



**Marwadi**  
University  
Marwadi Chandarana Group



**Faculty of Computer Applications**

**Bachelor of Computer Applications**

**BCA**

**(Online)**

**PROGRAMME GUIDE**

## Index

Sr.No	Content
1	About Marwadi University
2	About Programme : B.C.A <ul style="list-style-type: none"> <li>• Program Outcome</li> <li>• Program Specific Outcome:</li> </ul>
3	Programme's Mission and Objectives <ul style="list-style-type: none"> <li>• Mission Statement</li> <li>• Objectives</li> </ul>
4	Relevance of the programme with HEI's Mission and Goals : University Vision Statement University Mission Statement University Core Values
5	Nature of prospective target group of learners:
6	Appropriateness of programme
7	Instructional Design & Program structure: Master of Computer Applications (MCA)
8	Procedure for admissions, curriculum transaction, evaluation and medium of instruction: Minimum Eligibility Admission Procedure Evaluation Curriculum Transaction:
9	Online Education Evaluation Procedure
10	Semester wise Teaching Scheme & Syllabus

## 1. ABOUT MARWADI UNIVERSITY:

### **Marwadi University Overview**

**Established:** 2016

**Accreditation:** NAAC A+ Grade (the only one in Saurashtra, Gujarat)

**Promoters:** Marwadi Shares and Finance Limited (MSFL) and Chandarana Intermediaries Brokers Pvt. Ltd. (CIBPL)

**Location:** Rajkot, Gujarat, India

**Campus Size:** 40 acres

**Student Body:** Over 12,000 students from 22 countries

**Faculty:** 500+ educators, including 100+ Ph.D. holders

### **Educational Offerings:**

Marwadi University offers a unique blend of quality education, industry connections, and global exposure, all provided at an affordable cost. The institution ensures a safe and secure learning environment.

## 2. About Programme : B.C.A.:

The Bachelor of Computer Applications (BCA) is an undergraduate degree course in computer applications. With the swift expansion of the IT industry globally, the demand for computer professionals is increasing day by day. This increasing growth of the IT industry has created a lot of opportunities for computer graduates. BCA is a three-year program that provides a fundamental education in computer and business principles. The course typically covers various aspects of computer applications, from software engineering to systems development, networking, web design, and database management. The BCA curriculum is designed to bridge the gap between IT industries and academic institutions by incorporating the latest developments into the curriculum. Students are also introduced to various tools and frameworks used in the professional world. Graduates of BCA programs have a wide range of career opportunities available in the technology sector. They can start their career as junior programmers and grow to senior positions by gaining experience.

**Program Outcome:**

<b>PO #</b>	<b>PO Description</b>
PO-1	To understand the essentials of basics of computer applications.
PO-2	Study of solving complex problems by comparing various approaches.
PO-3	To design an application software for real life problems for key application areas.
PO-4	To define effective ways of communication, presentation and documentation.
PO-5	Function effectively as an individual or as a member or leader in the project team.
PO-6	Learn traditional v/s modern approaches in software development.
PO-7	To develop the foundation for higher studies in the field of computer applications.
PO-8	To help students understand the industry practices through experimental learning.

**Program Specific Outcome:**

<b>PO #</b>	<b>PO Description</b>
PSO-1	Acquire knowledge and skill to analyze and develop software, websites and mobile applications for successful career, entrepreneurship and higher studies.
PSO-2	Identify and formulate problems and make the decisions using problem solving approach.
PSO-3	Learn different programming languages like C, Java, Python, R, etc.

### 3. Programme's Mission and Objectives:

#### **Mission Statement:**

- To offer comprehensive theoretical and practical training in advanced areas of computer applications, fostering a culture of analytical learning that nurtures creativity, develops insights, and ignites a passion for information technology.
- To enhance the research environment and performance of both faculty and scholars by continuously improving our academic and research facilities, ensuring a supportive and conducive atmosphere for teaching, learning, and innovative exploration.
- To cultivate an educational atmosphere that promotes innovation and problem-solving capabilities, instilling professionalism in students to prepare them for dynamic careers in the IT industry.
- To integrate cutting-edge technology and current industry practices into our curriculum to equip students with up-to-date skills and knowledge, ensuring they are competitive and successful in the evolving tech landscape.
- To encourage lifelong learning and continuous professional development among students and faculty, supporting them in their pursuit of academic excellence and leadership in the field of computer applications.

#### **Programme Objective:**

The Bachelor of Computer Applications (BCA) course is designed to equip students with fundamental information technology and computer science skills essential for achieving technical proficiency. The program includes teaching various programming languages and paradigms to enable students to efficiently solve real-world problems. In addition, the course involves training in designing, implementing, and managing complex databases, which are crucial for supporting business operations and enhancing decision-making processes. Furthermore, students receive a thorough grounding in network architecture, protocols, and security measures, vital for protecting data and ensuring cyber safety. The curriculum also introduces methodologies and techniques for designing, developing, testing, and maintaining software applications. This knowledge base is expanded upon by enabling students to create dynamic and responsive websites using modern web technologies and frameworks.

### 4. Relevance of the programme with HEI's Mission and Goals:

#### **University Vision Statement:**

To foster an environment that empowers people, organizations, and societies through education, ideas, research, and training.

**University Mission Statement:**

- Provide quality education to bring about social transformation.
- Create leaders through innovation and entrepreneurship.
- Cultivate a culture of research advancements.
- Imbibe universal consciousness.
- Stimulate growth through industrial and international partnerships.

**University Core Values: LEADER**

- Lifelong Learning
- Empathy
- Adaptability
- Diversity
- Empowerment
- Respect

The primary goal of the Bachelor of Computer Applications (BCA) program is to equip students with comprehensive technical skills in areas such as software development, web design, and database management. This program emphasizes practical, hands-on learning experiences to prepare graduates for successful careers in the rapidly evolving IT industry. Additionally, it fosters critical thinking, problem-solving abilities, and a deep understanding of the ethical and professional responsibilities associated with the field of information technology.

- Master the fundamentals of computer programming and software development to build robust applications.
- Understand and apply the principles of network security to maintain and protect data integrity.
- Gain proficiency in the latest web technologies for designing and developing user-centric websites.
- Acquire analytical skills to interpret complex data sets for practical applications in business and technology.
- Learn and implement best practices in database management to efficiently handle and query large data repositories.
- Develop mobile applications that are functional on various platforms and devices to meet market demands.

- Cultivate the ability to troubleshoot and solve hardware and software issues to ensure system reliability.
- Enhance communication and project management skills to effectively lead IT projects and teams.
- Prepare for lifelong learning and continuous improvement to adapt to evolving IT trends and innovations.

#### **5. Nature of prospective target group of learners:**

The BCA courses aim for the development of knowledge modules having the right content to take care of the aspirations of the academic community and to address the personalized and industrial needs of the learners under low levels of disposable income, rural dwellers, women, unskilled men, minorities, disabled, etc. It will be open to all persons residing in any part of India and abroad irrespective of race, creed or class subject to the fulfillment of minimum qualifications prescribed for admission.

This Programme duration will be three year. Admission into this computing programme for students, who have done their 12th Grade in any stream and are interested in taking computing/IT as a career. The mode of teaching is English. It aims to provide opportunities to those aspirants who are either working or want to enhance their education level and technical skill while they are not able to attend regular colleges or university.

#### **6. Appropriateness of programme to be conducted in Open and Distance Learning mode to acquire specific skills and competence:**

As India moves towards Digital India, the challenge requires a huge pool of literate/graduate/post graduate students in computer applications. Since the current education system (in a normal state) would not be able to provide so many specialists, the deficit is compensated by the open distance learning format. It offers comprehensive and targeted interaction between the teacher and the learner through a well-designed learning package. Considering the scope of the program, the program is useful for candidates who want to quickly develop their skills, update their knowledge and gain knowledge. The growing field of data processing. It chooses modern computer tools and techniques and uses them skillfully.

## 7. Instructional Design:

**Course Curriculum:** The Bachelor of Computer Applications (BCA) course curriculum at our institution is designed and developed through a specialized approach, engaging professionals from our computer applications department and external IT experts. A draft outlining critical course objectives such as equipping students with foundational IT skills, programming proficiency, and knowledge in system security is initially prepared and then rigorously evaluated by a team of internal and external experts assembled by the institution. This process ensures the curriculum aligns with the unique objectives of distance education, focusing on flexibility, accessibility, and practical applicability. The team's approval leads to necessary updates and the implementation of a curriculum that is both academically robust and industry-relevant continually monitored and updated to meet technological advancements and industry demands, thus preparing students effectively for careers in the dynamic field of computer applications.

**Program Structure:** The educational institution forms a group of experts to review the structure of the course. The evaluation group provides feedback and recommendations to the respective faculty. After making the changes suggested by the evaluation team, the course plan will be changed.

**Study Materials:** The study material is in self-learning (SLM), which is the core of standard distance learning programs. This is how the department begins the development of all materials in SLM format. Both internal and external experts prepare the study material according to the guidelines set by the statutory body.

**Review by Board of Studies:** The course is fastidiously surveyed by BOS. BOS recommendations are implemented as a matter of priority. It also monitors and determines the appropriateness of the course, credits and examination system.

**Approval by Academic Council:** Finally, the course is sent to the university's academic council for final approval. Programs are offered in semesters. A modular approach is applied when completing a long-term training program. Academic activities are linked to engage the student and maximize learning.

### **Program Structure- Bachelor of Computer Application:**

## FACULTY OF COMPUTER APPLICATIONS

### Bachelor of Computer Applications

### BCA Semester-1

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05BC3101	MATHEMATICS – 1 (BM)	4	12	24	20	20	44	30	70	NA
05BC3102	ARCHITECTURAL ORGANIZATION OF COMPUTERS	4	12	24	20	20	44	30	70	NA
05BC3103	PROGRAMMING PRACTICES – 1 (BASICS OF C)	5	15	30	25	25	55	30	40	30
05BC3104	BASICS OF WEB DEVELOPMENT	4	12	24	20	20	44	30	40	30
05BC3105	ENVIRONMENTAL SCIENCE	3	9	18	15	15	33	30	70	NA
<b>Total</b>		<b>20</b>	<b>60</b>	<b>120</b>	<b>100</b>	<b>100</b>	<b>220</b>	<b>150</b>	<b>290</b>	<b>60</b>

## FACULTY OF COMPUTER APPLICATIONS

### Bachelor of Computer Applications

### BCA Semester-2

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05BC3201	MATHEMATICS – 2 (CONM)	4	12	24	20	20	44	30	70	NA
05BC3202	ANALYSIS AND DESIGN OF SYSTEMS	4	12	24	20	20	44	30	70	NA
05BC3203	PROGRAMMING PRACTICES – 2 (ADVANCED C)	5	15	30	25	25	55	30	40	30
05BC3204	INTRODUCTION TO DBMS	4	12	24	20	20	44	30	40	30
05BC3205	COMMUNICATION SKILLS	3	9	18	15	15	33	30	70	NA
<b>Total</b>		<b>20</b>	<b>60</b>	<b>120</b>	<b>100</b>	<b>100</b>	<b>220</b>	<b>150</b>	<b>290</b>	<b>60</b>



**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**BCA Semester – 3**

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05BC3301	DATABASE MANAGEMENT SYSTEM -2	4	12	24	20	20	44	30	40	30
05BC3302	DATA STRUCTURE USING C	4	12	24	20	20	44	30	40	30
05BC3303 ----- 05BC3304	ENTERPRISE RESOURCE PLANNING (ERP) ----- MANAGEMENT INFORMATION SYSTEM (MIS)	3	9	18	15	15	33	30	70	NA
05BC3305	SUMMER INTERNSHIP PROJECT - 1	3	9	18	15	15	33	NA	NA	100
05CR0301	LIFE SKILL 1 (UNIVERSAL HUMAN VALUES)	3	9	18	15	15	33	30	70	NA
05BC3306	PROGRAMMING IN JAVA	4	12	24	20	20	44	30	40	30
	Open Elective	3	9	18	15	15	33	30	70	NA
<b>Total</b>		<b>24</b>	<b>72</b>	<b>144</b>	<b>120</b>	<b>120</b>	<b>264</b>	<b>180</b>	<b>330</b>	<b>190</b>

