4 [Chapters - 12, 13, 16], RB3 [Chapter - 9], RB4 [Chapter - 10]

Leadership and Team-Building Skills, Decision Making and Problem Solving through Effective Communication Strategies. Role plays, Team building
UNIT- III
No. of Hours: 8   Chapter / Book Reference: RB3 [Chapters - 3, 4], RB4 [Chapter - 17]

Confidence Building Skills Self-Introduction, Self-Awareness, Mock Interviews, Extempore, Group Discussion
UNIT- IV
No. of Hours: 4   Chapter / Book Reference: RB1 [Chapters - 4, 6, 9]

Stress and Time Management
Stress management - Meaning, types, Impact /Consequences (Mind, Body and Health), Tips for Busting Stress, Case Studies
Time management- Importance, Techniques. Case Studies

TEXT BOOKS:
TB1. Business Communication by Asha Kaul- PHI
TB2. Personality Development and Communication Skills-I by Urmila Rai and S.M. Rai - Himalaya Publishing House
TB3. Communication Skills" by Sanjay Kumar and Pushp Lata, Oxford University Press.
TB4. Business Communication by Meenakshi Raman and Prakash Singh, Oxford University Press

REFERENCE BOOKS:
RB1. Life Management and Stress Management by Shawn Chhabra
RB2. Personality Development and Communication Skills-II- by C.B. Gupta
RB3. Self-Awareness: The Hidden Driver of Success and Satisfaction – Travis Bradberry
RB4. Business Communication by Hory Sankar Mukherjee, Oxford University Press

Course Code: BCA 272   **L   T/P   C**
Course Name: Practical – VIII Java Lab   **0   4   2**

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to:
1. Basic understanding of Object-Oriented Programming Concepts and create classes.
2. Learn Inheritance, exception handling in Java.
3. Understand and implement multithreading programming.
4. Learn building GUI applications using various controls in Swings.

PRE-REQUISITES: Prior knowledge of programming language is mandatory.

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Illustrate the Object-Oriented paradigm and Java language constructs	BT2	PO3
CO2	To inculcate concepts of inheritance to create new classes from existing ones and design the classes needed given a problem specification.	BT3	PO3
CO3	To apply various functions of String class	BT3	PO4
CO4	To facilitate students in handling exceptions and defining their own exceptions.	BT4	PO4
CO5	To manage input output using console and files	BT4	PO4
CO6	To apply the Java Thread model to develop multithreading applications.	BT5	PO4
CO7	To understand and apply the concepts of GUI programming using swings.	BT6	PO5,PO6
List of Practicals			
S. No.	Detailed Statement		Mapping to CO #
Core Practicals (Implement minimum 10 out of 15 practicals)			
1.	Write a program declaring a class Rectangle with data member's length and breadth and member functions Input, Output and CalcArea.		CO1
2.	Write a program to demonstrate use of method overloading to calculate area of square, rectangle and triangle.		CO1
3.	Write a program to demonstrate the use of static variable, static method and static block.		CO1
4.	Write a program to demonstrate concept of ``this``.		CO1
5.	Write a program to demonstrate multi-level and hierarchical inheritance.		CO2
6.	Write a program to use super() to invoke base class constructor.		CO2
7.	Write a program to demonstrate run-time polymorphism.		CO1
8.	Write a program to demonstrate the concept of aggregation.		CO2
9.	Write a program to demonstrate the concept of abstract class with constructor and ``final`` method.		CO2
10.	Write a program to demonstrate the concept of interface when two interfaces have unique methods and same data members.		CO1
11.	Write a program to demonstrate checked exception during file handling.		CO4
12.	Write a program to demonstrate unchecked exception		CO4
13.	Write a program to demonstrate creation of multiple child threads.		CO6
14.	Write a program to use Byte stream class to read from a text file and display the content on the output screen.		CO5
15.	Write a program to demonstrate any event handling.		C07
Application Based Practicals (Implement minimum 5 out of 10 practicals)			

16.	Create a class employee which have name, age and address of employee, include methods getdata() and showdata(), getdata() takes the input from the user, showdata() display the data in following format: Name: Age: Address:	CO1
17.	Write a Java program to perform basic Calculator operations. Make a menu driven program to select operation to perform (+ - * /). Take 2 integers and perform operation as chosen by user.	CO1
18.	Write a program to make use of BufferedStream to read lines from the keyboard until 'STOP' is typed.	CO5
19.	Write a program declaring a Java class called SavingsAccount with members ``accountNumber`` and ``Balance``. Provide member functions as ``depositAmount ()`` and ``withdrawAmount ()``. If user tries to withdraw an amount greater than their balance then throw a user-defined exception.	CO4
20.	Write a program creating 2 threads using Runnable interface. Print your name in ``run ()`` method of first class and "Hello Java" in ``run ()`` method of second thread.	CO6
21.	Write program that uses swings to display combination of RGB using 3 scrollbars.	CO7
22.	Write a swing application that uses atleast 5 swing controls	CO7
23.	Write a program to implement border layout using Swing.	CO7
24.	Write a java program to insert and update details data in the database.	CO7
25.	Write a java program to retrieve data from database and display it on GUI.	CO7

Note:
1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Course Code:	BCA 274	**L**	**T**	**C**
Course Name:	Practical-IX SE Lab	**0**	**4**	**2**

LEARNING OBJECTIVES:

Students will be capable to acquire the generic software development skill through various stages of software life cycle. Students will also be able to ensure the quality of software through software development with various protocol based environment. After completion of course student will be able to prepare SRS, analysis the requirement, design the requirements and generate test cases to test the project. Students will also be able to handle software development models through rational method. Rational Rose Enterprise Edition software is used to serve the objectives.

PRE-REQUISITES:

None

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	To apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment.	BT2	PO3
CO2	Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.	BT3	PO3
CO3	Analyzing and developing a software product along with its complete documentation.	BT3	PO4
CO4	Work as an individual and as part of a multidisciplinary team to develop and deliver quality software in one or more significant application domains.	BT4	PO4
CO5	Demonstrate an ability to use the techniques and tools necessary for engineering practice	BT4	PO4

List of Practicals

S.No.	Detailed Statement	Mapping to CO #
1.	Select and Write down the problem statement for a real time system of relevance.	CO2, CO3
2.	Analyze requirement for a system and develop Software Requirement Specification Sheet (SRS) for suggested system.	CO2, CO3
3.	To create the function oriented diagram: Data Flow Diagram (DFD)	CO2, CO3
4.	To perform the user's view analysis for the suggested system: Use case diagram.	CO2,CO3, CO4
5.	To draw the structural view diagram for the system: Class diagram	CO4
6.	To draw the behavioral view diagram : State-chart diagram or Activity diagram	CO2, CO3,CO4
7.	To perform the behavioral view diagram for the suggested system : Sequence diagram	CO2, CO3,CO4
8.	Draw the component diagram	CO2, CO3,CO4
9	Draw the Deployment diagram.	CO2, CO3,CO4
10.	Perform Measurement of complexity with Halstead Metrics for chosen system.	CO4

Suggested Applications

(i)	Inventory Management
(ii)	Library Management
(iii)	Result Management
(iv)	Hotel Management System
(v)	Any Website
(vi)	Any mobile application
(vii)	E-Commerce website
(viii)	Any other application

Note:
1. **Students are required to identify an application in the beginning of the semester and conduct all practicals for the same application.**
2. **In total 10 practicals to be implemented.**
3. **Students may use any open source software i.e. argoUML for drawing the above diagrams.**
4. **Students may Use testing tool such as junit.**
5. **Student may Use configuration management tool-libra.**

Detailed Syllabus of 3rd Year

	L	T	C
Course Code BCA 301			
Course Name: Operating System & Linux Programming	**3**	**1**	**4**

INSTRUCTIONSTOPAPERSETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each Question should be of12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:-
1. Working and functionalities of operating system
2. Understand the concept of process scheduling, ,memory management, deadlock and file system
3. Understand basic commands of Linux and shell scripts.

PRE-REQUISITES:
1. Basic understanding of hardware and software of computer organization.

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	MappingtoPO #
CO1	Understand the basic concept of Operating System with the help of Unix and Linux Architecture.	BTL2	PO1, PO4
CO2	Understand the concept of Processes, Process Scheduling, Process Synchronization and applying process commands in Linux environment.	BTL3	PO1, PO2,PO4,PO5
CO3	Understand the concept of memory management and deadlock.	BTL2	PO1, PO2,PO4,PO5
CO4	Understand the concept of file Systems, Types and Access Methods by using Linux commands.	BTL3	PO1, PO2,PO4

UNIT–I
No. of Hours: 12   Chapter/Book Reference: TB1 [Chapter 1]; TB2 [Chapters 1, 2, 3, 4, 5]

Introduction: What is an Operating System, Functions of Operating System, Simple Batch Systems; Multi programmed Batch systems, Time-Sharing Systems, Personal-computer systems, Parallel systems, Distributed Systems, Real-Time Systems.
Introduction to Linux: Architecture of Linux OS**,** Basic directory structure of Linux, Basic commands of Linux:- man,info,help,whatis,apropos, basic directory navigation commands likecat,mkdir,rmdir ,cd, mv, cp, rm, ,file, pwd ,date,cal,echo,bc,ls,who,whoami,hostname,uname,tty,aliase
Vi Editor:vi basics, Three modes of vi Editor, how to write, save, execute a shell script in vi editor
UNIT–II
No. of Hours: 12   Chapter/Book Reference: TB1 [Chapters 3, 5, 6]; TB2 [Chapter 9]

Processes: Process Concept, Process Scheduling, Operation on Processes
CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms
Process Synchronization: Background, The Critical-Section Problem, Semaphores solution to critical section problem

Process related commands in Linux: ps, top, pstree, nice, renice and system calls

UNIT–III
No. of Hours: 12   **Chapter/Book Reference: TB1 [Chapters 7, 8, 9]**

Memory Management: Background, Logical versus Physical Address space, swapping, Contiguous allocation, Segmentation**,** Paging

Virtual Memory: Demand Paging, Performance of Demand Paging, Page Replacement, Page-replacement Algorithms, Allocation of Frames, Thrashing

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT–IV
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter 10]; TB2 [Chapter 6]

Information Management: Introduction, File Concept, Access methods, Directory and Disk structure, File Protection

Linux File Security: Permission types, Examining permissions, changing permissions (symbolic method numeric method)

TEXT BOOKS:

TB1. Silbersachatz and Galvin, "Operating System Concepts", John Wiley & Sons, 10 th Ed. 2018
TB2. Sumitabha Das, "Unix Concepts and Application", TMH

REFERENCE BOOKS:

RB1. Madnick E., Donovan J., "Operating Systems", Tata McGraw Hill, 2011

RB2. Tannenbaum, "Operating Systems", PHI, 4th Edition, 2015
RB3. Sivaselvan, Gopalan, "A Beginner's Guide to UNIX", PHI Learning

Course Code: BCA 303   **L   T   C**
Course Name: Computer Graphics   **3   1   4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. Concept of Computer graphics, types of display devices and their techniques.
2. Methods of drawing of graphic objects on the display devices.
3. Concepts of viewport, mapping of real world objects to display device, clipping
4. Knowledge of projection concepts and their types

PRE-REQUISITES:
1. Programming in C/C++

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Develop basic knowledge of computer generated graphics, their applications, display devices and drawing of graphic objects on display devices.	BTL2	PO1, PO6
CO2	To develop knowledge of various graphics 2D transformation operation, their mathematical calculations.	BTL4	PO4, PO8
CO3	To learn about the surfaces and curves, properties of curves and shading of surfaces	BTL2	PO4
CO4	To give basic knowledge of 3D projection and identifying hidden surfaces to be removed.	BTL2	PO1

UNIT – I
No. of Hours: 11   Chapter/Book Reference: TB1, TB2

Introduction: Introduction to computer graphics, Applications of Computer Graphics, Non Interactive and interactive graphics, Conceptual Framework for Interactive Graphics. Introduction to Raster and Random scan display, Characteristics of display devices, Aliasing and Antialiasing, Introduction to latest display technologies (LED, OLED, Curved LED display)
Scan Conversion
Scan Converting Lines using DDA & Bresenham's Algorithm, Scan Converting Circles using Bresenham's algorithm.