## FACULTY OF COMPUTER APPLICATIONS

### Bachelor of Computer Applications

#### BCA Semester-4

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05BC3401	Operating Systems	3	9	18	15	15	33	30	40	30
05BC3402	Computer Networks	3	9	18	15	15	33	30	70	NA
05BC3403 05BC3404	R Programming Programming in C#.Net	2	6	12	10	10	22	30	40	30
05CR0401	Life Skill 2 (Professional Skills)	3	9	18	15	15	33	30	70	NA
05BC3405	Python Programming	2	6	12	10	10	22	30	40	30
	Open Elective 4	3	9	18	15	15	33	30	70	NA
<b>Total</b>		<b>16</b>	<b>48</b>	<b>96</b>	<b>80</b>	<b>80</b>	<b>176</b>	<b>180</b>	<b>330</b>	<b>90</b>

## FACULTY OF COMPUTER APPLICATIONS

### Bachelor of Computer Applications

### BCA Semester-5

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05BC2501	Management Information System	4	12	24	20	20	44	30	70	NA
05BC2502	Software Testing	5	15	30	25	25	55	30	40	30
05BC2504	Web Application Development-1 (PHP)	6	18	36	30	30	66	30	40	30
-	Elective - 1: 1. 05BC2503 - Data Analytics using R 2. 05BC2505 - Computer Graphics 3. 05BC0508 - C# .NET	5	15	30	25	25	55	30	40	30
05BC0509	Mini Project - 4 (Python)	2	6	12	10	10	22	NA	NA	100
<b>Total</b>		<b>22</b>	<b>66</b>	<b>132</b>	<b>110</b>	<b>110</b>	<b>242</b>	<b>120</b>	<b>190</b>	<b>190</b>

## FACULTY OF COMPUTER APPLICATIONS

### Bachelor of Computer Applications

### BCA Semester-6

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05BC2601	Cloud Computing	4	12	24	20	20	44	30	70	NA
05BC2602	Cyber Security Essentials	5	15	30	25	25	55	30	70	NA
05BC0608	Mobile Computing using Android	6	18	36	30	30	66	30	40	30
-	Elective 2 : 1. 05BC0609 Data Visualization 2. 05BC2605 Image Processing 3. 05BC0610 ASP .NET	5	15	30	25	25	55	30	40	30
05BC0611	Mini Project - 5 ( PHP)	2	6	12	10	10	22	NA	NA	100
<b>Total</b>		<b>22</b>	<b>66</b>	<b>132</b>	<b>110</b>	<b>110</b>	<b>242</b>	<b>120</b>	<b>220</b>	<b>160</b>

Total Programme Credit							
Semester	I	II	III	IV	V	VI	Total
<b>Total Credit</b>	20	20	24	16	22	22	124

## 8. Procedure for admissions, curriculum transaction, evaluation and medium of instruction:

### Minimum Eligibility:

A Candidate shall have passed the examinations of 12th Standard (10+2 Pattern) from a recognized education board.

### Admission Procedure:

- All details concerning eligibility criteria, required documentation, and registration procedures are accessible on the website [www.marwadiuniversity.ac.in](http://www.marwadiuniversity.ac.in)
- It's imperative for candidates to verify that their educational or qualifying degrees are from recognized institutions or universities.
- During online registration, candidates must scan and submit all relevant documents as outlined on the website.
- Admission will be processed based on the information provided by the candidate, and any misrepresentation or falsification of information will result in immediate cancellation of candidature.
- Candidates must ensure they meet the eligibility criteria for the program they intend to enroll in.
- Submission of documents and payments to the University is contingent upon meeting the eligibility criteria outlined in the University's guidelines.

### Evaluation:

In spite of the fact that assessments of Assignments / Class / course test / instructional exercise etc. are conducted to assess the students 30%, however the ultimate assessment 70% is done through Term Conclusion Examination (weight age: 100%). Assessments of the BCA course in done by table stamping handle.

### Curriculum Transaction:

Within the BCA course, we give information basically through Address strategy amid the Individual Contact Program. We too make use of a shrewd course room. The printed think

about fabric is sent to the understudies by post. Efforts are in the air to supply the thin material in delicate duplicates to the learners and to supply them to the office to download the considered fabric from the site through their individual understudy ID.

**Medium of Instruction:**

Medium of Instruction: The medium of instruction in B.C.A. is in English. The study material will be made available to the student in English language. The lectures in personal contact programme are generally delivered in English.

**Examination:**

CDOE is an institution claimed and controlled by the specialists of Marwadi University the examination in regard of CDOE understudies is conducted by the Marwadi University. All things relating to the examinations, i.e., result stamp sheet, degree certificate etc. are managed with the controller of the examination.

**Evaluation Procedure:**

The evaluation of the Programme will consist of two parts:

- i. Continuous Assessment
- ii. Relative Grading System/Absolute Grading System

**The Question Paper Design:**

The question paper design is meticulously crafted to encompass all levels of the knowledge domain, taking into account Bloom's taxonomy of the cognitive domain. Questions are formulated using appropriate verbs corresponding to each level of learning, thus facilitating the assessment of higher order thinking skills. The question paper incorporates a diverse range of question types, including structured essays that feature Long Answer Questions (LAQ), Short Answer Questions (VSQ), Multiple Choice Questions (MCQ) and Brief Questions. This variety ensures a comprehensive evaluation of students' understanding and proficiency across different aspects of the subject matter.

## Center for Distance and Online Education Evaluation Procedure

### 1. Assessment/Evaluation Procedure:

- 1.1 In the case of a multi-section/teacher course, a course/subject coordinator is appointed by the department faculty Coordinator (FC), and the following procedure shall be followed by the course/subject coordinator in consultation with the team of faculty members.
- 1.2 The academic performance of a student is evaluated by the concerned instructor with the approval from the department coordinator, except in the case of project work where other examiners may be nominated from the University for the viva voce.
- 1.3 The student's performance in each course, in general, is evaluated based on *in-semester continuous assessment*, *end-semester examination*, and *End-Term Practical/Project (ETP)* [for Practical/Project/Term Paper/Dissertation courses]

An *in-semester continuous assessment* (also known as comprehensive assessment) (CSE) is spread through the duration of the course and is done by the teacher teaching the course with a weightage of 30%. The assessment is done through various means including:

- |                      |                                      |
|----------------------|--------------------------------------|
| 1. Attendance        | 7. Projects                          |
| 2. Tutorials         | 8. Seminars                          |
| 3. Assignment        | 9. Group discussions/activities etc. |
| 4. Surprise Test     | 10. any other specified by FC        |
| 5. MCQ-based quizzes |                                      |
| 6. Presentations     |                                      |

The *end-semester examination* shall have an assessment from the following perspective with respect to all courses:

1. Evaluation with respect to remembering.
2. Evaluation with respect to knowledge.
3. Evaluation with respect to Understanding.
4. Evaluation with respect to skill.
5. Evaluation with respect to Applications
6. Higher Order Thinking Skills

The assessment method is further detailed below:

**(a) Course with only Theory component-**

<b>Assessment tool</b>	<b>Weightage</b>	<b>Remarks</b>
<b>Continuous Assessment (CSE):</b> 1. Attendance 2. Tutorials 3. Assignment 4. Surprise Test 5. MCQ based quizzes 6. Presentations 7. Projects 8. Seminars 9. Group discussions/activities etc. 10. any other specified by FC	30 %	As decided and announced by the teacher concerned in the class at the beginning of the course.
<b>End semester Examination (ESE)</b>	<b>70%</b>	<b>Duration–2 hours</b>

**(b) Course with both theory and practical component**

- (i) The theory and practical portions shall be assessed combinedly.
- (ii) Assessment for practical component is as given below:

<b>Assessment tool</b>	<b>Weightage</b>	<b>Remarks</b>
<b>Continuous Assessment (CSE):</b> 1. Attendance 2. Tutorials 3. Assignment 4. Surprise Test 5. MCQ based quizzes 6. Presentations 7. Projects 8. Seminars 9. Group discussions/activities etc. 10. any other specified by FC	30 %	As decided and announced by the teacher concerned in the class at the beginning of the course.
<b>End semester Examination (ESE)</b>	<b>40%</b>	<b>Duration–2 hours</b>
<b>End Term Practical (ETP)</b>	<b>30%</b>	<b>Assessment components:</b> Carrying out practical/project and submission of record & viva-voce.

**(c) Course with only practical component**

Assessment tool	Weightage	Remarks
<b>Continuous Assessment (CSE):</b>	30 %	Carrying out practical/project and submission of record
<b>End Term Practical (ETP)</b>	<b>70%</b>	<b>Assessment components:</b> Carrying out practical/project and submission of record & viva-voce.

**(d) Course with an only Project component**  
 (including term paper/dissertation/project-based courses)

Assessment tool	Weightage	Remarks
<b>End Term Practical (ETP)</b>	<b>100%</b>	<b>Assessment components:</b> Carrying out submission of term paper/dissertation/project record & viva-voce.

The following table summarizes the evaluation components and their weightages for Online & Distance Learning (ODL) Programmes:

Category of Course	Exam Weightage		
	CSE	ESE	ETP
Courses with only theory component	30%	70%	NA
Courses with only practical component	30%	NA	70%
Courses with both theory and practical component	30%	40%	30%
Courses with only project component (including Term Paper, Dissertation and Project based courses)	NA	NA	100%

**1.4 Structure for Grading of Academic Performance:**

**1.4.1. Letter Grades and Grade Points (GP):**

Based on the performance, each student is awarded a final letter grade at the end of each semester against each Course. The letter grades and the corresponding grade points are as follows:

Letter Grade	Grade Points
O (Outstanding)	10
A+ (Excellent)	9
A (Very Good)	8
B+ (Good)	7
B (Above Average)	6
C (Average)	5
D (Pass)	4
F (FAIL)	0
Ab (Absent)	0

### The range for Grade Using Relative Grading System: Large Classes (>25 students)

For large classes (>25 students) the grading should follow a normal distribution for the award of the grade in the course. The marks obtained out of 100 would be converted into grades following the guidelines given below:

The mean ( $\mu$ ) and the standard deviation ( $\sigma$ ) of marks obtained by all the students in a course shall be calculated. The grades shall be awarded to a student depending upon the marks and the ranges as per table given below:

Letter Grade	Grade Points	Lower Range -Upper Range
O (Outstanding)	10	$\geq \text{Mean} + 1.5 \sigma$
A+ (Excellent)	9	$\text{Mean} + 1.0\sigma \leq \text{to} < \text{Mean} + 1.5 \sigma$
A (Very Good)	8	$\text{Mean} + 0.5 \sigma \leq \text{to} < \text{Mean} + 1.0 \sigma$
B+ (Good)	7	$\text{Mean} \leq \text{to} < \text{Mean} + 0.5 \sigma$
B (Above Average)	6	$\text{Mean} - 0.5 \sigma \leq \text{to} < \text{Mean}$
C (Average)	5	$\text{Mean} - 1.0 \sigma \leq \text{to} < \text{Mean} - 0.5 \sigma$
D (Pass)	4	$\text{Mean} - 1.5 \sigma \leq \text{to} < \text{Mean} - 1.0 \sigma$
F (FAIL)	0	$< \text{Mean} - 1.5 \sigma$
Ab (Absent)	0	Failure due to insufficient attendance in the course / Not submitted Term work

### Range for Grade Using Absolute Grading System: Small Classes ( $\leq 25$ students)

For small classes ( $\leq 25$  students) the grades shall be awarded on the basis of absolute marks as given in the table below:

Letter Grade	Grade Points	Normalized Mark range
O (outstanding)	10	90-100
A+ (Excellent)	9	80-89
A (Very Good)	8	70-79
B+ (Good)	7	60-69
B (Above Average)	6	50-59
C (Average)	5	40-49
D (Pass)	4	35-39
F(Fail)	0	Failure due to in sufficient marks in the course OR Failure due to non-appearance in examination (Ab-Absent)
Ab (Absent)	0	Failure due to insufficient attendance in the course/ Not submitted Term work

For **Non-credit/Audit courses** “S” (Satisfactory) or “U” (Unsatisfactory) shall be indicated instead of the letter grade, and this will not be counted for the computation of SGPA/GPA/CGPA.

- For UG/DIPLOMA Students: Students having 35% or more marks should not be awarded the failing grade “F”. For PG Students: Students having 40% or more marks should not be awarded the failing grade “F”.  
However, for a student to get a grade of “D” or above in any course, he/she would have to appear in the End Examinations.
- If The student fails due to not submitting Term/Course work or due to short of attendance, an “F (Ab)” grade is awarded to the student.
- A student can be awarded the highest grade “O”, if secured 70% or more marks.
- For online/distance learning programs in any semester, a student obtaining ‘C or D’ grade in any course/s with an overall SGPA/GPA of 5.0 and above shall be declared to have earned the full credits of that semester.

**1.4.2** A student is considered to have successfully completed a course and earned the credits if he/she secured a letter grade other than **F or Ab** in that course. ***A letter grade of F or Ab in any course implies a failure in that course.***

### **1.4.3 Computation of Semester/Year Grade Point Average (SGPA/GPA) and Cumulative Grade Point Average (CGPA)**

(i) The SGPA/GPA will be calculated according to the formula

$$SGPA/GPA = \frac{\sum_1^n c_i \times (GP)_i}{\sum_1^n c_i}$$

Where  $C_i$ =credit for the  $i^{th}$  course,  $(GP)_i$  = the grade point obtained for the  $i^{th}$  course,  $n$ =total number of courses and the sum is over all the courses taken in that semester/year, including those in which the student has secured F grades.

(ii) For the cumulative grade point average (CGPA) following formula is used:

$$CGPA = \frac{\sum_1^r S_i \times (SGPA)_i}{\sum_1^r S_i}$$

Where  $S_i$ =Sum of credits in  $i^{th}$  semester/year,  $(SGPA)_i$ =Semester Grade Point Average earned in  $i^{th}$  semester/year and  $r$ =number of semester/year and the sum is over all the semesters under consideration.

(iii) The SGPA/GPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

An example of these calculations is given below:

<b>I Semester</b>					
Subject Code	Credits	Grade Awarded	Earned Credits	Grade Points	Point Earned/ Secured
(1)	(2)	(3)	(4)	(5)	(6)
01MA0101	4	C	4	5	20
01EE0101	4	D	4	4	16
01GS0101	4	A+	4	9	36
01SL0101	3	B+	3	7	21
01EE0102	4	C	4	5	20
01ME0101	1	D	1	4	4
01PE0101	3	A	3	8	24
Credits Registered in the I semester (total of column 2)				=	23
Earned Credits in the I semester (total of column 4)				=	23
Point secured in the I semester (total of column 6)				=	141
<b>SGPA (I Semester)</b>		=	<b>6</b>		
<b>CGPA (I Semester)</b>		=	<b>6</b>		

<b>II Semester</b>					
Subject Code	Credits	Grade Awarded	Earned Credits	Grade Points	Point Earned/ Secured
(1)	(2)	(3)	(4)	(5)	(6)
01MA0102	3	C	3	5	15
01EC0101	1	D	1	4	4
01EN0101	1	A+	1	9	9
01CI0101	3	B+	3	7	21
01ME0103	4	C	4	5	20
01CE0101	4	D	4	4	16
01CR0101	4	A	4	8	32
01MA0103	3	C	3	5	15
Credits Registered in the II semester (total of column 2)				=	23
Earned Credits in the II semester (total of column 4)				=	23
Point secured in the II semester (total of column 6)				=	132
<b>SGPA (II Semester)</b>		=	<b>5.7</b>		
<b>CGPA (II Semester)</b>		=	<b>(141 + 132) / (23+23)</b>	<b>5.9</b>	

#### 1.4.4 Conversion of grades into percentages

The performance of the student is measured in terms of CGPA (on a 10 point scale) as defined above. However, on request from the Indian Industry and overseas institutes querying on percentage obtained by students, a mathematical formula for conversion of CGPAs to equivalent percentage has been adopted and same is approved by the Academic council of the University.

Formula for conversion of equivalent percentage of grades/CGPA:

$$\text{Percentage marks} = \text{CGPA} \times 10$$

**1.4.5** Class/Distinction will be awarded to the students after they successfully complete the programme as per the norms stipulated in the following table:

CGPA	Class	Percentage (%)
Below 5.0	Pass Class	35-49.99 %
5.0 and above	Second Class	50-59.99%
6.0 and above	First Class	60-69.99 %
7.0 and above	First Class with Distinction	70% or above

The degree shall be conferred to students based upon CGPA (Cumulative Grade Point Average) considering all the semesters/year's performance.

## 2. The Process and conduct of different Evaluation components:

**2.1. Continuous Assessment (CSE):** The continuous assessment of ODL learners for each course is decided as per mentioned various rubrics by FC (as per 1.3).

**2.2. End Semester Examinations (ESE):**

**Question Paper:** The format of the question paper will be multiple-choice questions with duration of 2 hours. The examination will consist of 80 questions of different levels of difficulties. 50 questions of Easy level & 1 mark each, 20 questions of medium level difficulty & 1.5 mark each and 10 questions of high level with carrying 2 mark each. Examinee might ask to provide short/long descriptive answer as per the questions need/requirement.

## 3. Instructions for attending End Semester Examinations

### a) Online Proctored Examination

Exams are strictly timed and accessible through the University Examination Application. Students must ensure a well-lit, quiet environment with stable internet connectivity and proper seating arrangements. Logging in 15 minutes before the start time of the exam is mandatory, with a limited grace period for late logins. The exam format includes multiple-choice questions with varying difficulty levels and may include descriptive answers. No retakes or re-answering of questions is allowed once time is up. The exam session can be ended by the student or automatically upon completion of the allotted time or by the proctor.

### b) Secure browser/Operation System

The student must use compatible devices to appear for the examinations.

Developer mode should be disabled, and the device should not be rooted.

All necessary device permissions must be granted to the Examination Applications.

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Ad blockers and popup blockers should be turned off, and the device should not be connected to other devices.

**c) Use of Technology & Power Backup**

A stable internet connection (at least 25 Mbps) is crucial, and sitting near the Wi-Fi router is recommended. No power-related issues should arise, and the device should preferably be fully charged.

**d) Remote Proctoring:**

Various activities are prohibited during exams, including device or network changes, accessing messages or calls, and using other applications. Continuous monitoring via remote proctoring captures images of the student's face at regular intervals. Any suspicious activity is recorded and may lead to immediate termination of the exam, with further actions taken as per university regulations.

**4. Re-appearing the Examinations:**

- 4.1** No student having passing % marks should be awarded the failing grade “F”, he/she would be required to re-appear in the Course Examination.
- 4.2** The student fails due to not submitting Term/Course work or due to short of attendance, “F (Ab)” grade is awarded to the student. Students would be required to re-appear in the Course Examination in the next term.
- 4.3** If a student opts for re-appearing in an examination of a course after securing “F” grade, The student need not to attend the regular classes for that course.
- 4.4** All applicable fees charged against examination shall apply for re-appearance courses as well.

**5. Attendance:**

An examinee should have an attendance of at least 75% (calculated based on his/her involvement with the resources on LMS, live classes, master classes, e-tutorials, discussion forums, etc.) to be eligible to appear for the end-semester examination.



**Marwadi**  
University  
Marwadi Chandarana Group

NAAC



# **Faculty of Computer Applications**

**Bachelor of Computer Applications**

**BCA Sem - 1**

**Teaching Scheme**

**&**

**Syllabus**



## FACULTY OF COMPUTER APPLICATIONS

### Bachelor of Computer Applications

### BCA Semester-1

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05BC3101	MATHEMATICS – 1 (BM)	4	12	24	20	20	44	30	70	NA
05BC3102	ARCHITECTURAL ORGANIZATION OF COMPUTERS	4	12	24	20	20	44	30	70	NA
05BC3103	PROGRAMMING PRACTICES – 1 (BASICS OF C)	5	15	30	25	25	55	30	40	30
05BC3104	BASICS OF WEB DEVELOPMENT	4	12	24	20	20	44	30	40	30
05BC3105	ENVIRONMENTAL SCIENCE	3	9	18	15	15	33	30	70	NA
<b>Total</b>		<b>20</b>	<b>60</b>	<b>120</b>	<b>100</b>	<b>100</b>	<b>220</b>	<b>150</b>	<b>290</b>	<b>60</b>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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- **Sem.** 1
- **Subject Code** : 05BC3101
- **Subject** : Mathematics – 1(BM)
- **Course Objectives** :

1. To enable students to obtain understanding of basic Mathematics concepts which can be applicable in various computer science problems.
2. To enable students to understand concepts of Set Theory, Matrix Algebra and solve simple application problems based on these.
3. To enable students to simplify and evaluate logical statement using different connectives.
4. To enable to model real life situations of relations and functions.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	70	NA

- **Prerequisites:** None

Unit No	Topics Covered
<b>1</b>	<b>Set Theory</b> Definition of Set, Representation of Set, Types of Set, Venn Diagram of Sets, Operation on Sets (Union, Intersection, Difference, Symmetric Difference, Complement of a set), Algebra of Sets (Without Proof), De Morgan's Law (Without Proof), Cartesian Product of Sets.

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**Bachelor of Computer Applications**

<b>2</b>	<b>Propositional Logic</b> Definition, Statement (Proposition) and Notation, Connectives, (Conjunction, Disjunction, Negation, Implication, Bi - implication), Truth Table for all connectives, Statement Formulas, Truth tables,
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**Bachelor of Computer Applications**

	Tautology, Contradiction, Logical Equivalence, Validity of Arguments using truth table.
<b>3</b>	<p><b>Matrix Algebra</b></p> <p>Introduction of Matrix, Types of Matrix, Scalar Multiplication of Matrices, Matrix Operations (Addition, subtraction, Multiplication), Properties of Matrix, Transpose of Matrix, Determinant of Matrix, Minor and Cofactors of a Matrix, Inverse of a matrix, Cramer's rule to solve system of linear equations</p>
<b>4</b>	<p><b>Relation And Function</b></p> <p><b>Relation :</b> Introduction Of Relation, Types Of Relation (Reflexive, Irreflexive, Symmetric, Antisymmetric, Transitive), Equivalence Relation, Partial Ordering Set, Graphical and Matrix Representation of a relation</p> <p><b>Function :</b> Definition of Function, Types of Functions (One – One Function, Onto Function, Bijective Function), Composition of Functions</p>

**Course Outcomes:** At the end of the syllabus students will be able to understand

1. Able to apply concepts of set theory in problem solving.
2. Enhance the students' ability to think logically and mathematically.
3. Able to apply concepts of matrix in real life problem.
4. Able to specify and manipulate basic mathematical objects such as relations and functions and their properties.