UNIT – II
No. of Hours: 11   Chapter/Book Reference: TB1, TB2, RB3

Clipping
Cohen- Sutherland Algorithm, Cyrus-Beck Algorithm
Geometrical Transformations
2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Composition of 2D Transformations, Window-to-Viewport Transformation, Introduction of Matrix Representation of 3D Transformations of translation, scaling and rotation (without derivation).

UNIT – III
No. of Hours: 11   **Chapter/Book Reference: TB1, TB2**

Representing Curves
Introduction to Polygon Meshes and its types, Parametric Cubic Curves: parametric and geometric continuity, Hermite, Bezier & B-Spline.
Surfaces
Surface rendering- Basic Illumination, Effect of ambient lighting and distances, Shading models- Gourard Shading, phong model.

UNIT – IV
No. of Hours: 11   **Chapter/Book Reference: TB1, TB2**

Three Dimensional Viewing: Introduction, Representation of Three-dimensional objects, Projections, Parallel projections: Orthographic Projections, Oblique Projections. Perspective Projection,
Hidden Surface Removal: Depth-Buffer (z-buffer) method, Depth-sorting Method (Painter's algorithm)

TEXT BOOKS:
TB1. Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles & Practice, 2000, Pearson
TB2. Chennakesava R. Alavla "Computer Graphics", PHI Learning Pvt. Limited

REFERENCES BOOKS:
RB1. D. Hearn & Baker: Computer Graphics with OpenGL, Pearson Education, Third Edition, 2009.
RB2. Foley, J.D. & Van Dam, A: Fundamentals of Interactive Computer Graphics.
RB3. Rogers & Adams, "Mathematical Elements for Computer Graphics", McGraw Hill, 1989.

Course Code: BCA 305   **L   T   C**
Course Name: Cloud Computing   **3   1   4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Understand current cloud computing technologies, including technologies for different cloud services.
2. Analyze the components of cloud computing
3. Perform Large data processing in the cloud

PRE-REQUISITES:

1. Basics of Computer Network
2. Knowledge of Operating System and Databases.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Overview of Cloud Computing	BTL1	PO1, PO2, PO3, PO7
CO2	Understanding Cloud Computing Architecture	BTL2	PO1, PO2, PO3, PO4, PO7,
CO3	Working with Parallel and Distributed Computing	BTL3	PO1, PO2, PO3, PO4, PO5
CO4	Understanding the Concept of Virtualization	BTL4	PO1, PO2, PO3, PO6, PO7

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 1, 10], TB2 [Chapters - 1, 2]

Cloud Computing Overview –Services of Internet, Origins of Cloud computing – Cloud components – Essential characteristics – On-demand self-service, The vision of cloud computing – Characteristics, benefits, and Challenges ahead

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter - 4], TB2 [Chapters - 5, 6, 17, 18]

Cloud Computing Architecture-Introduction – Internet as a Platform, The cloud reference model - Types of clouds - Economics of the cloud, Computing platforms and technologies, Cloud computing economics, Cloud infrastructure - Economics of private clouds - Software productivity in the cloud - Economies of scale: public vs. private clouds.

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter - 2], TB2 [Chapter - 11]

Principles of Parallel and Distributed Computing: Parallel vs. distributed computing - Elements of parallel computing - Hardware architectures for parallel processing, Approaches to parallel programming - Laws of caution.

UNIT – IV

No. of Hours: 11   **Chapter/Book Reference: TB1 [Chapter - 3], TB2 [Chapter - 8]**

Virtualization: Introduction - Characteristics of virtualized environments - Taxonomy of virtualization techniques - Virtualization and cloud computing - Pros and cons of virtualization - Technology example: VMware: full virtualization, Types of hardware virtualization: Full virtualization - partial virtualization - para virtualization

TEXT BOOKS:
TB1. Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, "Mastering Cloud Computing" - Foundations and Applications Programming, MK publications, 2013.
TB2. Gautam Shroff, "Enterprise Cloud Computing: Technology, Architecture, Applications" by Cambridge University Press, 2010.

REFERENCE BOOKS:
RB1. Michael J.Kavis, "Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS)", John Wiley & Sons Inc., Jan 2014.

Course Code: BCA 307 L T/P C
Course Name: Minor Project 0 8 4

PROJECT REPORT
All the students are required to submit a report based on the project work done by them during the sixth semester.

SYNOPSIS (SUMMARY/ABSTRACT) :
All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name / Title of theProject
- Statement about theProblem
- Why is the particular topicchosen?
- Objective and scope of theProject
- Methodology (including a summary of theproject)
- Hardware & Software to beused
- Testing Technologiesused
- What contribution would the projectmake?

TOPIC OF THE PROJECT- This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

OBJECTIVE AND SCOPE: This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to bementioned.

PROCESS DISCRIPTION: The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

RESOURCES AND LIMITATIONS: The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

CONCLUSION: The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and also any other important feature that makes the system stand out from the rest.

The following suggested guidelines must be followed in preparing the Minor Project Report:
Good quality white A4 size paper should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

Page Specification: (Written paper and source code)

- Left margin - 3.0 cms
- Right margin- 2.0cms
- Top margin 2.54cms
- Bottom margin 2.54cms
- Page numbers - All text pages as well as Program source code listing should be

numbered at the bottom center of thepages.

Normal Body Text: Font Size: 12, Times New Roman, Double Spacing, Justified. 6 point above and below paraspacing
Paragraph Heading Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 point above & belowspacing.
Chapter Heading Font Size: 20, Times New Roman, Centre Aligned, 30 point above and below spacing. **Coding Font size :**10, Courier New, Normal
Submission of Project Report to the University : The student will submit his/her project report in the prescribed format. The Project Report should include:

1. One copy of thesummary/abstract.
2. One hard Copy of the ProjectReport.
3. The Project Report may be about 75 pages (excludingcoding).

FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT
   I. Cover Page as performat
   II. Acknowledgement
   III. Certificate of the project guide
   IV. Synopsis of theProject
   V. MainReport
         i. Objective & Scope of theProject
         ii. Theoretical Background Definition of Problem
         iii. System Analysis & Design vis-a-vis UserRequirements
         iv. System Planning (PERTChart)
         v. Methodology adopted, System Implementation & Details of Hardware & Software used System Maintenance &Evaluation
         vi. Detailed Life Cycle of theProject
                  a. ERD, DFD
                  b. Input and Output ScreenDesign
                  c. Processinvolved
                  d. Methodology usedtesting
                  e. Test Report, Printout of the Report & CodeSheet
   VI. Coding and Screenshots of the project
   VII. Conclusion and Future Scope
   VIII. References

Formats of various certificates and formatting styles are as:

1. Certificate from theGuide

<div align="center">CERTIFICATE</div>

This is to certify that this project entitled " xxxxxx xxxxx xxxxx xxxx xxxx xxx" submitted in partial fulfillment of the degree of Bachelor of Computer Applications to the "xxxxxxxxxxxxxxxxxxxxxxxxxx" through xxxxxx xxxxx doneby Mr./Ms._____,RollNo._____is an is an authentic work carried out by him/herat _____ under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree to the best of my knowledge andbelief.

Signature ofthestudent   Signature of theGuide

2. Project Report Cover PageFormat:

<div align="center">

Title of the Project/report
(Times New Roman, Italic, Font size = 24)

Submitted in partial fulfilment of the requirements for the award of the
degree of
Bachelor of Computer Applications
(Bookman Old Style, 16 point, centre)

</div>

    Submitted to: **Submitted by:**
    (GuideName)   **(Student'sname)**
                                                                          Roll No
                                                                        College Name

3. Self-Certificate by the students

SELF CERTIFICATE

This is to certify   that the dissertation/project report entitled "…………………………………" is done by me is an authentic work carried out for the partial fulfilment of the requirements for the award of the degree of Bachelor of Computer Applications under the guidance of__. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Signature of the student
Name of the Student
Roll No.

4. ACKNOWLEDGEMENTS

In the "Acknowledgements" page, the writer recognizes his indebtedness for guidance and assistance of the thesis adviser and other members of the faculty. Courtesy demands that he also recognize specific contributions by other persons or institutions such as libraries and research foundations. Acknowledgements should be expressed simply, tastefully, and tactfully.

Course Code: BCAT 311   **L   T   C**
Course Name: Machine Learning with Python   **4   0   4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.

3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:
1. To make student able to learn mathematical concepts, and algorithms used in machine learning techniques for solving real world problems and developing new applications based on machine learning.
2. To introduce students to the state-of-the-art concepts and techniques of Machine Learning using Python.

PRE-REQUISITES:

1. Basics of Python Programming

COURSE OUTCOMES(COs):

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

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO#
CO1	Explain machine learning concepts on real world applications and problems.	BTL2	PO1, PO2, PO8
CO2	Analyze and Implement Regression techniques.	BTL2, BTL3	PO1, PO4, PO5, PO7
CO3	Solve and design solution of Classification problem	BTL3, BTL6	PO2, PO3, PO4,PO8
CO4	Understand and implement Unsupervised learning algorithms	BTL2, BTL3	PO4, PO5, PO6, PO8
CO5	Interpret various machine learning algorithms in a range of real world applications.	BTL3	PO2, PO6, PO7

UNIT–I
No. of Hours: 11 Chapter / Book Reference: TB1 [Chapters - 1, 3, 4, 8, 9], TB2 [Chapters - 1, 4]

Introduction to Machine Learning, Why Machine learning, Types of Machine Learning Problems, Applications of Machine Learning. Supervised Machine Learning- Regression and Classification. Binary Classifier, Multiclass Classification, Multilabel Classification. Performance Measures- Confusion Matrix, Accuracy, Precision & recall, ROC Curve. Advanced Python- NumPy, Pandas. Python Machine Learning Library Scikit-Learn, Linear Regression with one Variable, Linear Regression with Multiple Variables, Logistic Regression.

UNIT-II
No. of Hours: 11 Chapter / Book Reference: TB1 [Chapters - 5, 6, 7], TB2 [Chapter - 6]

Supervised learning Algorithms: Decision Trees, Tree pruning, Rule-base Classification, Naïve Bayes, Bayesian Network. Support Vector Machines, k-Nearest Neighbor, Ensemble Learning and Random Forest algorithm.

UNIT - III
No. of Hours: 11 Chapter / Book Reference: TB1 [Chapter - 10], TB3 [Chapters - 2, 6]

Artificial Neural Networks, HebbNet, Perceptron, Adaline, Multilayer Neural Network, Architecture, Activation Functions, Loss Function, Hyper parameters, Gradient Descent, Backpropagation, Variants of Backpropagation, Avoiding overfitting through Regularization, Applications of Neural Networks.

UNIT – IV
No. of Hours: 11   Chapter/Book Reference: TB1 [Chapter - 8], TB2 [Chapter - 7], TB3 [Chapter - 4]

Unsupervised learning algorithms: Introduction to Clustering, K-means Clustering, Hierarchical Clustering, Kohonen Self-Organizing Maps. Implementation of Unsupervised algorithms. Feature selection and Dimensionality reduction, Principal Component Analysis.

TEXT BOOKS:
TB1. GeronAurelien, "Hands-On Machine Learning with Scikit-Learn & TensorFlow", O'REILLY, First Edition, 2017.
TB2. U Dinesh Kumar and Manaranjan Pradhan, "Machine Learning using Python", Wiley, 2019.
TB3. Fausett Laurence, "Fundamentals of Neural Networks", Pearson, Ninth Edition, 2012.

REFERENCE BOOKS:
RB1. Tom Mitchell, "Machine Learning", First Edition, McGraw- Hill, 1997.
RB2. Budd T A, "Exploring Python", McGraw-Hill Education, 1st Edition, 2011.
RB3. Jake VanderPlas,"Python Data Science Handbook", O'Reilly,1st Edition,2017.

Course Code: BCAP 311	L	T	C
Course Name: Machine Learning with Python Lab	**0**	**2**	**1**

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.
List of Practical

S.No.	Problem Statement	Mapping to CO#
1.	Extract the data from the database using python.	CO1
2.	Write a program to implement linear and logistic regression	CO2
3.	Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.	CO3
4.	Write a program to implement k-nearest neighbors (KNN) and Support Vector Machine (SVM) Algorithm for classification	CO3
5.	Implement classification of a given dataset using random forest.	CO3
6.	Build an Artificial Neural Network (ANN) by implementing the Back propagation algorithm and test the same using appropriate data sets.	CO3
7.	Apply k-Means algorithm k-Means algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using the k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Python ML library classes in the program.	CO4
8.	Write a program to implement Self - Organizing Map (SOM)	CO4
9.	Write a program for empirical comparison of different supervised learning algorithms	CO4
10.	Write a program for empirical comparison of different unsupervised learning algorithms	CO4
Note: **1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.** **2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**		

Course Code: BCAT 313
Course Name: Web Security

	L	**T**	**C**
	4	0	4

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. Students will be able to learn the techniques needed for providing protection and security to our data and information resources over internet.
2. To understand and learn web application and its Architecture.
3. Students will be able to develop awareness regarding Cyber laws and crimes.
4. Students will be able to understand the internet and web application security issues.
5. Students will be able to learn and understand wireless network security issues.
6. To learn and understand the concept of web services, ajax and other technology which are helpful.

PRE-REQUISITES:
1. Computer Network
2. C/C++/HTML (Programming Knowledge of C/C++/HTML/JS)

COURSE OUTCOMES(COs):
After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Define overall web security infrastructure, components, issues and basic concept etc.	BTL1	PO1, PO4, PO7
CO2	Describe briefly various types of security like social media security, email security, web application and web services security etc. Explain Web related services.	BTL2	PO1, PO2, PO4, PO5, PO7
CO3	Apply and implementing various vulnerabilities for Ethically hacking a websites / Web Applications.	BTL3	PO1, PO4, PO6, PO8
CO4	Focusing Penetration Testing, Computer Forensics.	BTL4	PO1, PO2, PO7
CO5	Evaluate different web security algorithms with the help of program.	BTL5	PO1, PO3, PO4, PO6, PO7, PO8
CO6	Design and implement XSS attacks, SQL Injection attack, password hashing and cracking.	BTL6	PO1, PO3, PO4, PO7, PO8

UNIT–I
No. of Hours: 12 Chapter/Book Reference: TB1 [Chapter - 1], TB2 [Chapters - 1, 3]

Components of Internet, Weak points of Internet, HTTP vs HTTPS, Overview of web authentication technologies, Web application architecture, Recent attack trends, Types of Web Security, Web infrastructure security/Web application firewalls, managing configurations for web apps, Techniques of Web Hacking, Methods of Attacking users, Importance of Web Application Security, Web Application Security vs Network Security. Social Media security - What is Online Social Networks, data collection from social networks, challenges, opportunities, and pitfalls in online social networks, APIs Collecting data from Online social media. Trust, credibility, and reputations in social systems.

UNIT–II
No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 4, 6], TB2 [Chapters - 8, 11]

Internet and Web Application Security: Email security (PGP and SMIME), Web Security: Web authentication, Injection Flaws, Programming Bugs and Malicious code, XSS and SQL Injection, Memory corruption exploits, Web Browser Security, E-Commerce Security

UNIT–III
No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter - 5], TB2 [Chapters - 1, 10, 11]

Wireless Network Security: Components, Security issues, Securing a Wireless Network, Mobile Security Management: Disaster Recovery, Ethical Hacking, Penetration Testing, Computer Forensics, Cyber laws and crime, Security Audit and Investigation, Cyber Security Solutions

UNIT–IV
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter - 6], TB2[Chapters - 5, 10, 11]

Web services overview, Honeytoken, XML security, AJAX attack trends and common attacks, REST security, Content Security Policy Serialization security, Clickjacking, DNS rebinding, HTML5 security, Logging collection and analysis for web apps, Security testing, IPv6 impact on web security

TEXT BOOKS:
TB1. Joel Scam bray, Vincent Liu, Caleb Sima, "Hacking Exposed Web Applications, 3rd Edition", McGraw-Hill, October 2010
TB2. Baloch, R., Ethical Hacking and Penetration Testing Guide, CRC Press, 2015.

REFERENCE BOOKS:
RB1. Dafydd Stuttard, and Marcus Pinto, The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, 2nd Edition, John Wiley & Sons, 2011.
RB2. Council, Ec. , Computer Forensics: Investigating Network Intrusions and Cybercrime, Cengage Learning, Second Edition, 2010.
RB3. John W. Ritting house, William M. Hancock, "Cyber Security Operations Handbook", Elsevier Pub
RB4. Deborah G Johnson, "Computer Ethics", 4th Edition, Pearson Education Publication.
RB5. Earnest A. Kallman, J.P Grillo, "Ethical Decision making and IT: An Introduction with Cases", McGraw Hill Publication.

Course Code: BCAP 313
Course Name: Web Security Lab

L T C
0 2 1

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

S.No.	Detailed Statement	Mapping to CO#
	List of Practicals	
1.	Implement the Security in web browsers (Mozilla Firefox/Google Chrome/IE)	CO1, CO2
2.	Analysis of the security and privacy features and issues in Ecommerce & social media websites i.e., Facebook, Twitter and Google+	CO1, CO2
3.	Implement CAPTCHA to keep the website secure.	CO3, CO6
4.	Implement Password hashing and cracking technique	CO3, CO6
5.	Implement SQL Injection Attack	CO3, CO6
6.	Implement XSS attacks	CO3, CO6
7.	Implement Malicious Code & Memory Corruption Exploits	CO3, CO6
8.	Implement the process of SSL Certificate	CO4
9.	Implement Reconnaissance with the help of Google and Whois	CO5, CO6
10.	Implement Clickjacking, DNS rebinding & Ajax Attack	CO5, CO6

Note:
1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Course Code: BCAT 315   **L   T   C**
Course Name: Web Development with Java & JSP   **4   0   4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:-
1. Learn Web development using Java.
2. Understand the basics of J2EE and Web development.
3. Understand and implement Servlet
4. Creating and implementing JDBC application.
5. Implement JSP and JSF concepts.
6. Understand the fundamentals of Hibernate, Struts and springs.

PRE-REQUISITES:
1. Programming Knowledge of Java
2. HTML

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO#	DetailedStatementoftheCO	*BTLevel	MappingtoPO #
CO1	Understand the concept of HTML, CSS and Java Script.	BTL2	PO3, PO4, PO5
CO2	Understand J2EE architecture, web application structure and web architecture models.	BTL2	PO3, PO4, PO5, PO8
CO3	Creating and configuring Servlets.	BTL6	PO3, PO4, PO5
CO4	Understand JDBC architecture and design database applications using JDBC.	BTL2	PO3, PO4, PO5, PO8
CO5	Design applications using JSP and JSF.	BTL3	PO3, PO4, PO5, PO8
CO6	Elaborate the functional programming concepts of Hibernate, Struts and Springs.	BTL1	PO3, PO4, PO5, PO7, PO8

UNIT – I
No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 1, 13, 31, 32, 33], TB2[Chapters - 1, 2, 18],TB3[Chapters - 2, 3, 4, 11, 14]

Introduction to HTML, CSS and Java Script: Content, layout, and styling of web page
J2EE and Web Development: Java Platform, J2EE Architecture Types, Types of Servers in J2EE Application, HTTP Protocols and API, Web Application Structure, Web Containers and Web Architecture Models.
Swings: Introduction and comparison with AWT controls.

UNIT – II
No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter - 37], TB2[Chapters - 34, 41, 42]

Introduction to Java EE Web Component: Overview of Servlet, Servlet Life Cycle, Types of Servlet, HTTP Methods Structure and Deployment descriptor Servlet Context and Servlet Config interface, State Management: client and server side,
JDBC Programming: JDBC Architecture, Types of JDBC Drivers, Introduction to major JDBC Classes and Interface, Creating simple JDBC Application, Database operations using JDBC, Types of Statement (Statement Interface, Prepared Statement, Callable Statement), Exploring Result Set Operations.

UNIT–III
No. of Hours: 11 Chapter/Book Reference: TB2 [Chapters - 43, 44]

Java Server Pages: Introduction to JSP, Comparison with Servlet, JSP Architecture, JSP Life Cycle, JSP Directives, JSP Action, JSP Standard Tag Libraries, JSP Session Management.
Develop Web Applications with JSF: JavaServer Faces (JSF) framework, architecture of JSF web applications, development view of a JSF application.

UNIT – IV
No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 22, 37, 39], TB2[33, 36]

Java Beans, Java Web Frameworks: Spring MVC: Java Beans,Spring Introduction, Spring Architecture, Spring MVC Module, Bean life cycle, Spring API.
Hibernate and Struts: Java Beans, Introduction to Hibernate, Hibernate Architecture, Hibernate Mapping Types, Introduction to Struts, core components, architecture, Interceptors, validation.
Advance Networking: Networking Basics, Introduction of Socket, Types of Socket, Socket API, TCP/IP client sockets, URL, TCP/IP server sockets, Datagrams, java.net package Socket, ServerSocket, InetAddress, URL, URLConnection.

TEXTBOOKS:
TB1. Herbert Schildt, "Java - The Complete Reference", Oracle Press, 9th Edition, 2014
TB2. Y. Daniel Liang, "Introduction to Java Programming, Comprehensive Version, Pearson.
TB3. Sams Teach Yourself HTML, CSS & JavaScript Web Publishing in One Hour a Day by Laura Lemay, Rafe Colburn, Jennifer Kyrnin, 2015

REFERENCEBOOKS:
RB1. E.Balaguruswamy,"ProgrammingwithJava",TataMcGrawHill,4thEdition,2009.
RB2. CayHorstmann,"ComputingConceptswithJava2Essentials",JohnWiley&Sons, 2ndEdition, 1999.
RB3. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson.
RB4. Jakarta Struts Cookbook, by Bill Siggelkow, O'Reilly Media, Inc. 2005

Course Code: BCAP 315   **L   T   C**
Course Name: Web Development with Java & JSP Lab   **0   2   1**

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

<table>
<tr><th colspan="3">List of Practicals</th></tr>
<tr><th>S. No.</th><th>Detailed Statement</th><th>Mapping to CO#</th></tr>
<tr><td colspan="3" align="center">Core Practicals (Implement minimum 8 out of 10 practicals)</td></tr>
<tr><td>1.</td><td>Create a webpage that prints your name to the screen, print your name in Tahoma font, print a definition list with 5 items, Create links to five different pages, etc.</td><td>CO1</td></tr>
<tr><td>2.</td><td>Program to demonstrate Swing components.</td><td>CO1</td></tr>
<tr><td>3.</td><td>Configure Apache Tomcat and write a hello world JSP page.</td><td>CO1</td></tr>
<tr><td>4.</td><td>Write a java program that connects to a database using JDBC and does add, delete and retrieve operations.</td><td>CO3</td></tr>
<tr><td>5.</td><td>Create and Develop a web application using JSF.</td><td>CO3</td></tr>
<tr><td>6.</td><td>Write a program to implement a Java Beans to set and get values.</td><td>CO2</td></tr>
<tr><td>7.</td><td>Create a Java application to demonstrate Socket Programming in Java.</td><td>CO5</td></tr>
<tr><td>8.</td><td>Write a program to retrieve hostname--using methods in Inetaddress class</td><td>CO2</td></tr>
<tr><td colspan="3" align="center">Application Based Practicals (Implement minimum 5 out of 10 practicals)</td></tr>
<tr><td>9.</td><td>Write a client-server program which displays the server machine's date and time on the client machine.</td><td>CO1</td></tr>
<tr><td>10.</td><td>Create a table in the database containing the columns to store book details like: book name, authors, description, price and URL of the book's cover image. Using JSP and JDBC retrieve the details in the table and display them on the webpage</td><td>CO3</td></tr>
<tr><td>11.</td><td>Write a program to create a login page using Java Beans.Also validate the username and password from the database.</td><td>CO1</td></tr>
<tr><td>12.</td><td>Create a form for inputting text and uploading image using struts</td><td>CO4</td></tr>
<tr><td>13.</td><td>Create a Student Registration application using Hibernate.</td><td>CO4</td></tr>
<tr><td>14.</td><td>Write a program to implement MVC using Spring Framework</td><td>CO4</td></tr>
<tr><td colspan="3">Note:
1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.</td></tr>
</table>

Course Code: BCA 331   **L   T   C**
Course Name: Summer Training Project   **0   0   2**

Summer Training Project Guidelines

Objective:

All the students enrolled for BCA Programme, have to undergo compulsory summer training/ Project of minimum 06 weeks in an organization in the IT field. The aim of the project is to give the students an integrated experience in solving a real-life problem by applying knowledge and skills gained on completion of theory papers and in-house practical papers during BCA course. It provides an occasion for students to realize the importance of resource and time management, ownership of task towards deliverables, innovation and efficiency in the task management. It also provides a good opportunity for students to build, enhance and sustain high levels of professional conduct and performance and evolves a problem solver frame of mind in students at early stage. It also prepares students for taking up responsible assignments in the corporate establishment.