<b>CO - PO MAPPING</b>										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	M		L				L			
CO 2	M		L				M			
CO 3	M		L				H			
CO 4	M		L				M			

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**Text Books:**

1. 'Business Mathematics', V.K.Kapoor and D.C.Sancheti, Sultan Chand & Sons Publications, 11<sup>th</sup> Edition
2. 'Discrete Mathematical Structures with Application to Computer Science', J.P. Trembly and R. Manohar, Tata McGraw – Hill, 2010

**Reference Books :**

1. 'Discrete Mathematics and its applications', K.H.Rosen, Tata McGraw – Hill, 6<sup>th</sup> Edition
2. 'Discrete Mathematical Structure', Bernard Kolmann & others, Pearson Education, 6<sup>th</sup> Edition
3. 'Discrete Mathematics', D.S.Malik & M.K.Sen, Cengage Learning, 2004

**Web References :**

1. [www.uva.onlinejudge.org](http://www.uva.onlinejudge.org)
2. [www.cse.iitd.ernet.in/~bagchi/courses/discrete-book/fullbook.pdf](http://www.cse.iitd.ernet.in/~bagchi/courses/discrete-book/fullbook.pdf)

**App References :**

1. **Matrix Operations :**  
[https://play.google.com/store/apps/details?id=ru.sssprog.matrixoperations&hl=en\\_US](https://play.google.com/store/apps/details?id=ru.sssprog.matrixoperations&hl=en_US)

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Text Book 1 Chapter 2
2	Text Book 2 Chapter 1 (1-1,1-2.1 to 1-2.4,1-2.6 to1-2.13)
3	Text Book 1 Chapter 20
4	Text Book 2 Chapter 2 (2-3.1 to 2-3.3, 2-3.5, 2-3.8, 2-4.1 to 2-4.3)

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

- **Sem.** 1
- **Subject Code** : 05BC3102
- **Subject** : Architectural Organization of Computers
- **Course Objectives:**
  1. To understand basic organization of digital computer.
  2. To understand various digital circuits and components.
  3. To understand basics of CPU.
  4. To understand basics of IO.
  5. To understand basics of Memory.

▪ Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	70	NA

- **Prerequisites: Knowledge of Basic Computer & input output devices**

Unit No	Topics Covered
<b>1</b>	Basic Of Digital Computer: Digital Computers, Characteristic of Digital Computer, Block Diagram of Digital Computer, Introduction of Number System, Multiplication and division of binary number, Floating Point Representation, Fixed Point Representation, Error detection code (Parity bit)
<b>2</b>	Digital Logic Circuit: Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Flip-Flops and Sequential circuits.
<b>3</b>	Digital Components: Integrated Circuits, Decoders, Encoder, Multiplexers, Demultiplexer, Registers, Shift Registers and Binary Counters.
<b>4</b>	Central Processing Unit: Instruction code, Common Bus System, General Register Organization, Stack Organization, Addressing Modes.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>5</b>	Input – Output and Memory Organization: Peripheral Devices, Input – Output Interface, Asynchronous Data Transfer, Modes of Transfer, DMA, Memory Hierarchy, Main Memory, Auxiliary Memory and Cache Memory
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**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**Course Outcomes:**

1. Outline the organization of a digital computer system and understand the digital representation of data and differentiate between number systems and codes.
2. Describe laws of Boolean Algebra and the usage, understand functions of logic gates and understand the concept of sequential logic and combinational circuit
3. Understand the component of the CPU.
4. Outline the organization of a computer system in terms of its main component
5. Understand the concept of system memory hierarchy and input/output interface.

Course Outcomes – Program Outcomes Mapping Table:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
05BH0102.1	M	L					H	
05BH0102.2	M	M					M	
05BH0102.3	L	L					M	
05BH0102.4	L	L					M	
05BH0102.5	M	M				M	H	

Course Outcomes – Program Specific Outcomes Mapping Table :

	PSO1	PSO2	PSO3
05BH0102.1			L
05BH0102.2			L
05BH0102.3			L
05BH0102.4			M
05BH0102.5			M



**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**Text Book :**

**"Computer System Architecture", M. Morris Mano, Pearson Publication, Third Edition.**

**Reference Books :**

**"Computer System Architecture", John. P. Hayes, McGraw Hill Education, Third Edition.**

**"Computer Architecture and parallel processing", Hwang K. Briggs, McGraw Hill Education, First Edition.**

**"Computer Organization and Architecture", Ikvinderpal Singh, Baljinder Singh, Khanna Publishers, First Edition.**

**"Fundamentals of Digital Circuits", A. Anand Kumar, PHI Publishers, Second Edition.**

**Web References:**

1. <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUK EwjezrrhmOrgAhUNk3AKHb9vAJYQFjAAegQICRAC&url=https%3A%2F%2Ffaculty.psau.edu.sa%2Ffiledownload%2Fdoc-10-pdf-d171a71acbe44cd5cd2f78a40570a069-original.pdf&usg=AOvVaw1AkKILXxtjpEJAV74qSEqv> App References :

**App References:**

1. [https://play.google.com/store/apps/details?id=com.faadooengineers.free\\_computerorganizationarch&hl=en](https://play.google.com/store/apps/details?id=com.faadooengineers.free_computerorganizationarch&hl=en)
2. [https://play.google.com/store/apps/details?id=com.cdac.csa&hl=en\\_US](https://play.google.com/store/apps/details?id=com.cdac.csa&hl=en_US)

**Syllabus Coverage from text /reference book & web/app reference:**

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

Unit #	Chapter Numbers
1	TextBook,Ch.1:[1.1] Ch.3:[3.1 to 3.6]
2	TextBook,Ch.1:[1.2to1.7]
3	TextBook,Ch.2:[2.1to 2.6]
4	TextBook,Ch.5:[5.1,5.2]Ch.8:[8.2to 8.3,8.5]
5	TextBook,Ch.11:[11.1to11.4,11.6] Ch.12:[12.1 to12.3,12.5]

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Application**

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- **Sem.** 1
- **Subject Code** : 05BC3103
- **Subject** : Programming Practices – 1
- **Course Objectives** :
  1. To understand the fundamentals of C programming.
  2. To code, document, test, and implement a well-structured C program.
  3. To be able to write code in C programming language for simple problems.
  4. To learn about the data types, operators and functions in C programming language.
  5. Students will become familiar with problem solving techniques.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Application**

- **Prerequisites:** Basic Computer Fundamental knowledge.

Unit No	Topics Covered
<p align="center"><b>1</b></p>	<p><b>Introduction to Programming</b>            Program Definition - Program development cycle -            Programming Languages - Generation of Programming            Language : Low Level language - High Level Language -            Features of a good programming language.</p> <p><b>Algorithm and Flow chart:</b></p> <p>Introduction of algorithm with sequence, decision and            iterative statements,            Introduction of flowchart with standard symbols.</p>
<p align="center"><b>2</b></p>	<p><b>Fundamentals of C Program</b>  <b>Introduction to C :</b> History of C - Features of C Language -            Structure of a C program - execution of C Program :            Compiling, Link and Run a program.</p>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Application**

	<p><b>Variables and Constants:</b> C character set – Tokens – Constants - Keywords – identifiers and Variables -Data types and storage - Declaration of variables – Assigning values to variables – Escape sequences -Defining symbolic constants</p>
<b>3</b>	<p><b>Operators and IO Statements</b> <b>C Operators :</b> Arithmetic, Logical, Assignment, Relational, Increment and Decrement, Conditional, Bit wise, Special - Operator Precedence and Associativity - C Expressions – Arithmetic expressions – Evaluation of expressions – Type conversions in expressions – Type cast operator</p> <p><b>I/O statements :</b> Reading a character – Writing a Character - Formatted input, formatted output</p>
<b>4</b>	<p><b>Control Structures</b> <b>Branching :</b> Introduction – Simple if statement - if-else - else-if ladder, nested if-else – Switch case statement. <b>Looping Statements:</b> Concept of Entry Control Loop : for &amp; while Exit control loop : do while, Nested Loop. Concept of break, continue and goto statement.</p>
<b>5</b>	<p><b>Function and Preprocessor directives</b> <b>Functions :</b> Library functions (Mathematical and Character), Need for user-Defined functions- Elements of User-Defined Functions – Definition of Functions – Return Values and their types – Function Calls – Function Declaration- Categories of Functions – NoArgument No Return Values – Arguments but No Return Values – Arguments with Return Values - No Arguments with Return Values – Nesting of Functions – Recursion</p> <p><b>Preprocessor directive:</b> Introduction, Macro Substitution, File Inclusion, Compiler Control Directives</p>

**Course Outcomes :**

1. Ability to develop understanding of Procedure Oriented Programming Language
2. Ability to illustrate the flowchart and design an algorithm for a given

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Application**

problem

3. Ability to use conditional and iterative statements.
4. Ability to develop user defined functions for the different applications.
5. Ability to use preprocessor directives for the file inclusion and macro substitutions.

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L		M			H				
CO2		M			L			H		L
CO3	L		L			M	M		M	
CO4	M			H		L		M		M
CO5		L			M		L		H	

**Text Book :**

1. Programming in ANSI C, by E.Balagurusamy, Publisher – McGraw Hill, Seventh Edition.
2. Programming in C, PradipDey, Manas Ghosh, Publisher - Oxford Higher Education, Second Edition

**Reference Books :**

1. Let us C, by YashwantKanitkar, Publisher – BPB Publications
2. Programming with ANSI and Turbo C, by Ashok N Kamthane, Publisher – Pearson Education
3. C: The Complete Reference, by Herbert Schildt, Publisher – Tata McGraw Hill

**Web References :**

1. <https://www.tutorialspoint.com/cprogramming/index.htm>
2. <https://www.cprogramming.com/tutorial/c-tutorial.html>

**App References :**

1. Learn C Programming by Coding and Programming - Programming Hub
2. C Programming - Learn Code, Theory & Discuss by SPDroid

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Application**

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Book - 2, Ch - 1
2	Book - 1, Ch - 1, Ch - 2
3	Book - 1, Ch - 3, Ch - 4
4	Book - 1, Ch - 5, Ch - 6
5	Book - 1, Ch - 9, Ch - 14

**Requirement of Laboratory support**

- Student's need to install **CODE BLOCK** using following link

<https://turbo-c.net/>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Application**  
**PRACTICALS**

<b>Unit No</b>	<b>List of Practicals</b>
<b>1</b>	<p>Draw Algorithm and Flow chart for the following Definitions</p> <ol style="list-style-type: none"> <li>1. Print "Hello World".</li> <li>2. Takes 2 Values from user and Perform All Arithmetic Operations.</li> <li>3. Print numbers from 1 to 20.</li> <li>4. Input 3 values from user and find out its Average.</li> <li>5. Calculate the Square and Cube of a number.</li> <li>6. Interchange the value of two numbers.</li> <li>7. Find largest out of three numbers</li> <li>8. Find out Fibonacci series up to given n values</li> <li>9. Find out Number is Odd or Even</li> <li>10. Find out sum of digits of a given number.</li> </ol>
<b>2</b>	<ol style="list-style-type: none"> <li>1. Write a Program to Print "Hello World".</li> <li>2. Write a Program that takes 2 Values from user and Perform All Arithmetic Operation.</li> <li>3. Write a program that takes 3 values for Principle Amount, Rate of Interest and No. of Years and find out Simple Interest.</li> <li>4. Write a program that input value from user and find out Area of Circle.</li> <li>5. Write a program that input two values from user and find out Area of Rectangle.</li> <li>6. Write a program that input 3 values from user and find out its Average.</li> <li>7. Write a program to Calculate the Square and Cube of a number.</li> <li>8. Write a program Interchange the value of two numbers using third variable.</li> <li>9. Write a program Interchange the value of two numbers without using third variable.</li> <li>10. Write a program that input quantity, price, discount and display final amount.</li> </ol>
<b>3</b>	<ol style="list-style-type: none"> <li>1. Write a program that input 2 values from user and find out Maximum.</li> </ol>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Application**

2. Write a program that input 2 values from user and find out Minimum.
  3. Write a program that input age from user if  $\text{age} \geq 18$  then print person is eligible for vote else person is not eligible for vote.
  4. Write a program that input value from user and find out number is even or odd.
  5. Write a program that input 2 number from user and find out number is equal or not.
  6. Write a program that Input Salary From the user if salary Greater than or equal to 5000 then  $\text{hr} = 5\%$  of basic salary,  $\text{ta} = 6\%$  of basic salary,  $\text{da} = 4\%$  of basic salary and  $\text{pf} = 5\%$  of basic salary. but if salary is less than 5000 then  $\text{hra} = 4\%$ ,  $\text{ta} = 5\%$ ,  $\text{da} = 3\%$  and  $\text{pf} = 4\%$ . find out gross salary. print  $\text{hra}$ ,  $\text{ta}$ ,  $\text{da}$ ,  $\text{pf}$  and gross salary (Hint : take all variable as float. formula for gross salary =  $\text{salary} + \text{hra} + \text{ta} + \text{da} - \text{pf}$ ).
  7. Write a C Program to input price quantity of an item from user and display final payment according to following condition.  
If total purchase ( $\text{price} * \text{quantity}$ ) is greater than Rs.1000 then calculate discount 15% otherwise calculate discount 10% of total rupees.
  8. Write a program to input year and find whether year is leap year or not. (Hint Use % Sign)
  9. Write a program to input two values from user and check whether the first number is divisible by second or not. (Hint Use % Sign)
  10. Write a program to Input a character, if it is capital convert into small else convert into capital.
  11. Write a program that input one character from user and find out that character is vowel or not. (aeiouis called vowel).
  12. Write programs that find out character is in uppercase or lowercase.
- Using If...Else..If or Switch.. Case
13. Input Three Values from user and Find Maximum.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Application**

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|--|--|
|  | <ol style="list-style-type: none"><li>14. Input Three Values from user and Find Minimum.</li><li>15. Input RollNumber, Marks of 5 Subjects and findout Total, Percentage, Result and Grade.</li><li>16. Input day in number and print in text(for Exampleinput 1 then Output Monday)</li><li>17. Input Month in number and print in text(for example input 1 then output January)</li><li>18. Input number and check whether the number is positive, negative or zero.</li></ol> |
|--|--|

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Application**

<b>4</b>	<ol style="list-style-type: none"> <li>1. Write a program that Print 1 2 3 4 ..... 10</li> <li>2. Write a program that Print 2 4 6 ..... 20</li> <li>3. Write a program that Print 1 3 5 7 ..... N</li> <li>4. Write a program that Print 100 99 98..... 90</li> <li>5. Write a program that Print 200 198 196 .... 180</li> <li>6. Write a program that Print 1 10 2 9 3 8 4 7 5 6 6 5 7 4 8 3 9 2 10 1</li> <li>7. Write a program to print multiplication table of inputted number.</li> <li>8. Write a program to print 0 1 1 2 3 5 8 13.....n</li> <li>9. Print first 10 natural number with its square and cube.</li> <li>10. Accept 10 numbers from user one by one and displays its total value on screen.</li> <li>11. Input x and y calculate its power value</li> <li>12. Write a program that input number and find out sum of digits.</li> <li>13. Write a program that input number and find out reverse of that number.</li> <li>14. Write a program that input number and find out number is palindrome or not.</li> <li>15. Write a program that input number and find out number is Armstrong or not.</li> <li>16. Write a program that input number and find out number is Prime or not.</li> <li>17. Write a program to find out prime numbers up to user series.</li> <li>18. Write a program to find out Armstrong numbers up to user series.</li> <li>19. Write a program that input number and find out factorial of given number.</li> <li>20. Write a program to display following pyramid using loop. (Upto N terms)</li> </ol>			
	A.	B.	C.	D.
1	1	1	1	
1 2	2 2	1 0	0 0	
1 2 3	3 3 3	1 0 1	1 1 1	
1 2 3 4	4 4 4 4	1 0 1 0	0 0 0 0	
1 2 3 4 5	5 5 5 5 5	1 0 1 0 1	1 1 1 1 1	
E.	F.	G.	H.	
1	5	1 2 3 4 5	1 2 3 4 5	
2 3	5 4	1 2 3 4	2 3 4 5	
4 5 6	5 4 3	1 2 3	3 4 5	
7 8 9 10	5 4 3 2	1 2	4 5	
11 12 13	5 4 3 2 1	1	5	
14 15				

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Application**

<b>5</b>	<ol style="list-style-type: none"><li>1. Write a program to find out addition of two values using UDF.</li><li>2. Write a program to find out factorial of number using UDF.</li><li>3. Write a program to find out reverse of number using UDF.</li><li>4. Write a program to find out Sum of digits using UDF.</li><li>5. Write a program to find out Number is Palindrome or not using UDF.</li><li>6. Write a program to find out Number is Armstrong or not using UDF.</li><li>7. Write a program to find out Number is Prime or not</li><li>8. Write a program to find out Fibonacci series up to user input using UDF.</li><li>9. Write a program to find out area of rectangle using UDF.</li><li>10. Write a program to find out area of circle using UDF.</li><li>11. Write a program to demonstrate use of macro</li><li>12. Write a program to demonstrate use of #include directive</li></ol>
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**Requirement of Laboratory Support :**

Students need to install "Turbo C" using <https://turbo-c.net/>

## FACULTY OF COMPUTER APPLICATIONS

### Bachelors of Computer Applications

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- **Sem.** : 1
- **Subject Code** : 05BC3104
- **Subject** : Basics of Web Development
- **Course Objectives** :
  1. Students will be able to design and develop an interactive website using HTML5.
  2. Students will be able to understand different elements of web-application.
  3. Analyze and apply CSS to make website more presentable.
  4. Provide facility to design an interactive website using JavaScript.
  5. Students can make their web site live using different hosting sites.

6. Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	40	30

**Prerequisites:** -

Unit No	Topics Covered
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**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelors of Computer Applications**

<b>1</b>	<b>Internet &amp; WWW</b> Introduction, evolution and history, types of internet: internet, intranet & extranet, Internet Applications, Internet tools, Internet Protocols: TCP/IP, FTP, TELNET, HTTP, SMTP, web browser, web server, web pages, search engines, video conferencing, working with an E-mail
<b>2</b>	<b>Introducing HTML5</b> Difference between traditional HTML4 & HTML5, Introduction to HTML5, HTML5 document structure, HTML5 tags & attributes: Text formatting tags, List tags, adding background, special characters, links, anchor tag, image tag, working with image map
<b>3</b>	<b>Advanced HTML5</b> Creating and working with tables, forms and frames, adding multimedia to web page using audio and video, Canvas, SVG, Drag/Drop, Geo-location, iframes, URL Encode, Quick List, Semantic, Web Semantic, Application Cache, SSE(Server Sent Event)
<b>4</b>	<b>CSS3 and Bootstrap Framework</b> Introduction, types of CSS, Box Model and Text Flow, Grouping or Nesting, Pseudo-class, Pseudo-element, Navigation Bar, Image Manipulation, Media Types, Attribute Selectors, Borders, Gradients, Text Effect, Animations, Introduction of Bootstrap framework, Bootstrap Grids, Bootstrap Theme, Bootstrap CSS Reference
<b>5</b>	<b>JavaScript &amp; Hosting a Web-Site</b> Introduction, introduction to Java script, variables, java script operators, conditional statements and loops, JavaScript break and continue statement, Dialog boxes, JavaScript Arrays, JavaScript Events, JavaScript User Define Function, JavaScript Built in Functions, JavaScript Cookies, publishing a web-site

**Course Outcomes:**

1. Students will be able to design dynamic website.
2. Students will be able to apply different HTML5 tags to develop user friendly web-site.
3. Students will be able to apply CSS to make website presentable.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelors of Computer Applications**

4. Students will be able to develop website using multimedia tags like audio and video.
5. Students will be able to design and develop dynamic website using javascript.

**Course Outcomes – Program Outcomes Mapping Table :**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L		M			H				
CO2		M			L			H		L
CO3	L		L			M	M		M	
CO4	M			H		L		M		M
CO5		L			M		L		H	

**Text Book :**

1. Honey Cutt, “Using the Internet”, 4th Edition, PHI Learning.
2. Powell Thomas, “HTML & CSS The Complete Reference”, Tata McGraw Hill
3. “Learning Java Script” , O’Reilly 3<sup>rd</sup> Edition.

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**Bachelors of Computer Applications**

**Reference Books :**

1. Wendy Willard, "HTML: A Beginner's Guide 5/E", 5th Edition, McGraw Hill.
2. Faithe Wempen, "Step by Step HTML 5", South Asian Edition, Microsoft Press and PHI Learning
3. HTML5 Black Book, Kogent learning solutions Inc.
4. Benjamin Jakobus , Jason Marah, "Mastering BootStrap 4" 2nd Edition
5. Matt Lambert, "Learning BootStrap 4", Packt Publishing

**Web References :**

1. [www.w3schools.com](http://www.w3schools.com)
2. [www.codecademy.com](http://www.codecademy.com)

**App References :**

1. SoloLearn:  
<https://www.sololearn.com/Course/HTML/>
2. Microsoft Store:  
<https://www.microsoft.com/en-us/p/html-and-css/tutorial/9wzdnrdhshv?activetab=pivot:overviewtab>
3. KhanAcademy:  
[https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwifzvWs0O\\_gAhVZi3AKHabpD0MQFjAAegQIABAC&url=https%3A%2F%2Fwww.khanacademy.org%2Fcomputing%2Fcomputer-programming%2Fhtml-css&usg=AOvVaw3yp6RYj4XEB7njtvx7wC2f](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwifzvWs0O_gAhVZi3AKHabpD0MQFjAAegQIABAC&url=https%3A%2F%2Fwww.khanacademy.org%2Fcomputing%2Fcomputer-programming%2Fhtml-css&usg=AOvVaw3yp6RYj4XEB7njtvx7wC2f)

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**Bachelors of Computer Applications**

Syllabus Coverage from text /reference book & web/app reference:

Unit No	Chapter Numbers
1	Book 1: Chapter 1 and <a href="https://www.tutorialspoint.com/internet_technologies/">https://www.tutorialspoint.com/internet_technologies/</a>
2	Book 2: Chapter 2.1 to 2.6
3	Book 2: Chapter 9,10,11, <a href="https://www.w3schools.com/html/html5_intro.asp">https://www.w3schools.com/html/html5_intro.asp</a> , <a href="https://www.tutorialspoint.com/html5/">https://www.tutorialspoint.com/html5/</a> , <a href="https://www.javatpoint.com/html5-tutorial">https://www.javatpoint.com/html5-tutorial</a>
4	Book 2: Chapter 6, <a href="http://www.w3school.com">www.w3school.com</a> , <a href="https://www.pdfdrive.com/css3-for-web-designerspdf-e9214924.html">https://www.pdfdrive.com/css3-for-web-designerspdf-e9214924.html</a> , <a href="https://css3-tutorial.net">https://css3-tutorial.net</a> , <a href="https://www.cssbasics.com/">https://www.cssbasics.com/</a> , <a href="https://www.syncfusion.com/ebooks/twitterbootstrap4-succinctly">https://www.syncfusion.com/ebooks/twitterbootstrap4-succinctly</a> ), <a href="https://www.w3schools.com/bootstrap4/">https://www.w3schools.com/bootstrap4/</a> , <a href="https://www.tutorialspoint.com/bootstrap4">https://www.tutorialspoint.com/bootstrap4</a> , <a href="https://scrimba.com/g/gbootstrap4">https://scrimba.com/g/gbootstrap4</a> .
5	Book 3: Chapter 3,4,5,6,8