General Guidelines:

1. The project should be original, of real-life value, and not copied from existing material from any source. A student should ensure that he understands what is expected by preparing a requirement document of his understanding and get it reviewed by the guide.
2. Design document should also be reviewed and code should also be peer reviewed.
3. A user manual has to be prepared and reviewed.
4. Testing has to be thorough and at various levels, followed by an acceptance test based on the requirement document and user manual.
5. Students should follow the steps as discussed in Software Development Life Cycle while writing dissertation and use Software Engineering Methodologies for development of deliverables, mere programming will not be sufficient. Students must note that interviewers for job are often more interested in the problem solved, alternatives that could have been tried and the benefits derived from the developed application, rather than just implementation details.
6. One Project will be submitted only by one student.However, if the nature of the project is very big & large enough to be divided in different independent big modules having an estimated required effort of minimum 06 weeks to be developed by one person, can be taken up and designed in such a way that every student will be responsible for one module and will submit only that specific module as it were a complete software project.
7. Every student has to get his / her synopsis approved from the guide.
8. The synopsis must be brief i.e., not more that 4-6 pages. It must address details like (however, students may follow the SRS format of IEEE for writing Synopsis)
   a. Name / title of the project,
   b. Statement about the problem,
   c. Why the Particular topic is chosen? It must address Present State of the Art.
   d. Objective and scope of the project,
   e. Analysis, Design, Development & Testing Methodology,
   f. H/W & S/W to be used,
   g. Testing Technologies to be used,
   h. What contribution / value addition would the project make?
   i. Limitations / constraints of the project,
   j. Conclusion, Future Scope for Modification,
   k. References and Bibliography.
9. After approval of the Synopsis, Students will need to give Two Presentations / Demonstration, as per the schedule fixed by their respective Institutions or University. First Presentation will ideally be given after Design Phase is over. Second should be given when System Testing is over. First Presentation **(Summer Training)** should be given in the first month. Second Presentation **(Projects)** is in second month**.** Final Project reports should be given latest by the end of the third month of the semester**.**
10. Summer Training report has to be submitted by **31ˢᵗ October of every academic year.**
11. The student will submit his/her project report/thesis in the prescribed format, as given hereunder, after the second presentation. The project report/thesis should include: -
    a. ONE hard copy (Maroon colour with golden print) of the project report / thesis.
    b. Soft copy of project on CD including all resource code/ compiled binary code and the manuscript in MS-Word document format.
12. Note the following guidelines with respect to Preparation of the Documentation. Please note that documentation is meant for other people, and hence it must be self-explanatory, in all respect.
    12.1.1   The sequence of the Pages in the Project Report will be as follows:

1. One Transparency Sheet
2. Title Page (Strictly as per the sample supplied)
3. Institute's Certificate
4. Company's Certificate
5. Candidate Declaration of originality of work
6. Acknowledgement.
7. Abstract
8. List of Figures (Strictly as per the sample supplied)
9. List of Tables (Strictly as per the sample supplied)
10. List of Abbreviations (Strictly as per the sample supplied)
11. Contents (Strictly as per the sample supplied) and then body of the dissertation according to the content.

12.2 The pages coming under the preview of the CONTENTS will only be numbered in the BOTTOM of the Page Centrally Aligned.

12.3 ONE Hardbound Copies (One Original and Two Xerox) will be submitted with the Institute out of which one will be given back to the candidate. All the students are required to follow the same binding format in maroon color with back quote mentioning title of the project, name of the student and year.

12.4 At the end of the Project Report Two White blank sheets must be attached.

12.5 At the beginning of each chapter one blank page (Strictly as per the sample supplied) must be attached. These pages will neither be numbered nor counted in total numbering of pages. They will only indicate the beginning of a New Chapter with its learning objectives.

12.6 Font size of the documentation will be *12 Times New Roman* and the pages will be one and half line spaced. The page margin will be as under: -

Top – 1 inch, Bottom – 1 inch,
Left – 1.5 inch, Right – 1 inch.

12.7 Kindly note that all-methodological details and theoretical aspects must be written in students' own words. Copying from books or other students will not be accepted, in any case.

All students are informed not to write definition of various concepts in index, mention the topics w. r. t. to your project (i.e., how various concepts have been implemented in the project)

* No detailed theories required
TEMPLATE FOR CHAPTER SCHEME

C O N T E N T S
(font size -18)

****

\# Please note that for all the System Design (Database, Input & Output) the basic Prototype, format, Table Structure, etc. is to be discussed along with related validations, verifications & normalization. However, the sample Input & Output (Screen Snapshots) will be attached in the annexure.

\#\# Under Testing, you have to discuss the approach of Testing, Test Data, Test Cases and Test Report. How Debugging has been performed, on the basis of Test Report, must be also discussed?

Template for blank page before every chapter

CHAPTER 2
SYSTEM ANALYSIS

Other Templates

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

Abbreviation	Description
CAD	Context Analysis Diagram
DFD	Data Flow Diagram
HIPO	Hierarchical Input Process Output

References/Bibliography:

1. Patterson D W, "Introduction to Artificial Intelligence and Expert Systems", Second Edition, 2002, Prentice Hall of India Private Ltd., New Delhi.

2. V. Rajaraman, "An Introduction to Digital Computer Design", Third Edition, 1995, Prentice Hall of India Private Ltd., New Delhi.

Note: All of the above three will be prepared on separate pages.

Template for back-quote

INVENTORY MANAGEMENT SYSTEM   STUDENT NAMEENROLLMENT NUMBER

Course Code: BCA 371			**L**	**T/P**	**C**
Course Name: Practical-X LINUX – OS LAB			**0**	**4**	**2**

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to:
1. Unix/Linux environment
2. Understanding of Linux commands and scripts

PRE-REQUISITES:

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Understand Linux Environment with the help of its architecture.	BT Level 1	PO1,PO2
CO2	Understand the Linux environment by using general Linux Commands.	BT Level 2	PO1,PO2,PO4
CO3	Implement Process Related commands.	BT Level 4	PO1,PO2,PO4,PO5
CO4	Implement File Permission concept.	BT Level 4	PO1,PO2,PO4,PO5
CO5	Understanding the shell script by combining commands.	BT Level 2	PO1,PO2,PO4

List of Practicals		
S. No.	**Detailed Statement**	**Mapping to CO #**
Core Practicals		
1	Connect to the Linux Server and understand the basic Directory Structure of Linux.	CO1
2.	To understand help commands like:-man,info,help,whatis,apropos	CO2
3.	To understand basic directory navigation commands like cat,cd, mv, cp, rm, mkdir,rmdir ,file, pwd command.	CO2
4.	To understand basic commands like:-date,cal,echo,bc,ls,who,whoami,hostname,uname,tty,aliase	CO2
5.	To understand vi basics, Three modes of vi Editor, how to write, save, execute a shell script in vi editor.	CO5
6.	To understand process related commands like: -ps, top, pstree, nice, renice in Linux.	CO3
7	To understand how to examine and change File permissions.	CO4
8	Set a file to be read-only with the chmod command. Interpret the file permissions displayed by the ls -l command.	CO4
9	Delete one or more directories with the rmdir command. See what happens if the directory is not empty. Experiment (carefully!) with the rm -r command to delete a directory and its content.	CO2
10	Change your directory to the directory exercises. Create a file in that directory, named the file as example1 using the cat command containing the following text: water, water everywhere and all the boards did shrink; water, water everywhere, no drop to drink.	CO2
11	Write basic shell script to display the table of a number.	CO5
12	Write basic shell script to input a character from user and then check whether it is uppercase, lowercase or digit.	
13	Write basic shell script to calculate factorial of a number.	
14	Write basic shell script to input the month number and generate corresponding calendar.	
15	Write basic shell script to list all directories.	
16	Write basic shell script to display greatest of three numbers.	
17	Write basic shell script to check whether the number entered by user is prime or not.	

Note:
1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Course Code: BCA 373	L	T/P	C
Course Name: Practical - XI CG Lab	0	4	2

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to:
1. Concept of Computer graphics, the coordinate system of display devices.
2. Implementing various scan converting algorithms.
3. Methods of drawing of graphic objects on the display devices.
4. Generating complex graphic objects
5. Implementation of various 2D transformations
6. Implementing line clipping algorithms

PRE-REQUISITES:

Knowledge of Programming in C/C++ is preferable

Understanding of various functions included in graphics.h header files

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Develop basic computer generated graphic and drawing of graphic objects on 2D display devices.	BTL3	PO1, PO6
CO2	To perform various algorithms for generating objects	BTL4	PO4
CO3	To implement various 2D transformation operations through matrices.	BTL4	PO4, PO8
CO4	Implementation of cohen-sutherland line clipping algorithm.	BTL3	PO1
List of Practicals			
S. No.	Detailed Statement		Mapping to CO #
Core Practicals (Implement minimum 8 out of 10 practicals)			
1.	Drawing objects like circle, rectangle, polygon etc using graphic function		CO1
2.	raphics Inbuilt functions		CO2
3.	ne Drawing Algorithms (DDA & Bresenham's Algorithm)		CO2
4.	rcle Algorithms		CO2
5.	Translation in 2D		CO3
6.	Rotation in 2D		CO3
7.	Scaling in 2D		CO3
8.	Reflection in 2D		CO3
9.	Shearing in 2D		CO3
10.	Cohen Sutherland's Algorithm		CO4
Application Based Practicals (Implement minimum 5 out of 10 practicals)			
11.	Program to rotate a circle outside another circle		CO1
12.	Program to draw Flying Balloons		CO1
13.	Show Bouncing Ball Animation		CO2
14.	Draw pie chart of family income and Expenditure		CO2
15.	Show changing radius of circle		CO2, CO3
16.	Program to rotate a coin on table		CO3

17.	Making an Analog Clock	CO3
18.	Draw a moving cycle	CO3, CO4
19.	Design a screensaver	CO4
20.	Show Moving Car Animation	CO3, CO4

Note:
1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Course Code: BCA 302

L T C

Course Name: Data Ware Housing and Data Mining

3 1 4

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its sub parts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNINGOBJECTIVES:
In thiscourse,thelearnerswill beableto developexpertise relatedtothefollowing:-
1. To understand the basic principles, concepts and applications of Data warehousing and ELT tools.
2. Differentiate Online Transaction Processing and Online Analytical processing
3. To understand the Data Mining Process, Technologies & Rules, platform tools and data

pre-processing or data visualization techniques.

4. Identifying business applications of data mining
5. Develop skills in selecting the appropriate data mining algorithm for solving practical problems.

PRE-REQUISITES:
1. Discrete Mathematics
2. Information system concept

COURSEOUTCOMES(COs):
Aftercompletionofthiscourse,thelearners willbe ableto:-

CO#	DetailedStatementoftheCO	*BTLevel	MappingtoPO #
CO1	Understand the various component of Datawarehouse	BTL2	PO1, PO2, PO3,PO7,PO5
CO2	Appreciate the strengths and limitations of various data mining and data warehousing models	BTL3	PO1, PO2, PO3,PO7, PO10
CO3	Critically evaluate data quality to advocate application of data pre-processing techniques.	BTL3	PO1, PO2, PO3,PO4
CO4	Describe different methodologies used in data mining and data ware housing.	BTL4	PO1, PO2, PO3,PO4,PO7
CO5	Design a data mart or data warehouse for any organization	BTL5	PO1,PO2,PO3, PO4,PO11
CO6	Test real data sets using popular data mining tools such as WEKA	BTL6	PO1, PO2, PO3,PO4, PO6, PO7,PO8

UNIT–I

No. of Hours:12 Chapter/Book Reference: TB3[Chapters - 1,2,3]

Introduction to Data Warehousing: Overview, Difference between Database System and Data Warehouse, The Compelling Need for data warehousing, Data warehouse – The building Blocks: Defining Features, data warehouses and data marts, overview of the components, three tier architecture, Metadata in the data warehouse.
ETL tools: - Defining the business requirements: Dimensional analysis, information packages – a new concept, requirements gathering methods, requirements definition: scope and content

UNIT–II
No. of Hours:11 Chapter/Book Reference: TB3 [Chapters - 10,11,12]

Principles of Dimensional Modeling: Objectives, From Requirements to data design, Multi-Dimensional Data Model, Schemas: the STAR schema, the Snowflake schema, fact constellation schema.
OLAP in the Data Warehouse: Demand for Online Analytical Processing, limitations of other analysis methods, OLAP definitions and rules, OLAP characteristics, major features and functions, hyper cubes.
OLAP Operations: Drill-down and roll-up, slice-and-dice, pivot or rotation, OLAP models, overview of variations, the MOLAP model, the ROLAP model, the DOLAP model, ROLAP versus MOLAP, OLAP implementation considerations. Query and Reporting, Executive Information Systems (EIS), Data Warehouse and Business Strategy

UNIT–III
No. of Hours:10 Chapter/BookReference:TB1 [Chapters:1,3], TB2[Chapter - 3], RB5[Chapter - 17]

Data mining and data pre-processing:
Data mining: Introduction, What kind of data can be mined, What kind of patterns to be mined, Which technologies are used, What kinds of applications are targeted, Major issues in data mining.
Data pre-processing: Overview of Data pre-processing, data cleaning, data integration, data reduction, data transformation and data discretization, exploring data using IRIS datasets. Introduction to apriori algorithm for association mining rule.

UNIT–IV
No. of Hours: 10 Chapter/Book Reference: TB1[Chapters - 1, 3], RB2, RB3

Data mining applications, and Data mining Tools:
Applications of data mining: Data mining for retail and telecommunication industries, data mining and recommender systems.
Introduction to data mining tools (open source): Weka, RapidMiner, IBM Watson for classification and clustering algorithms using IRIS Datasets

TEXTBOOKS:
TB1. Kamber and Han, "Data Mining Concepts and Techniques", Third edition, Hartcourt India P.Ltd.,2012.
TB2. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "Introduction to data mining", Pearson education, 2006
TB3. Paul Raj Poonia, "Fundamentals of Data Warehousing", John Wiley & Sons, 2004
REFERENCEBOOKS:
RB1. Ashok N. Srivastava, Mehran Sahami, "Text Mining Classification, Clustering, and Applications", Published by Chapman and Hall/CRC1st Edition, June 23, 2009
RB2. Ian H., Eibe Frank, Mark A. Hall, Christopher Pal "Data Mining: Practical Machine Learning Tools and Techniques"Published by Morgan Kaufmann; 4th edition ,December 1, 2016
RB3. G. K. Gupta, "Introduction to Data Mining with Case Studies", PHI, 2006
RB4. Alex Berson and Stephen J.Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw Hill, 1 July 2017
RB5. Shmueli, "Data Mining for Business Intelligence : Concepts, Techniques and Applications in Microsoft Excel with XLMiner",Wiley Publications

Course Code: BCA 304   **L   T   C**
Course Name: E-Commerce   **3   1   4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its sub parts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following: -
1. To learn and understand the basic nature of e-commerce.
2. To study how the internet and web support e-commerce.
3. To explain how to use technologies to build e-commerce websites.
4. To make students aware of the business environment associated with e-commerce.

PRE-REQUISITES:
1. Basic Knowledge of computers and business concepts.
2. Basic knowledge of the Internet.

COURSE OUTCOMES(COs):
After completion of this course, the learners will be able to: -

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the framework and business models of E-commerce.	BTL2	PO1, PO2, PO3, PO7
CO2	Explain the concept of network infrastructure and gain knowledge about mobile commerce.	BTL2	PO1, PO2, PO3, PO7, PO10
CO3	Demonstrate the process of secure electronic transactions for E-commerce.	BTL3	PO1, PO2, PO3, PO4
CO4	Analyze various e-commerce secure payment gateway.	BTL4	PO1, PO2, PO3, PO4, PO7
CO5	Evaluate Internet banking platform to work with E-commerce infrastructure.	BTL5	PO1, PO2, PO3, PO4, PO11
CO6	Implement ecommerce website for online business.	BTL6	PO1, PO2, PO3, PO4, PO6, PO7, PO8

UNIT-I
No. of Hours: 10 Chapter/Book Reference: TB1[Chapters – 1,2],

Introduction: Definition of Electronic Commerce,Evolution of e-commerce, E-Commerce& E Business, Unique features of e-commerce, applications of E-Commerce, advantages and disadvantages of E-commerce, Types of e-commerce:B2B, B2C, C2C, M-commerce, Social Commerce
E-commerce infrastructure: Technological building blocks:Internet, web and mobile applications

UNIT II
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters - 2, 3], RB1,RB3
Building an e-commerce presence: Planning, System Analysis, Design, Choosing Software, Hardware, Other E-commerce site tools: Tools For website design, Tools for SEO, Interactivity and active contents (Server side scripting)
Important Components of E-commerce website: Product Cataloging, Product Listing Page, Product description Page, Cart building andCheckout, Third party integrations: Payment systems, Data Layer Integrations for analytics, Customer support integration, Order tracking, Shipping, return and cancellation
New Technologies for E-commerce: Chatbots, Recommendation systems (Personalisation), Smart Search, Product Comparison,Augmented reality, Big data, Cloud computing

UNIT III
No. of Hours: 10 Chapter/Book Reference: TB2 [Chapters - 5, 6, 7], RB1, RB3
Electronic Payment Systems-
Overview of Electronics payments, electronic Fund Transfer, Digital Token based Electronics payment System, Smart Cards, Credit Cards, Debit Cards, Emerging financial Instruments Smartphone wallet, Social / Mobile Peer to Peer Payment systems, Digital Cash and Virtual Currencies,Online Banking, Payment Gateway, Electronic Billing Presentment and Payment.

UNIT IV
No. of Hours: 10 Chapter/Book Reference: TB1[Chapters - 5, 6, 7], RB4
Security Threats and Issues: Cyber crimes, Credit card frauds/theft, Identity fraud, spoofing , sniffing, DOS and DDOS attacks, Social network security Issues, Mobile Platform Security issues, Cloud security issues
Technology Solutions: Encryption :Secret Key Encryption, Public Key Encryption, Digital Certificates and public key infrastructure
Securing channels: Secured Socket Layer (SSL), Transport Layer Security(TLS) , Virtual Private Network (VPN), Protecting Networks: Firewalls, Proxy Servers, Intrusion detection and protection systems , Anti Virus software

TEXT BOOKS:
TB1. Kenneth C. Laudon, "E-Commerce: Business, Technology and Society", 15th Edition, Pearson education
TB2. KK Bajaj & Debjani Nag," E-Commerce: The Cutting Edge of Business "McGraw Hill, II edition, 2015
TB3. Efraim Turban, Jae Lee, David King, H. Michael Chung, "Electronic Commerce – A Managerial Perspective", Addison-Wesley.

REFERENCE BOOKS:
RB1. The Complete Reference: Internet, Margaret Levine Young, Tata McGraw Hill.
RB2. E-Commerce: Concepts, Models, Strategies, CSV Murthy, Himalayas Publishing House.
RB3. Frontiers of Electronic Commerce, Ravi Kalakota & Andrew B. Wilson, Addison-Wesley (An Imprint of Pearson Education).
RB4. Network Security Essentials: Applications & Standards, William Stallings, Pearson Education.

Course Code: BCA 306
Course Name: Internet of Things

	L	T	C
	3	1	4

<table>
<tr><td colspan="2">INSTRUCTIONS TO PAPER SETTERS:</td></tr>
<tr><td>1.</td><td>Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.</td></tr>
<tr><td>2.</td><td>Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its sub parts, if any.</td></tr>
<tr><td>3.</td><td>Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.</td></tr>
</table>

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. To learn and understand the concept of Internet of Things (IOT).
2. To study the constituent components of Internet of Things.
3. To design and develop IoT applications using different, Sensors/actuators.
4. To seek working knowledge of Arduino, Raspberry pi Boards and to develop cloud based IOT projects.

PRE-REQUISITES:
1. Basic Programming Knowledge
2. Use of Internet

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the architecture and the functional blocks of Internet of Things.	BTL2	PO1, PO2, PO3
CO2	Explain the concepts of Internet of Things and gain knowledge to design IoT applications	BTL2	PO1, PO2, PO3,PO7, PO10
CO3	Demonstrate the process of capturing and analyzing data in Internet of Things.	BTL3	PO1, PO2, PO3,PO4
CO4	Examine the various components involved in IoT design methodology.	BTL4	PO1, PO2, PO3,PO4,PO7
CO5	Evaluate an IoT device to work with a Cloud Computing infrastructure.	BTL5	PO1,PO2,PO3, PO4,PO11
CO6	Implement IoT protocols for communication.	BTL6	PO1,PO2, PO3,PO4, PO6, PO7,PO8

UNIT–I

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters - 1,3,4,6]; TB2[Chapters - 1,2,3]

Internet of Things (IoT): Vision, Definition, Conceptual framework, Architectural view, Technology behind IoT, Sources of the IoT, M2M Communication, IoT examples.
Design Principles for Connected Devices: IoT/M2M systems layers and design standardization, Communication technologies, Data enrichment and consolidation, Ease of designing and affordability.

UNIT–II

No. of Hours: 10 Chapter/Book Reference: TB1 [Chapters - 4,7,8,11], TB2 [Chapters - 4,5,7,9], TB4[Chapters - 2,4,5,6,9]

Hardware for IoT: Sensors, Digital sensors, Actuators, Radio frequency identification (RFID) technology, Wireless sensor networks, Participatory sensing technology.
Embedded Platforms for IoT: Embedded computing basics, Overview of IOT supported hardware platforms such as Arduino, NetArduino, Raspberry Pi, Beagle Bone, Intel Galileo boards and ARM cortex.

UNIT–III

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 1,3,4,], TB2 [Chapters - 2,3,6], TB4 [Chapter - 7]

Network & Communication Aspects in IoT: Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination
Programming the Arduino: Arduino platform boards anatomy, Arduino IDE, Coding using emulator, Using libraries, Additions in Arduino, Programming the Arduino for IoT.

UNIT–IV

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 15,16], TB3[Chapters - 13, 14, 15, 16, 17], RB1[Chapter - 4]

Challenges in IoT Design Challenges: Development challenges, Security challenges, Other challenges.
IoT Applications: Smart metering, E-health, City automation, Automotive applications, Home automation, Smart cards, Communicating data with H/W units, Mobiles, Tablets, Designing of smart street lights in smart city.

TEXT BOOKS:
TB1. Rajan Gupta, Supriya Madan, "Fundamentals of IoT", BPB Publications, Ist Edition, 2023
TB2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things Key Applications and Protocols", Wiley.
TB3. Jeeva Jose, "Internet of Things", Khanna Publishing House.
TB4. Michael Miller, "The Internet of Things", Pearson Education.
TB5. Raj Kamal, "Internet of Things", McGraw-Hill, 1st Edition, 2016

REFERENCE BOOKS:
RB1. Arshdeep Bahgaand Vijay Madisetti,"Internet of Things: A Hands-on Approach", University Press, 2015
RB2. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies,   Platforms, and Use Cases", CRC Press, 2017.

Course Code: BCA 308　　　　　　　　　　　　　　　　　　　　　**L   T/P C**
Course Name: Major Project　　　　　　　　　　　　　　　　　　**0   12   6**

PROJECT REPORT

All the students are required to submit a report based on the project work done by them during the sixth semester.

SYNOPSIS (SUMMARY/ABSTRACT) :
All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name / Title of theProject
- Statement about theProblem

- Why is the particular topicchosen?
- Objective and scope of theProject
- Methodology (including a summary of theproject)
- Hardware & Software to beused
- Testing Technologiesused
- What contribution would the projectmake?

TOPIC OF THE PROJECT- This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

OBJECTIVE AND SCOPE: This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to bementioned.

PROCESS DISCRIPTION: The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

RESOURCES AND LIMITATIONS: The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

CONCLUSION: The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and also any other important feature that makes the system stand out from the rest.

The following suggested guidelines must be followed in preparing the Final Project Report:
Good quality white A4 size paper should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

Page Specification: (Written paper and source code)
- Left margin - 3.0 cms
- Right margin- 2.0cms
- Top margin 2.54cms
- Bottom margin 2.54cms
- Page numbers - All text pages as well as Program source code listing should be
numbered at the bottom center of thepages.