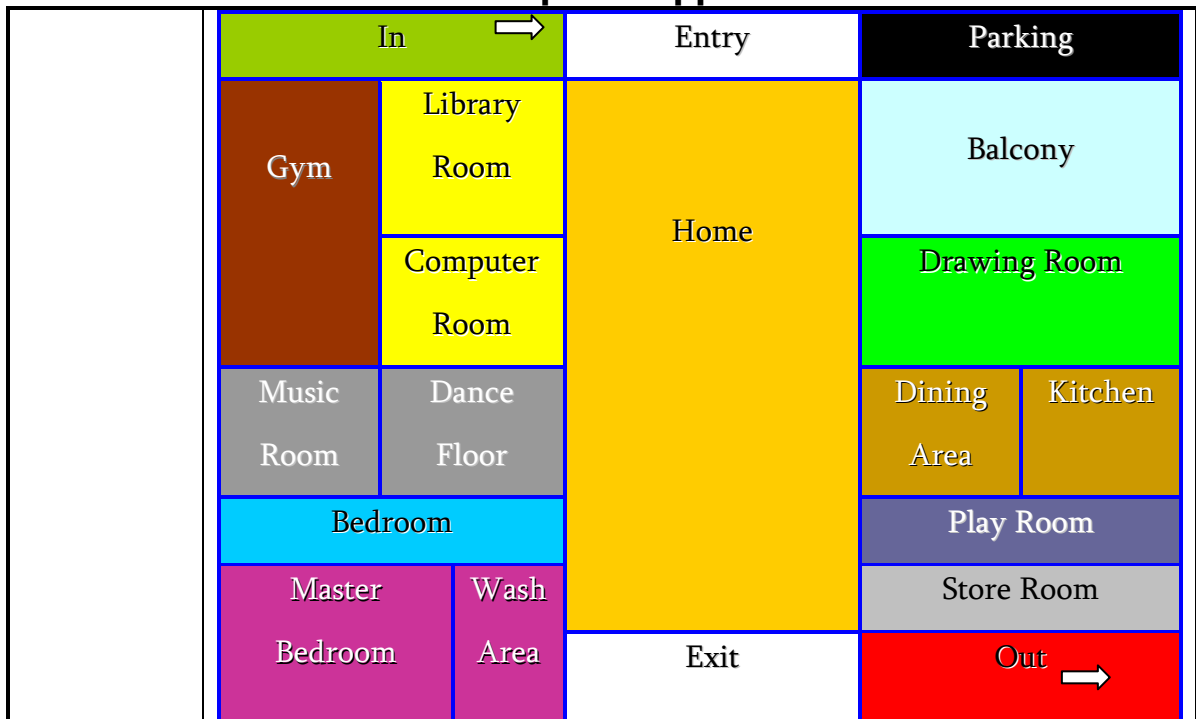
**Requirement of Laboratory support**

- Student's need to work with **NOTEPAD** which is inbuilt in Windows OS

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelors of Computer Applications**  
**PRACTICALS**

Unit No	List of Practicals
1	-
2	<ol style="list-style-type: none"> <li>1. Write html code to insert background to the webpage</li> <li>2. Create a web page with appropriate content and insert an image towards the left hand side of the page when user clicks on the image, it should open another web page.</li> <li>3. Create a web page showing an ordered list of names of the subjects, with nested list if any subject has been selected it should display the content of each subject</li> <li>4. Suppose your company has three employees and you want to create a company "directory page" listing some information about each of them. Write the HTML for that page and link 1 employee to another employee.</li> <li>5. Create a web page showing an ordered list of names of the subjects, with nested list if any subject has been selected it should display the content of each subject.</li> <li>6. Write the HTML to make it possible for someone clicking the words "About the authors" at the top of the page to skip down to a list of credits at bottom of the page.</li> <li>7. Create an ordered list of stream and name of subjects. When user clicks on stream, it should open stream and when user clicks on subject name, it must display details of subject.</li> <li>8. Create unordered list of menu of restaurant.</li> <li>9. Write html code which allows the user to move within a same web page.</li> <li>10. Write an html code to display complete detail of student including student name, city, stream, class, email id, gender using different list.</li> </ol>
3	<ol style="list-style-type: none"> <li>1. Create a simple table which shows only 2 columns like Student Name and city.</li> <li>2. Create a following table structure in your HTML page.</li> </ol>

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**Bachelors of Computer Applications**



4. Create a below web page using form tag.

**<form> Tag**  
**Sign Up Form**

**Email**

**Username**

**Password**

Already have an account? [Sign in.](#)

5. Create a web page which contains below information using form tag.

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**Bachelors of Computer Applications**

**Personal Details**

Name:

Password:

E-mail id:

Gender:  Male  Female

Contact#:

**Educational Qualification**

Degree:

Engineering:

Hobbies:  Playing chess  Reading Books

**Address**

Attch Resume:  No file chosen

6. Create the following frames in your html page.

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	<div data-bbox="589 338 1281 810" style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between;"> <div style="background-color: #8080c0; color: white; padding: 5px; width: 30%;"> <p><b>Frame A</b></p> <p>Note: The frameset, frame, and noframes elements are not supported in HTML5.</p> </div> <div style="background-color: #d2b48c; width: 40%;"></div> <div style="background-color: #ffff00; width: 30%;"></div> </div> </div> <ol style="list-style-type: none"> <li>7. Create a web page for play audio and video song and SVG animation.</li> <li>8. Create a web page for canvas animation and URL encoding in HTML5.</li> <li>9. Create a web page for HTML 5 semantic element and Geo-location.</li> <li>10. Create a web page for drag and drop in HTML5.</li> <li>11. Create a web page for Server-Sent Events Support in HTML5.</li> </ol>
<p><b>4</b></p>	<ol style="list-style-type: none"> <li>1. Write a text with color in HTML page using inline CSS.</li> <li>2. Write a two different paragraph in your HTML page and apply different formatting to both of that using external stylesheet.</li> <li>3. Create a HTML page in which, if you mouse over on image so image opacity will be decreased and if you mouse out so, it gains the original opacity back.</li> <li>4. Create one 3x3 HTML table which display different color name in each cell and when you mouse over on that cell so it change the</li> </ol>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelors of Computer Applications**

	<p>bgcolor of that cell as per the color is mentioned in that cell.</p> <ol style="list-style-type: none"> <li>5. Create a any simple table using bootstrap grid system.</li> <li>6. Create HTML page with some textual paragraph with different style using Bootstrap typography classes.</li> <li>7. Create a HTML page to display different Glyphicons using Bootstrap.</li> <li>8. Create HTML page to display progress bar using Bootstrap</li> <li>9. Create a html page with pager (pagination) which helps to navigate from one page to another page.</li> <li>10. Create HTML page to generate drop down menu using Bootstrap and to generate any attractive carousel using Bootstrap.</li> </ol>
5	<ol style="list-style-type: none"> <li>1. Write a program in java script to get student name, class and stream using dialog box and print all three details in an alert box.</li> <li>2. Write a program in Java Script which allows certain fields like Name, Age, Gender, <input type="text"/>Age, Cite, State and Country. Perform certain validations like name should accept only alphabets, Gender should accept only 1 character, Age should be only in numeric between 1 and 100. <input type="text"/></li> <li>3. Write a program in Java Script which allows certain fields like First Name, Last name, email address, comments. Perform certain validations like first name and last name should not be empty and email should be valid. If user clicks the submit button it should open a new window and contents should be displayed. If reset contents should be cleared. <input type="text"/></li> <li>4. Write a program in Java Script which contains 3 functions which are invoked on clicking the Red, Blue and green buttons. The function should contain changing the background, foreground to respective color and to display corresponding</li> </ol>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelors of Computer Applications**

	<p>status messages. [SEP]</p> <p>5. Develop a webpage using java Script which has following fields like Source, Destination; train no, Date and Number of tickets.</p> <p>Source and destination should allow only place code in 3 character [SEP]</p> <p>Date should be in the format DD/ MM / YY [SEP]</p> <p>Number of tickets should allow only numeric [SEP]</p> <p>6. Write a program in Java Script that allows user to enter the text. It also allows the user [SEP] to accept size and font name that has to be applied on the text entered by the user. [SEP]</p> <p>7. Write a program in java script which accepts names in a text box, if a button is clicked names should be sorted and added in another one text area.</p> <p>8. Write Java Script code to represent Document object.</p> <p>9. Represent all properties and methods of Location object in Java Script.</p> <p>10. Represent all events of Java Script.</p>
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**Bachelors of Computer Applications**  
**CASE STUDY**

1. Study [www.w3schools.com](http://www.w3schools.com) and analyze which HTML tags has been used in this website.
  2. Study <https://www.codecademy.com/learn/learn-html> and analyze which HTML5 tags has been used in this website.
  3. Study [www.tutorialspoint.com](http://www.tutorialspoint.com) and [www.javatpoint.com](http://www.javatpoint.com) and create your own fully responsive HTML web page with all possible types of styling inside.
  4. Study <https://www.wix.com> and more free hosting web site and create your own fully responsive HTML web page with all possible types of styling inside and host it.
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**Requirement of Laboratory Support :**

Students need to Use“Notepad”

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Application**

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- **Sem.** 1
- **Subject Code** : 05BC3105
- **Subject** : Environmental Science (ES)
- **Course Objectives:**
  1. Understand the importance of environmental science
  2. Develop sensitivity to protect environment
  3. Understand individual responsibility for environment.
  4. Understand the individual role in Environment safety and pollution.
  5. Develop sensitivity of human population explosion & information technology welfare programs.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
3	9	18	15	15	33	30	70	NA

- **Prerequisites:** None

Unit No	Topics Covered
<b>1</b>	<p><b>The Multidisciplinary nature of environmental studies:</b></p> <p>Basic Introduction of Environment and environment studies. Definition, Scope and importance, Need for public awareness</p>

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**Bachelor of Computer Application**

<p><b>2</b></p>	<p><b>Natural Resources:</b></p> <p><b>Renewable and non-renewable resources:</b></p> <p><b>Forest resources:</b> Use and Over-exploitation, Timber extraction, mining, dams and their effects on forest and tribal people.</p> <p><b>Water resources:</b> Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.</p> <p><b>Mineral resources:</b> Use and exploitation, environmental effects of extracting and using mineral resources.</p>
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**Bachelor of Computer Application**

	<p><b>Food resources:</b> World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.</p> <p><b>Energy resources:</b> Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.</p> <p><b>Land resources:</b> Land as a resource, land degradation, man induced landslides, soil erosion and desertification.</p> <p>-Role of an individual in conservation of natural resources.</p>
<b>3</b>	<p><b>Ecosystems:</b> Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem</p>
<b>4</b>	<p><b>Environment Pollution:</b> Causes &amp; effects and control measures of environmental pollution : air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear pollution.</p>
<b>5</b>	<p><b>Human Population and the Environment :</b> Population growth, variations among nations. Population explosion-Family welfare Programme. Environment and human health.</p>



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**Bachelor of Computer Application**

**Course Outcomes:** At the end of the syllabus students will able to understand

1. Understand and realize the multi-disciplinary nature of the environment science & relationship between man and environment.
2. Understand the relevance and importance & protection of the natural resources in the sustenance of life on earth and living standard.
3. Comprehend the importance & responsibility of environment protection control measure.
4. Identification of different types of environmental pollution and safety measures.
5. To correlate the exploitation of population and role of information technology in environment.

**Text Book:**

1. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha Second edition, 2013 Publisher: Universities Press (India) Private Ltd, Hyderabad.

**Reference Books:**

2. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
3. Agarwal, K.C.2001 Environmental Biology, Nidi Publ.Ltd.Bikaner.
4. Environmental Studies by Dr. Suresh K Dhameja, 2007 Published by : S K Kataria& Sons New Delhi

**Web References :**

1. <https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf>

**App References :**

1. [https://play.google.com/store/apps/details?id=com.educationapps.environmental&hl=en\\_U](https://play.google.com/store/apps/details?id=com.educationapps.environmental&hl=en_U)

**FACULTY OF COMPUTER APPLICATIONS****Bachelor of Computer Application****Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Unit-1 ( 1.1 ,1.2 )
2	Unit-2 ( 2.1 ,2.2,2.3 )
3	Unit-3 (3.1 ,3.2,3.3,3.4 (3.4.1 to 3.4.5) )
4	Unit-5 ( 5.1,5.2)
5	Unit-7 (7.1,7.2,7.3)



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NAAC



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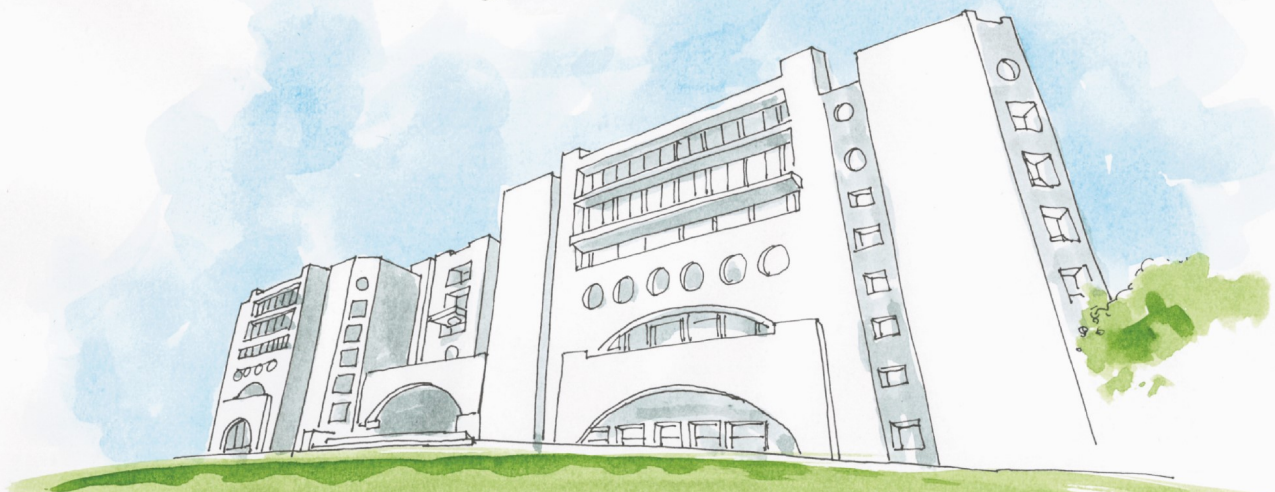
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**BCA Sem - 2**

**Teaching Scheme**

**&**

**Syllabus**



## FACULTY OF COMPUTER APPLICATIONS

### Bachelor of Computer Applications

### BCA Semester-2

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05BC3201	MATHEMATICS – 2 (CONM)	4	12	24	20	20	44	30	70	NA
05BC3202	ANALYSIS AND DESIGN OF SYSTEMS	4	12	24	20	20	44	30	70	NA
05BC3203	PROGRAMMING PRACTICES – 2 (ADVANCED C)	5	15	30	25	25	55	30	40	30
05BC3204	INTRODUCTION TO DBMS	4	12	24	20	20	44	30	40	30
05BC3205	COMMUNICATION SKILLS	3	9	18	15	15	33	30	70	NA
<b>Total</b>		<b>20</b>	<b>60</b>	<b>120</b>	<b>100</b>	<b>100</b>	<b>220</b>	<b>150</b>	<b>290</b>	<b>60</b>



**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>3</b>	<p><b>INTERPOLATION:</b></p> <ul style="list-style-type: none"> <li>• Lagrange Interpolation,</li> <li>• Newton's Forward Difference Interpolation,</li> <li>• Newton's Backward Difference Interpolation,</li> <li>• <input type="checkbox"/> Newton's Divided Difference Interpolation</li> </ul>
<b>4</b>	<p><b>DIFFERENTIATION &amp; INTEGRATION:</b></p> <p><b>Differentiation :</b></p> <ul style="list-style-type: none"> <li>• Using Newton's Forward Difference, Newton's Backward Difference, Newton's Divided Difference (First Order Differentiation only)</li> <li>• Integration : Using Trapezoidal rule, Simpson's 1/3 &amp; Simpson's 3/8 rules</li> </ul>
<b>5</b>	<p><b>SOLUTION OF SIMULTANEOUS LINEAR &amp; DIFFERENTIAL EQUATIONS:</b></p> <p>Solution of Simultaneous Linear Equations:</p> <ul style="list-style-type: none"> <li>• Gauss Elimination method, Gauss-Jordan method, Gauss-Seidel Method</li> <li>• Predictor-Corrector Methods: Milne Simpson and Adam's Moulton methods</li> </ul>

**Course Outcomes: (Students will be able to)**

1. Apply different type of errors rules occurring in numerical calculation & solution of them.
2. Impart knowledge of numerical iterative methods for the basic problems of numerical analysis.
3. Apply algorithmic implementation of different interpolation methods.
4. Apply the concept of differentiation, integration in numerical calculation.
5. Understand and apply the application and solution of linear differential equations & predictor –corrector methods.

**Text Book:**

1. "Computer Oriented Numerical Methods" by R. S. Salaria, Khanna Publisher.

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**Bachelor of Computer Applications**

**Reference Books:**

1. T Veerarajan, T Ramachandran, "Numerical Methods with Programs in C", 2nd Edition, Tata McGraw Hill Publication
2. V. Rajaraman, "Numerical Methods", 3rd Edition, Prentice-Hall India Pvt. Ltd.
3. R M Somasundaram, R M Chandrasekaran, "Numerical Methods with C++ Programming", Prentice-Hall India Pvt. Ltd.
4. C F Gerald, P O Wheatley, "Applied Numerical Analysis", 7th Edition, Pearson Education Asia, New Delhi
5. Atkinson, Han, "Elementary Numerical Analysis", Wiley India Edition
6. Dr. V N Vedamurthy, Dr. N Ch Lyenger, "Numerical Methods", Vikas Publication
7. Richard L Burden, J Douglas Faires, "Numerical Analysis", Cengage Publication
8. Srimanta Pal, "Numerical Methods", Oxford University Press

**Web Reference:**

<https://nptel.ac.in/courses/122106033/>

**App References :**

Numerical Method Calculators:

<https://play.google.com/store/apps/details?id=com.bragitoff.numericalmethods>

**Syllabus Coverage from text /reference book & web/app reference:**

UNIT	TOPICS/SUBTOPICS
1	Text Book , Ch. – 2 (2.5, 2.7, 2.8)
2	Text Book , Ch. – 3 (3.6, 3.7, 3.8, 3.10)
3	Text Book , Ch. – 6 [6.4, 6.5, 6.6(6.6.1 to 6.6.3), 6.7(6.7.1 to 6.7.3), 6.8]
4	Text Book , Ch. – 8 (8.1 to 8.3)
	Text Book , Ch. – 9 [9.2(9.2.1, 9.2.2, 9.2.3)]
5	Text Book , Ch. – 5 [5.1, 5.2, 5.3, 5.4(5.4.1 & 5.4.2), 5.5.2 , 5.6]
	Text Book , Ch. – 10 [10.8, 10.9(10.9.2 & 10.9.3)]

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**Bachelor of Computer Applications**

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- Semester : 2
- Subject Code : 05BC3202
- Subject : Analysis and Design of Systems
- **Course Objectives** :
  1. Apply knowledge of steps in Software Development.
  2. Application of Information gathering methods.
  3. Depiction of Analysis in terms of diagrams and tables.
  4. Creating effective User Interface Design.
  5. Ensuring Quality Assurance and effective implementation of system.

Course Credit	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	70	NA

**Prerequisites** : Understanding of Information Systems

Unit No.	Topics Covered
1	<b>System analysis basics</b> Types of systems, Integrating technologies for system, Need for system analysis and design, Role of system analyst, System Development Life Cycle, Impact of maintenance, Using CASE tools, Agile approach
2	<b>Information Requirement analysis</b> Information gathering methods : interviewing, JAD, usage of questionnaire, Sampling, Investigation, Observing decision maker's behavior and physical environment  Agile modeling and prototyping: Prototyping, Developing a prototype, Rapid application development, Agile modeling

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>3</b>	<p><b>Process of Analysis</b></p> <p>Using data flow diagrams: Dataflow approach, Developing data flow diagrams, Logical and physical data flow diagrams, Example</p> <p>Data dictionaries: Data dictionary, data repository, creating data dictionary, using data dictionary, Process specifications and structured decisions, Overview of process specifications, Structured English, Decision tables, Decision trees</p>
<b>4</b>	<p><b>Design of system</b></p> <p>Designing output: output design objectives, relating output content to output method, realizing output bias effects, designing output for displays, designing output for websites</p> <p>Designing input: Good form design, Good display and web forms design, Intranet and internet page design</p> <p>Designing database: Databases, data concepts, normalization, guidelines for master file/database relation design, denormalization, data warehouse</p> <p>Human Computer Interaction (HCI): Understanding HCI, usability, Types of user interface, guidelines for dialog design, feedback for users</p>
<b>5</b>	<p><b>Quality assurance and implementation</b></p> <p>Designing accurate data entry procedures: Effective coding, effective and efficient data capture, Ensuring data quality through input validation,</p> <p>Quality assurance and implementation: TQM approach, Documentation approach, Testing, maintenance and auditing, Implementing distributed systems, Training users, Conversion to a new system, evaluation</p>

**Course Outcome :**

1. Develop project by applying knowledge of System development lifecycle.
2. Impart knowledge of how to gather information, agile modeling and prototyping.
3. Impart knowledge about analysis process.
4. Impart knowledge about proper design and documentation.
5. Design accurate data entry procedure, quality assurance and implementation

**Text Book:**

1. System Analysis and Design, Kenneth Kendall and Julie Kendall, Prentice Hall, 8th Edition

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**Reference Books:**

1. Modern System Analysis and Design, Joseph Valacich and Joey George, Pearson, 8th edition
2. Analysis and Design of Information Systems, James A Senn, TMH, 2nd edition
3. Workbook on System Analysis and Design, V.K Garg.
4. System Analysis and Design methods, Jeffrey Whitten and Lonnie Bentley, McGraw-Hill, 7th edition
5. Analysis and Design of Information Systems, V. Rajaraman, PHI, 3rd edition

**Web References:**

1. <https://nptel.ac.in/courses/106108103/>
2. [https://www.tutorialspoint.com/system\\_analysis\\_and\\_design/](https://www.tutorialspoint.com/system_analysis_and_design/)

**Syllabus Coverage from text/reference book & web/app reference:**

Unit No	Chapter Numbers
1	Text Book, Chapter 1
2	Text Book, Chapter 4, 5, 6
3	Text Book, Chapter 7, 8, 9
4	Text Book, Chapter 11, 12, 13, 14
5	Text Book, Chapter 15, 16

**CASE STUDY**

1. Prepare the following for E-commerce portal
  - a. SRS
  - b. Context flow and Level-0 (Data or any open source tool)
  - c. Data repository design
2. Prepare Decision table and decision tree for one of the following:
  - a. Calculating PF contribution of employee
  - b. Deciding on discount policy
3. Prepare wireframe (Using open source tools) for
  - a. E-commerce portal (Web)
  - b. E-commerce mobile app

Note: Student can take case study of other web applications or mobile applications also like transport booking system like redbus, railway reservation system.