Normal Body Text: Font Size: 12, Times New Roman, Double Spacing, Justified. 6 point above and below paraspacing
Paragraph Heading Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 point above & belowspacing.
Chapter Heading Font Size: 20, Times New Roman, Centre Aligned, 30 point above and below spacing. **Coding Font size :**10, Courier New, Normal
Submission of Project Report to the University : The student will submit his/her project report in the prescribed format. The Project Report should include:
1. One copy of thesummary/abstract.
2. One hard Copy of the ProjectReport.
3. The Project Report may be about 75 pages (excludingcoding).

FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT
I.   Cover Page as performat
II.   Acknowledgement
III.   Certificate of the project guide
IV.   Synopsis of theProject
V.   MainReport
- i.   Objective & Scope of theProject
- ii.   Theoretical Background Definition of Problem
- iii. System Analysis & Design vis-a-vis UserRequirements
- iv.   System Planning (PERTChart)
- v.   Methodology adopted, System Implementation & Details of Hardware & Software used System Maintenance &Evaluation
- vi.   Detailed Life Cycle of theProject
  - a. ERD, DFD
  - b. Input and Output ScreenDesign
  - c. Processinvolved
  - d. Methodology usedtesting
  - e. Test Report, Printout of the Report & CodeSheet
VI.   Coding and Screenshots of the project
VII.   Conclusion and Future Scope
VIII.   References

Formats of various certificates and formatting styles are as:

1. Certificate from theGuide

CERTIFICATE

This is to certify that this project entitled " xxxxxx xxxxx xxxxx xxxx xxxx xxx" submitted in partial fulfillment of the degree of Bachelor of Computer Applications to the "xxxxxxxxxxxxxxxxxxxxxxxxxx" through xxxxxx xxxxx doneby Mr./Ms._____,RollNo._____is an is an authentic work carried out by him/herat _____ under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree to the best of my knowledge andbelief.

Signature ofthestudent   Signature of theGuide

2. Project Report Cover PageFormat:

Title of the Project/report
(Times New Roman, Italic, Font size = 24)

Submitted in partial fulfilment of the requirements for the award of the degree of
Bachelor of Computer Applications
(Bookman Old Style, 16 point, centre)

Submitted to: **Submitted by:**
(GuideName)   **(Student'sname)**
                                                     Roll No
                                                     College Name

3. **Self-Certificate by thestudents**

SELF CERTIFICATE

This is to certify that the dissertation/project report entitled "…………………………………" is done by me is anauthentic work carried out for the partial fulfilment of the requirements for the award of the degree of Bachelor of Computer Applications under the guidance of_____. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge andbelief.

Signature of the student
Name of the Student
Roll No.

4. **ACKNOWLEDGEMENTS**

In the "Acknowledgements" page, the writer recognizes his indebtedness for guidance and assistance of the thesis adviser and other members of the faculty. Courtesy demands that he also recognize specific contributions by other persons or institutions such as libraries and research foundations. Acknowledgements should be expressed simply, tastefully, and tactfully.

Course Code: BCAT 312   **L   T   C**
Course Name: Data Visualization & Analytics   **4   0   4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. Students will develop relevant programming abilities.
2. Students will demonstrate proficiency with statistical analysis of data.
3. Conduct exploratory data analysis using visualization.
4. Craft visual presentations of data for effective communication.

PRE-REQUISITES:
1. Basics of Python Programming (BCA-206)

COURSE OUTCOMES(COs):
After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Illustrating the features of Multithreading in python.	BTL2	PO1, PO2, PO3, PO5
CO2	Analyzing data using suitable python library.	BTL2	PO1, PO2, PO3,PO7, PO10
CO3	Visualizing data using Matplotib, Seaborn library.	BTL3	PO1, PO2, PO3,PO4
CO4	Develop python applications with database connectivity operations.	BTL3	PO1, PO2, PO3,PO4

UNIT–I
No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 1, 2], TB2 [Chapters - 1, 2]

Analytics: Basic Nomenclature, Analytics Process Model, Analytics part in different profiles, Analytical Model Requirements.
Data Sources for data collection, Sampling and Sampling distribution, Types of data elements, Missing Values, Outlier Detection and Treatment, Standardization using Min/max and z-score, categorization, Segmentation.

UNIT–II
No. of Hours: 11 Chapter/Book Reference: TB2 [Chapter - 3], TB3 [Chapter - 7]

Statistical Hypothesis Testing, p-Values, Confidence Intervals.
Correlation, Simpson's Paradox, Some Other Correlational Caveats, Correlation and Causation, Correlation Statistics-ANOVA.

UNIT–III
No. of Hours: 11   **Chapter/Book Reference: TB3[Chapter - 3], TB4 [Chapter - 8]**

Data Visualization: Graphs in Python: Line Graph, Bar charts, Pie-charts, Scatter plots, multiple plots, Subplots, Legends, Changing figure Size, Styling plots using Matplotib Library**.** Functions like relplot(), displot() and catplot ().
Seaborn Library: Introduction, Line plot, Dist plot, Lmplot, Count plot, Color palettes.

UNIT–IV
No. of Hours: 11   **Chapter/Book Reference: TB5 [Chapter - 4], TB3 [Chapter - 7]**

GUI Programming: Creating User-interface, GUI Widgets with Tkinter, Creating Layouts, Check Box, Radio Buttons, List Box, Menus, Menus Options, Dialog Boxes

Database Access: Database Connectivity Operations: Create, lnsert, Select, Delete, Drop, Update.

TEXT BOOKS:
TB1. Analytics in a Big Data World, Essential Guide to Data Science and its Application, Bart Baesens, Wiley Big Data Series.
TB2. Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data Published by John Wiley & Sons, Inc
TB3. Data Science from Scratch, 2nd Edition by Joel Grus Publisher(s): O'Reilly Media, Inc
TB4. Agile tools for real world data: Python for Data Analysis by Wes McKinney, O'Reilly
TB5. Python and Tkinter Programming JOHN E. GRAYSON

REFERENCE BOOKS:
RB1. Allen Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly, 2nd Edition,2015.
RB2. ReemaThareja, "Python Programming using Problem Solving Approach", Oxford University Press, 1" Edition, 2017. RB4. Joel Grus, "Data Science from Scratch", O'Reilly, 2no Edition ,2019.
RB3. Tony Gaddis, "starting out with Python", Pearson, 3'd Edition, 2014.
RB4. Y. Daniel Liang, "lntroduction to Programming Using Python", Pearson, 1" Edition, 201,3.
RB5. Programming in Python 3: A Complete Introduction to the Python Language (2nd Edition), Mark Summerfield

		L	T	C
Course Code: BCAP 312				
Course Name: Data Visualization & Analytics Lab		0	2	1

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

List of Practicals	
S.No.	**Detailed Statement**	**Mapping to CO#**
**Core Practicals**		
1.	Write a program to create a DataFrame have E-commerce data and perform selection of row/column using loc() and iloc()	CO1,CO2,CO3
2.	Create a Series object S5 containing numbers. Write a program to store the square of the series values in object S6. Display S6's values which are >15.	CO1, CO2, CO4
3.	Write a program to fill all missing values in a DataFrame with zero.	CO1, CO2
4.	Program for combining DataFrames using concat(), join(),merge()	CO1, CO2
5.	Write a program to draw bar graph for the following data for the Medal tally of CWG-2018:- <table><tr><td>Gold</td><td>Silver</td><td>Bronze</td><td>Total</td></tr><tr><td>26</td><td>20</td><td>20</td><td>66</td></tr></table>	CO1, CO2,CO3
6.	Implementing Line plot, Dist plot, Lmplot, Count plot using Seaborn library	CO1, CO2,CO3
**Application Based Practicals (Implement minimum 5 out of 10 practicals)**		

7.	Create a DataFrame namely aid that stores aid (Toys,books,uniform,shoes) by NGO's for different states. Write a program to display the aid for:-
	    (a) Books and Uniforms only
	    (b) Shoes only
		CO1, CO2,CO5

8.	Create a DataFrame ndf having Name, Gender, Position, City, Age, Projects. Write a program to summarize how many projects are being handled by each position for each city? Use pivot()	CO1, CO2,CO5
9.	**Marks** is a list that stores marks of a student in 10 unit test. Write a program to plot Line chart for the student's performance in these 10 test.	CO1, CO2
10.	Write a program to plot a horizontal bar chart from the height of some students.	CO1, CO2,CO3
11.	Write a program to implement ANNOVA.	CO1, CO2,CO3,CO5
12.	Write a program to show correlation between two randomly generated numbers .	CO1,

		CO2,CO4,CO5
13.	Write a program to implement Covariance.	CO1, CO2, CO5
14.	Create a GUI based form for admission purpose for your college	CO1, CO2, CO3
15.	The created GUI based application form is to connected to a database and use insert query to enter data.	CO1, CO2, CO5

Note:
1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.
2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Course Code: BCAT 314　　　　　　　　　　　　　　　　　　　　　　**L　T　C**
Course Name: Deep Learning with Python　　　　　　　　　　　　**4　0　4**

INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its sub parts, if any.
3. Examiners are requested to go through the Course Outcomes(CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy(BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:-
1. To present the mathematical, statistical and computational challenges of building neural networks
2. To study the concepts of deep learning and important deep learning techniques
3. To introduce important Deep Learning architectures
4. To enable the students to apply deep learning techniques to support real-life applications

PRE-REQUISITES:
Basics of Python Programming

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the basic concepts of Deep Learning and differentiate between shallow learning and deep learning.	BTL2	PO1, PO2, PO6
CO2	Implement various Deep Learning Models.	BTL3	PO2, PO3, PO4,PO8
CO3	Understand different Deep Learning architectures and training algorithms.	BTL3	PO1, PO2, PO3,PO5, PO8
CO4	Understanding Dimensionality Reduction and optimization in Deep Learning.	BTL4	PO1, PO2, PO3,PO4
CO5	Understanding and implementing Recurrent Neural Network (RNN).27	BTL3	PO1,PO2,PO3, PO8
CO6	Applying Deep Learning techniques in real life applications such as object detection and analysis.	BTL6	PO2, PO3,PO4, PO5, PO6,PO8

UNIT-I
No. of Hours:11 Chapter/Book Reference: TB1 [Chapters - 1, 2], TB2 [Chapter - 2], TB3 [Chapters - 3, 5]

Introduction – Overview of Machine Learning, Introduction to Artificial Neural Network (ANN), Perceptron, Training a Neural Network, Activation Functions, Loss Function, Hyperparameters, Gradient Descent, Stochastic Gradient Descent, Backpropagation and regularization, Batch normalization, Building an ANN in Python, Frameworks-TensorFlow, Keras.

UNIT-II
No. of Hours:12   Chapter/Book Reference: TB1 [Chapters - 3, 4, 5, 6], TB2 [Chapters - 3,4,5], TB3[Chapters - 7, 8]

What is Deep Learning? Deep vs Shallow Networks, Convolution Neural Networks (CNN) –Convolution Layers, Pooling Layer, Flattening, FullyConnected Layers, Softmax and Cross-Entropy, Building a CNN in Python, Fully Connected CNN, CNN Architectures – LeNet, AlexNet, ZFNet, GoogLeNet, VGGNet, ResNet, DenseNet, Training a Convnet: weights initialization, batch normalization, hyperparameter optimization

UNIT-III
No. of Hours:11 Chapter/Book Reference: TB1 [Chapters - 3, 4, 7]

Deep Belief Networks, Auto Encoders, Concept of Dimensionality Reduction, Autoencoder, Denoising Autoencoders, Deep Autoencoders, Concept of Reinforcement Learning

UNIT-IV
No. of Hours: 11 Chapter/Book Reference: TB2 [Chapter - 7]; TB3 [Chapter - 9]

Recurrent Neural Networks (RNN), LSTM, Sequence Prediction and Time Series Forecasting with LSTM, Overview of Object Detection Techniques using Deep Learning, Overview of Transfer Learning.

TEXT BOOKS:
TB1. Adam Gibson and Josh Patterson, Deep Learning: A Practitioner's Approach, (O'Reilly).
TB2. Mohamed Elgendy, Deep Learning for Vision Systems, Manning Publications, ISBN: 9781617296192
TB3. Navin Kumar Manaswi, Deep Learning with Applications Using Python, Apress (2018)

REFERENCE BOOKS:
RB1. Cosma Rohilla Shalizi, Advanced Data Analysis from an Elementary Point of View, 2015.
RB2. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.
RB3. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016.
RB4. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.
RB5. Charu C. Aggarwal, Neural Networks and Deep Learning, Springer, 2018.
RB6. M. Arif Wani, Farooq Ahmad Bhat, Saduf Afzal, Asif Iqbal Khan, Advances in Deep
Learning, Springer, 2020.

Course Code: BCAP 314   **L   T   C**
Course Name: Deep Learning with Python Lab   **0   2   1**

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

List of Practical

S.No.	Detailed Statement	Mapping to CO#
1.	Write a program for creating a perceptron.	CO1
2.	Write a program to implement multi-layer perceptron using TensorFlow. Apply multi-layer perceptron (MLP) on the Iris dataset.	CO1
3.	(a) Write a program to implement a Convolution Neural Network (CNN) in Keras. Perform predictions using the trained Convolution Neural Network (CNN). (b) Write a program to build an Image Classifier with CIFAR-10 Data.	CO5
4.	(a) Write a program to perform face detection using CNN. (b) Write a program to demonstrate hyperparameter tuning in CNN.	CO5

	(c)Predicting Bike-Sharing Patterns – Build and train neural networks from scratch to predict the number of bike share users on a given day.	
5.	Write a program to build auto-encoder in Keras.	**CO2, CO3**
6.	Write a program to implement basic reinforcement learning algorithm to teach a bot to reach its destination.	**CO3**
7.	(a) Write a program to implement a Recurrent Neural Network (b) Write a program to implement LSTM and perform time series analysis using LSTM.	**CO5**
8.	(a) Write a program to perform object detection using Deep Learning (b) Dog-Breed Classifier – Design and train a convolutional neural network to analyze images of dogs and correctly identify their breeds. Use transfer learning and well-known architectures to improve this model.	**CO2,CO4**
9.	(a) Write a program to demonstrate different activation functions. (b) Write a program in TensorFlow to demonstrate different Loss functions.	**CO2**
10.	Write a program to build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets	**CO5**
Note: **1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.** **2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**		

		L T C
Course Code: BCA 316		
Course Name: IT Act and Cyber Laws		**4 1 5**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.

3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
1. Students will be able to have the basic clarity and understanding of cybercrimes and cyber security laws
2. Students will be able to understand the need for cyber laws, will be able to describe and differentiate between substantive, procedural, and preventive cybercrime laws.
3. To understand and critically assess national, regional, and international cybercrime laws.
4. To create awareness among the students about how crime being is committed in the cyber world.

PRE-REQUISITES:
None

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to: -

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Define various Cyber laws in the world, Classification of Cybercrime	BTL1	PO1, PO7
CO2	Describe and explain the ways in which certain cybercrimes are perpetrated.	BTL2	PO3
CO3	Explain and use the objectives of national cyber security strategies.	BTL2 BTL3	PO3, PO7
CO4	Discover IPR and E-commerce law.	BTL4	PO2
CO5	Explain and Evaluate E-Commerce Issues and provisions in Indian Law.	BTL5	PO3, PO4
CO6	Design and create frameworks for international cooperation on cyber security Matters.	BTL6	PO4, PO6

UNIT I
No. of Hours:14 Chapter/Book Reference: TB5 [Chapter - 1], RB2 [Chapters - 1, 2], RB3 [Chapters - 1, 3]

Introduction to the Cyber World and Cyber Law: Cyber World: An Overview, The internet and online resources, Introduction to Computer Crimes and Cyber Crimes, Distinction between cybercrimes and conventional crimes, Reasons for commission of cyber-crime, Cyber forensic.
Classification of cyber-crimes: Cyber criminals and their objectives, Planning of attacks.
Types of cybercrimes: Cyber Stalking; Forgery and Fraud, Social engineering attacks, Phishing, DoS and DDoS attacks, Identity Theft, Salami Attack, Net Extortion.
Introduction to Cyberspace: Cybercrime, Threats to the virtual world, Cyber Crimes & Social Media attacks, Cyber Squatting, Cyber Espionage, Cyber Warfare, Cyber Terrorism, Cyber Defamation, Crime related to IPRs, Computer Vandalism etc.
Access and Unauthorized Access, Data Security, E-Contracts and E-Forms

UNIT II
No. of Hours: 14 Chapter/Book Reference: TB1 [Chapter - 1], RB2 Chapter –2]
Introduction to Cyber Law, Need for Cyber Law
Evolution of the IT Act, Genesis and Necessity - Salient features of the IT Act, 2000, Various authorities under IT Act and their powers, Penalties & Offences, Amendments.
Impact on other related Acts (Amendments) - Amendments to Indian Penal Code, Indian Evidence Act, Bankers Book Evidence Act, Reserve Bank of India Act - Cyberspace Jurisdiction.
Online Safety for all with special reference for women and children, Misuse of individual information. Violation of privacy, Trafficking of Information and Data

UNIT-III
No. of Hours: 10 Chapter/Book Reference: TB1 [Chapter - 4], RB2 [Chapter - 7]

E–Commerce and Laws in India: Digital/Electronic Signature in Indian Laws, Digital Certificates, Certifying Authority, E-Commerce Issues and provisions in Indian Laws, Concept of E-Governance and its Implication in India, Issues related to E-Taxation in Cyberspace, E-Contracts and its validity in India (f) Cyber Tribunal & Appellate Tribunal.

UNIT-IV
No. of Hours: 12 Chapter/Book Reference: TB1 [Chapter - 2], RB2 [Chapters - 4, 5]

Intellectual Property Rights - Domain Names and Trademark Disputes, Concept of Trademarks in Internet Era, Cyber Squatting, Reverse Hijacking Jurisdiction in Trademark Disputes, Copyright in the Digital Medium, Copyright in Computer Programmes.
Cyber Laws in India – Crime against Individual, Crime against Property, Crime against Nation,
Indian Case Laws, An introduction to International Cyber Laws

TEXT BOOKS:

TB1. Supriya Madan, Rajan Gupta, "Security in Cyber Space and its Legal Perspective", AGPH Books
TB2. Sharma J. P,& Kanojia S. (2016). Cyber Laws. New Delhi: Ane Books Pvt. Ltd.
TB3. Duggal, P. Cyber Laws. (2016) Universal Law Publishing.
TB4. Kamath, N. (2004). Law relating to computers, internet and e-commerce: A guide to Cyber Laws and the Information Technology Act, 2000 with rules, regulations and notifications (2nd ed.). Delhi: Universal Law Publishing Co.
TB5. Cyber security: Nina Godbole, Wiley Publication 2016

REFERENCE BOOKS:

RB1. Baase, S. (2013). A Gift of Fire: Social, Legal, and Ethical Issues for Computing
RB2. Cyber Law Simplifies: Vivek Sood, McGraw Hill Publication
RB3. Introduction to Cyber Security: Anand Shinde
RB4. Technology (4th ed.) Upper Saddle River, NJ: Pearson Education.

Course Code: BCAT-318	L	T	C
Course Name: Mobile Application Development	4	0	4

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.

3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNINGOBJECTIVES:

In thiscourse,thelearnerswill beableto developexpertise relatedtothefollowing:-

1. Identify various concepts of mobile application programming that make it unique from programming for other platforms.

2. To help learner to gain a basic understanding of Android application development.

3. Program mobile applications for the Android operating system that use basic and advanced phone features, and deploy applications to the Android marketplace for distribution.

PRE-REQUISITES:

1. Java Programming
2. Programming fundamental

COURSEOUTCOMES(COs):

Aftercompletionofthiscourse,thelearners willbe ableto:-

CO#	DetailedStatementoftheCO	*BTLevel	MappingtoPO #
CO1	Recognize the concept of application development for mobile devices.	BTL2	PO1, PO2,
CO2	Understand the basic technologies used by the Android platform	BTL2	PO1, PO2,
CO3	Recognize and use Android Environment Emulator and Application life cycle	BTL3	PO1, PO2, PO3,PO4
CO4	Develop mobile applications for the Android operating system that use basic and advanced phone features	BTL5	PO1, PO2, PO3,PO4,PO7
CO5	Deploy applications to the Android marketplace for distribution	BTL6	PO1,PO2,PO3, PO4,PO11

UNIT-I
No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 1, 2], TB2 [Chapters - 2, 3]

Introduction: Brief history of mobile applications, Different types of mobile applications, Brief history of Android, Introduction to Android Development Environment, Android Application
Design Essentials: Anatomy of an Android applications, Creating First Android Application, Creating Android project , Project organization, Setting up real Android device , Setting up Android emulator, Developing simple user interface , Running your first application
Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

UNIT-II
No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter - 3,4,5,6], TB2 [Chapters – 5, 6, 7]

User Interface in Android: Adaptive and responsive user interfaces, User Input Controls, Menus, Screen Navigation, Recycler View, Drawables, Themes and Styles, Fragments Fragment Life Cycle, Introduction to Material Design.

Android Application Components: App Widgets, Processes and Threads, User Interface Components, Views and layouts, Input controls, Input Events, Settings, Dialogs, Menus, Notifications, Toasts, Testing the user interface

UNIT – III
No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 8, 9], TB2 [Chapter - 9]

Background tasks: AsyncTask, AsyncTaskLoader, Connecting App to Internet, Broadcast receivers, Services, Notifications, Alarm managers.
Sensor, Location and Maps: Sensor Basic, Motion and Position Sensors, Location services, Google maps API, Google Places API

UNIT- IV
No. of Hours: 11 Chapter/Book Reference: TB1[Chapters - 9,10], TB2[Chapter - 10]

Working with data in Android: Shared Preferences, App Setting, SQLite primer, Store data using SQLite database, Content Providers, Content Resolver, Loader
Publishing Your App: Preparing for publishing, Signing and preparing the graphics, publishing to the Android Market
Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

TEXT BOOKS:
TB1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)
TB2. Wei-Meng Lee," Beginning Android 4 Application Development", Wiley India Pvt. Ltd.
TB3. J. F. DiMarzio, "Android: A Programmers Guide", McGraw Hill Education (India) Private Limited.

REFERENCE BOOKS:
RB1. Paul Deitel "Android for Programmers: An App-Driven Approach" 1st Edition, Pearson   India.
RB2. Wei-Meng Lee, "Beginning Android Application Development", Wiley Publishing

Course Code: BCAP 318   **L   T   C**
Course Name: Mobile Application Development Lab   **0   2   1**

This is the associated practical paper. The learning outcomes are same as the corresponding theory paper.

List of Practicals		
	Detailed Statement	**Mapping to CO#**
Core Practicals (Implement minimum 8 out of 10 practicals)		
1.	Create "hello world" application to display "hello world" in the middle of the screen in the emulator as well asandroid phone	**CO1**
2.	Create an android app to display various android lifecycle phases.	**CO3**
3.	Create a calculator app that performs addition, subtraction, division and multilpication operation on numbers.	**CO2**
4.	Write an Android application to convert into different currencies for example, Rupees to dollar	**CO4, CO5**
5.	Write an android application to convert a ball from size of radius 2(colour red) to radius 4(colour blue) to radius 6 (colour green). The ball must rotate in circle for 1 minute before changing size and colour.	**CO4, CO5**
6.	Write an application to mark the daily route of travel in map.	**CO4, CO5**
7.	Write an application to record video and audio on topic "Intent" and play the audio and video.	**CO4, CO5**
8.	Create a spinner application with strings taken from resource directory	**CO4, CO5**

	res/values/strings.xml and on changing the spinner value, image will change. Image is saved in the drawable directory.	
9.	Create an app that uses radiobutton group which calculates discount on shopping bill amount. Use ediitext to enter bill amount and select one of three radio buttons to determine a discount for 10, 15, or 20 percent.the discount is calculated upon selection of one of the buttons and displayed in a textview control.	**CO3,CO4, CO5**
10.	Create an application that uses checkbox for construction of a shopping list so the user can check off items as they are picked up. The checked items should be displayed in a textview control.	**CO4, CO5**
11.	Create a login application to verify username and password. On successful login, redirect to another activity that has a textview to display "welcome user" with logout button. On click of logout button, a dialog should appear with ok and cancel buttons. On click of oK button, go back to the login activity and on click of cancel button, stay on the same activity.	**CO2, CO4, CO5**
12.	Create an application to perform the operations of create, insert, delete, view and update, using sqlite database.	**CO4, CO5**
13.	Create an application to pick up any image from the native application gallery and display it on the screen.	**CO4, CO5**
14.	Read phonebook contacts using content providers and display in list.	**CO2,CO4, CO5**
15.	Create an application to take picture using native application.	**CO2,CO4, CO5**
Note: **1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.** **2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**		

Course Code: BCA 332   **L T C**
Course Name: Seminar/ Conference Presentation   **0 0 2**

OBJECTIVE:

Seminars/Conferences and Presentations provide a platform to the students, where they can learn from what others are doing, learn about new things, ideas and important tips related to new technologies. To foster the Innovations happening in upcoming technologies and harnessing the entrepreneurial opportunities, Institutes must provide ample opportunities to the students to learn and yield the advantages of new advancements in the field of technology. It is expected from a student to learn latest in the industry and write an article related to it and present their findings in front of a panel.

The following points need to considered while planning and evaluating the presentation

- The seminars must be conducted after every 15 days/ or a month. A minimum of 3-4 seminar sessions can be organized during the semester.

- A minimum of 7-8 slides must be there which would include the title slide. The first slide should be the Introduction slide and the last one reference slide wherein all the links/books references/paper reference to paper must be quoted. The rest of the slides should focus on the technology, application areas etc.

- The title of the seminar must be related to the field of Information technology and must talk about the latest innovation/technology like IOT, Machine learning, Deep learning, AI Cloud computing, Mobility, Hand held devices, Social Computing, NOSQL Database, CRM, Social CRM, Open Source Application Development Frameworks, Zero Trust Security Framework/ Architecture, Big Data/ Data Lake, Emerging and Innovative Technologies, Conversational AI, Sentiments Analysis, DevOps, Real time Analytics, Fraud Detection. Proper approval must be taken before starting the work.

- Student's feedback must be taken after taking the seminar as to what learning they have gathered after studying the topics. For this, a feedback form may be designed using Google form utility.

Course Code: BCA 372   **L   T   C**
Course Name: Practical-XII IOT Lab   **0   4   2**
LEARNING OBJECTIVES:
In this course, the learners will be able to develop expertise related to the following:
5.   To learn and understand the concept of Internet of Things (IOT).
6.   To study the constituent components of Internet of Things.
7.   To design and develop IoT applications using different, Sensors/actuators.
8.   To seek working knowledge of Arduino, Raspberry pi Boards and to develop cloud based IOT projects.

PRE-REQUISITES:
3.   Basic Programming Knowledge
4.   Use of Internet

COURSE OUTCOMES (COs):
After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the architecture and the functional blocks of Internet of Things.	BTL2	PO1, PO2, PO3
CO2	Explain the concepts of Internet of Things and gain knowledge to design IoT applications	BTL2	PO1, PO2, PO3,PO7, PO10
CO3	Demonstrate the process of capturing and analyzing data in Internet of Things.	BTL3	PO1, PO2, PO3,PO4
CO4	Examine the various components involved in IoT design methodology.	BTL4	PO1, PO2, PO3,PO4,PO7
CO5	Evaluate an IoT device to work with a Cloud Computing infrastructure.	BTL5	PO1,PO2,PO3, PO4,PO11
CO6	Implement IoT protocols for communication.	BTL6	PO1,PO2, PO3,PO4, PO6, PO7,PO8

List of Practicals

S.No.	Detailed Statement	Mapping to CO #
1.	Study and Install IDE of Arduino	CO1,CO2
2.	Write the steps to add libraries in Arduino and setup of Arduino IDE for programming.	CO2, CO3
3.	Write a Program using Arduino for Blink LED.	CO2, CO3
4.	Write a Program for monitoring Temperature using Arduino and LM35 Temperature Sensors.	CO2, CO3,
5.	Write a Program for Controlling Raspberry Pi with WhatsApp.	
6.	Write a program to shows how to fade an LED on pin 9 using the analog Write( )function.	CO3,CO4
7.	Write the steps to add blynk libraries for NodeMCU and account on IFTTT for home automation.	CO2, CO3,CO4
8.	Write a program of Fade LED using NodeMCU(ESP8266) and blynk app	CO2, CO3,CO4
9.	Write a program for Arduino by using Ultrasonic sensors and servo motor (HC-	CO2, CO3,CO4

	SR04), and make a smart dustbin.	
10.	Write a program for controlling bulb on/off by using Blynk app.	CO2, CO3,CO4

Suggested IOT based Applications
1. Create home automation project for controlling electrical home appliances via Google assistant or any other IOT based project may be undertaken.
2. Setting up Wireless Access Point using Raspberry Pi.
3. Fingerprint Sensor interfacing with Raspberry Pi
4. Raspberry Pi GPS Module Interfacing.
Visitor Monitoring with Raspberry Pi and Pi Camera
Note: **1. In total 10 practicals and one application to be implemented. 2 additional practical may be given by the course instructor.** **2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

Course Code: BCA 374   **L   T   C**
Course Name: NSS/NCC/Cultural Clubs/Technical Society/Technical Club   -   -   2

NUES: Comprehensive evaluation of the students by the concerned coordinator of NSS/NCC/Cultural Clubs/Technical Society/Technical Club, out of 100 as per the evaluation scheme worked out by these activity societies, organizations at the institution/ university level; the coordinators shall be responsible for the evaluation for the same. These activities shall start from the first semester and the evaluation shall be conducted at the end of sixth semester for students admitted in the first semester

Course Code: BCA 374   **L   T   C**
Course Name: NSS/NCC/Cultural Clubs/Technical Society/Technical Club   -   -   2

Note on Examination of Elective Papers:

(a) Papers with only theory component shall have 25 marks continuous evaluation by the teacher and 75 marks term-end examinations. Both these component marks shall be reflected on the marksheet of the student.

(b) Papers with only practical component shall have 40 marks continuous evaluation by the teacher and 60 marks term-end examinations. Both these component marks shall be reflected on the marksheet of the student.

(c) Papers with both theory and practical components shall have 25 marks continuous evaluation by the teacher and 25 marks term-end examinations for practical and 50 marks term end examination for the theory component. All three component marks shall be reflected on the marksheet of the student.

Implementation Rules:

1. The examinations, attendance criteria to appear in examinations, promotion and award of the degree shall be governed by the Ordinance 11 of the University. The term "major discipline" / "primary discipline" in this document refers to the discipline in which student is admitted / studies from 3rd semester onwards.

2. Minimum duration of the Bachelor of Computer Applications (BCA) programme shall be 3 years (N=4 years) (6 semesters).

3. Maximum duration of the Bachelor of Computer Applications (BCA) programme shall be 5 years (N+2 years). After completion of N+2 years of study, if the student has appeared in the papers of all the semesters upto 6th semester, then a maximum extension of 1 year may be given to the student for completing the requirements of the degree if and only if the number of credits already earned by the student is atleast 120. Otherwise, the admission of the student shall stand cancelled. After the period of allowed study, the admission of the student shall be cancelled.

4. The MOOC courses may be taken through SWAYAM / NPTEL MOOCs platform. The student desirous of doing a specific MOOC based course must seek approval of the APC of the institution for the same before the commencement of the semester. The APC shall allow the MOOC paper to the student if and only if the MOOC subject / course being considered for the student is being offered in line with the Academic Calendar applicable. The student shall submit the successful completion certificate with marks to the institution for onwards transfer to the Examination Division. The Examinations Divisions shall take these marks on record for incorporation in the result of the appropriate semester. These marks / grades of these courses shall be used for calculation of the SGPA/CGPA of the student concerned by the examination division of the University. Though the result of the MOOC courses may be declared subsequently. The MOOC course credits shall not be considered for calculation of the promotion criterion from one academic year of study to the next academic year.

5. Maximum Credits: at least 162. The student has to appear in the examinations for these credits in all components.

6. Minimum Credits: atleast 150.

7. To earn an Honours degree, the student may enrol for 20 credits or more through SWAYAM / NPTEL MOOCs platform. This point has to be read together with other points specially point 8. The acquisition of the credits should be completed before the 15th of the July of the admission year plus 3 years. That is, if a student is admitted in the year X, then these credits must be acquired through MOOCs by 15th July of the year (X+3), no extra duration or time shall be allocated. Honours in the degree shall be awarded if and only if at least 20 credits are acquired through MOOCs. To obtain Honours in the programme, the student must apply to the institution about the same, before the commencement of the 2nd semester and about registration for the MOOCs and the specific courses through MOOCs shall be registered by the student only after approval by the Academic Programme Committee (APC) of the Institution. The APC shall approve the course if it is not already studied by the student or the student shall not study it in future and adds value to the major area of specialization (which is the degree). The papers for which the student desires to appear for Honours through MOOCs, all papers results shall be submitted by the student to the school for onwards transfer to Examination Division of the University, to be taken on record of the University. The results of these papers shall be a part of the records of the examinations of the students. The records shall be submitted by the student to the school, then transferred to the Examinations division, shall be notified by the examinations division of the University, and a separate marksheet shall be issued by the Examinations divisions. The cost of taking the MOOC course is to be borne by the concerned student. Such courses shall be reflected as additional courses / papers for the student. The "Honours" in the degree shall be awarded if and only if in addition to the 20 credits earned as specified the student has a CGPA of 7.5 or above.

If a student acquires less than 20 credits through MOOCs, following the mechanism specified, then also the results of these papers shall be taken on record as specified above, though no Honours degree shall be awarded. The papers through MOOCs for Honours degree shall not be a part of the set of the papers over which the SGPA / CGPA of the student shall be calculated.

The papers through MOOCs for Honours degree shall be additional papers studied by the students and are to be taken into account only for award of Honours in the degree programme, if 20 credits are earned through MOOCs as approved by APC, by a student. See Clause 8 also.

8. The following degree route can be taken by a student (also refer point 7):
   a. A degree with the nomenclature **Bachelor of Computer Applications with minor specialization in <Discipline Specific Elective Group Name> (Honours)** shall be awarded if and only if the following conditions are satisfied:
      i. The student has acquired 150 credits, to meet the minimum credit requirement.
      ii. The student has acquired 20 credits from one Discipline Specific Elective Group. Student must pass all the subjects of Discipline specific course for the award of Bachelor of Computer Applications with Specialization.
      iii. The honours in the degree shall be specified on the degree certificate if the student fulfills the criteria at point 7 and also has a CGPA of 7.5 or above.
   b. A degree with the nomenclature **Bachelor of Computer Applications (Honours)** shall be awarded if and only if the following conditions are satisfied:
      i. The student does not fulfil the criteria (a) above.
      ii. The student has acquired 150 credits, to meet the minimum credit requirement.
      iii. The honours in the degree shall be specified on the degree certificate if the student fulfills the criteria at point 7 and also has a CGPA of 7.5 or above.
   c. A degree with the nomenclature **Bachelor of Computer Applications with minor specialization in <Discipline Specific Elective Group Name>** shall be awarded if and only if the following conditions are satisfied:
      i. If the student does not fulfill the criteria at (a.) and (b) above.
      ii. The student has acquired 150 credits, to meet the minimum credit requirement.
      iii. The student has acquired 20 credits from one Discipline Specific Elective Group. Student must pass all the subjects of Discipline specific course for the award of Bachelor of Computer Applications with Specialization.
   d. A degree with the nomenclature **Bachelor of Computer Applications** shall be awarded if and only if the following conditions are satisfied:
      i. The student does not meet the criteria at (a), (b) and (c) above.
      ii. The student has acquired 150 credits, to meet the minimum credit requirement.

9. Pass marks in every paper shall be 40.

10. Grading System shall be as per Ordinance 11 of the University.

11. The medium of instructions and examinations shall be English.

Assessment of Outcomes Achieved in a Course / Paper. That is, Learning Outcome Assessment Alignment Grid.

Learning Outcome	Course/Project	How Learning Will Be Assessed	Resources	Attainment Level

To complete the alignment grid, start by listing one learning outcome per row beneath the "Learning Outcome" column. Make sure that each learning outcome can be assessed by a single method.

Next, beneath the "Course/ Project" column, list the course(s) or project(s) or assignments or tests that students will complete in order to achieve the learning outcome.

In the "How Learning Will Be Assessed" column, list the assessment(s) tool that will be used for that particular learning outcome. It is fine for there to be more than one assessment used for a particular outcome, so long as each assessment captures the outcome in its entirety. Likewise, it is fine for a single assessment to be used for multiple outcomes.

In the column entitled "Resources", list any additional materials, technologies, or resources needed for students to meet the learning outcome.

In the column entitled "Attainment Level", list in a quantifiable manner the average attainment level.

Every teacher must make this sheet for every paper taught. Be that a paper with only theory component, only practical component or with both theory and practical component.