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**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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- Semester :2
- Subject Code : 05BC3203
- Subject : PROGRAMMING PRACTICES – 2 (ADVANCED C)

- **Course Objectives** :

1. To understand the advance structured and procedural programming to improve C programming skill.
2. To understand various operations and types of array.
3. To study the advantages of user defined data type which provides flexibility for application development
4. To impart the knowledge about pointers; which is the backbone of effective memory handling.
5. To develop basic understanding of file handling mechanism.

Course Credit	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

**Prerequisites** : Basic Knowledge of C Programming

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

Unit No.	Topics Covered
1	<p><b>Array :</b>            Introduction, One – Dimensional Array, Two – Dimensional Array, Multi – Dimensional Array            Character Arrays And Strings:            Introduction, Declaring and Initializing String Variables, Reading and Writing String, Arithmetic Operations on String, Concatenation and Comparison of Two Strings, String Handling Functions</p>
2	<p><b>Structure and union:</b>            Introduction, Defining, Declaring, Accessing and Initializing Structure, Copying and Comparing Structure Variables, Operations on Individual Members, Arrays of Structure and Arrays Within Structure, Structure and Functions, Unions,            Size of Structure, Bit Fields.</p>
3	<p><b>Pointers :</b>            Introduction, Declaring and Initialization of Pointer Variables, Accessing a Variable Through its Pointer, Pointer Chaining, Pointer Expressions, Pointer Increments and Scale Factor, Dynamic Memory Allocation (malloc, calloc, realloc And free), Pointers and Arrays, Dynamic Arrays, Pointers and Character Strings, Array of Pointers, Pointers as Function Arguments, Functions Returning Pointers, Pointers To Functions, Pointers and Structures.</p>
4	<p><b>File Management :</b>            Introduction, Defining and Opening a File, Closing a File, Input / Output Operations in File, Error Handling During I/O Operations, Random Access Files, Command Line Arguments.</p>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>5</b>	Searching : Introduction, Search Techniques – Linear search, Binary search (Iteration and Recursion) Sorting : Introduction, Sorting Techniques – Bubble sort, Insertion sort, Selection sort, Quick sort, Heap sort, Shell sort, Radix sort, Merge sort, Comparison of All Sorting Methods
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**Course Outcomes:**

1. Ability to work with arrays of complex objects.
2. Ability to work with textual information, characters and strings.
3. Ability to develop advanced applications using enumerated data types, function pointers and nested structures.
4. Ability to implement programs with pointers and arrays, perform pointer arithmetic, and use the dynamic memory allocation.
5. Ability to work with basics of file handling mechanism that is essential for understanding the concepts in database management systems.
6. Ability to find out better searching and sorting techniques for list of data.

**Text Book:**

1. Programming in ANSI C, E. Balagurusamy, McGraw Hill, 7<sup>th</sup> Edition.
2. An Introduction to Data Structures with Applications, J. P. Tremblay , P. G. Sorenson, McGraw Hill, 2<sup>nd</sup> Edition.

**Reference Books:**

1. Let Us C, Yashavant Kanetkar, BPB Publication, 10<sup>th</sup> Edition.
2. Programming in C, Reema Thareja, Oxford University Press.
3. Mastering C, by Venugopal & Prasad, Tata McGraw Hill.
4. The Complete Reference, Herbert Schildt, Tata McGraw Hill.
5. The C Programming Language, Brian W. Kernighan and Dennis M. Ritchie, 2<sup>nd</sup> edition.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**Web References:**

1. <https://www.w3schools.in/c-tutorial>
2. <https://www.tutorialspoint.com/cprogramming>

**App References:**

1. W3Schools App
2. Tutorials Point App

Syllabus Coverage from text /reference book & web/app reference:

Unit No	Chapter Numbers
1	Book – 1, Chap. 7 (except dynamic arrays), chap. 8
2	Book – 1, Chap. 10
3	Book – 1, Chap . 11, Chap. 13
4	Book – 1, Chap. 12
5	Book – 2, Chap . 6 (6.1.1 to 6.1.7, 6.2.1,6.2.2)

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

## PRACTICALS

Unit No	List of Practical																		
<b>1</b>	<ol style="list-style-type: none"> <li>1 Enter N elements and print them.</li> <li>2 Enter N elements and find total and average of them.</li> <li>3 Enter N elements and find maximum and minimum value.</li> <li>4 Enter N elements and find how many are positive, negative, even and odd.</li> <li>5 Copy the elements of one array into another.</li> <li>6 Enter N elements and arrange them in reverse order.</li> <li>7 Merge two arrays.</li> <li>8 Write a program to print 3 * 3 matrix.</li> <li>9 Write a program to add two matrices.</li> <li>10. Write a program to subtract two matrices.</li> <li>11. Write a program to multiply two matrices.</li> <li>12. Enter your name and print it vertically.</li> <li>13. Enter a string and find out length of string with using string function and without string function.</li> <li>14. Enter a string and print it in reverse order with using string function and without string function.</li> <li>15. Enter a string and find out how many spaces and vowels in the string.</li> <li>16. Compare two strings and find out they are same or not.</li> <li>17. Check the string is palindrome or not.</li> </ol>																		
<b>2</b>	<ol style="list-style-type: none"> <li>1. Design a structure named student to store data about student which contains following data element :</li> </ol> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;">Data Item</th> <th style="text-align: left;">Type</th> <th style="text-align: left;">Length</th> </tr> </thead> <tbody> <tr> <td>Rollno</td> <td>int</td> <td>-----</td> </tr> <tr> <td>Name</td> <td>char</td> <td>20</td> </tr> <tr> <td>Department</td> <td>char</td> <td>40</td> </tr> <tr> <td>Year of joining</td> <td>int</td> <td>----</td> </tr> <tr> <td>Score</td> <td>float</td> <td>-----</td> </tr> </tbody> </table> <p style="margin-left: 40px;">Write a program to input data and display data.</p>	Data Item	Type	Length	Rollno	int	-----	Name	char	20	Department	char	40	Year of joining	int	----	Score	float	-----
Data Item	Type	Length																	
Rollno	int	-----																	
Name	char	20																	
Department	char	40																	
Year of joining	int	----																	
Score	float	-----																	

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

	<ol style="list-style-type: none"><li>2. Modify above program for 5 students record.</li><li>3. Sort above data by name.</li><li>4. Sort above data by score in descending order.</li><li>5. Write a function to print names of students whose grade is greater than 5.0.</li><li>6. Write a function to print data of all students who joined in 2019.</li><li>7. Add Two Complex Numbers by Passing Structure to a Function.</li><li>8. Demonstrate difference between structure and union.</li><li>9. Write a program that compares two given dates. To store a date use a structure that contains three members namely date, month and year. If the dates are equal then display message “equal” otherwise “not equal”.</li><li>1 Write a program to demonstrate nested structure.</li></ol>
<b>3</b>	<ol style="list-style-type: none"><li>1. Swap two variables using pointer and function.</li><li>2. find out area of circle using pointer and function</li><li>3. Find out maximum and minimum number using pointer to function.</li><li>4. Enter N elements and find out sum and average of them using dynamic array.</li><li>5. Enter N elements and find out sum of prime numbers using dynamic array.</li><li>6. Enter N elements and find out sum of odd and even numbers using dynamic array</li><li>7. Add two matrices using array of pointers.</li><li>8. Subtract two matrices using pointer to pointer.</li><li>9. Enter 5 strings and arrange them in ascending order.</li><li>10. Enter 2 strings and concatenate them.</li><li>11. Enter a string and print it in uppercase letters.</li><li>12. Enter a string and print it in lowercase letters.</li><li>13. Enter a string and print it in reverse order.</li><li>14. Compare two strings and find out strings are same or not.</li><li>15. Copy a string into another.</li><li>16. Enter a string and find out the string is palindrome or not.</li></ol>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

4	<ol style="list-style-type: none"><li>1. Wap to write content in file and then read that file and print the content on screen. Wap to copy one file into another file.</li><li>2. Wap to append the content in given file.</li><li>3. Wap to write string in “greencity.txt” and print it in reverse order in file “cleancity.txt”</li><li>4. Wap to write a file DATA.Txt which has 1 to 10 numbers and then read this file. If number is odd then store it in “ODD.txt” and if it is even store it in “EVEN.txt”</li><li>5. Wap to add records in file as per following structure. (empcode, empname , salary) then read the content and find out employee who earns highest salary.</li><li>6. Wap to add records in binary file as per following structure. (empcode, empname, salary) and read the content and print on screen</li><li>7. Wap to read a file and find out no. of upper case letters , lower case letters, special symbols, digits and vowels in the file.</li><li>8. Wap to read a file and replace all ‘a’ with ‘x’.</li><li>9 Wap to find the size of file without traversing character by character.</li><li>10 Wap to enter a number in one file and print its reverse in another file.</li><li>11 Wap to print no. of arguments and list of strings given in command line.</li><li>12.Wap to copy one file into another using command line arguments</li></ol>
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**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>5</b>	<ol style="list-style-type: none"><li>1. Write a program to enter N elements and search a value from the list using linear search.</li><li>2. Write a program to enter N elements and search a value from the list using binary search (without recursion).</li><li>3. Write a program to enter N elements and search a value from the list using binary search. (with recursion)</li><li>4. Write a program to enter N elements and arrange the list in ascending order using bubble sort.</li><li>5. Write a program to enter N elements and arrange the list in ascending order using shell sort.</li><li>6. Write a program to enter N elements and arrange the list in ascending order using quick sort.</li><li>7. Write a program to enter N elements and arrange the list in ascending order using merge sort.</li><li>8. Write a program to enter N elements and arrange the list in ascending order using Insertion sort.</li><li>9. Write a program to enter N elements and arrange the list in ascending order using Insertion sort.</li><li>10. Write a program to sort 5 strings in descending order.</li></ol>
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**Requirement of Laboratory support**

- Student's need to install "**CODE BLOCK**" using following link

<https://www.codeblocks.org/downloads/>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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- **Sem.** 2
- **Subject Code** : 05BC3204
- **Subject** : Introduction To DBMS
- **Course Objectives** :

1. This course is intended to give students basic fundamental knowledge
2. This will give conceptual insight about how database design and implementation takes place.
3. Gives insight about relational operations and use of databases.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	40	30

- **Prerequisites:** Basics and elementary knowledge of working with the computer.

Unit No	Topics Covered
<b>1</b>	<b>Overview to Database Management System</b> Introduction to Database Management systems, Database-applications, purpose, instance and schema, Data Models, Database System Architecture.
<b>2</b>	<b>Database Design and Normalization</b> The Entity Relationship Model: The Basic ER concepts, Entities and Attributes, Relationships, constraints, E-R Diagram symbols, Examples of ERD. Introduction to Normalization, First Normal Form, Second Normal Form, Third Normal Form.

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**Bachelor of Computer Applications**

<b>3</b>	<p><b>Interactive SQL :</b></p> <p>SQL Commands, Data Definition Language Commands, Data Manipulation Language Commands, Insertion of data into the tables, viewing of data into the tables, Deletion Operations, Updating the contents of the table, Modifying the structure of the table remaining table into destoring Tables, Data Constraints, Type of data Constraints, Column level Constraint, Table level Constraint.</p>
<b>4</b>	<p><b>Viewing The Data :</b></p> <p>Computations on Table Data, Arithmetic Operators, Logical Operators, Comparison Operators, Range Searching, Pattern Searching, ORACLE FUNCTIONS, Number Functions, Group Functions, Scalar Functions, Data Conversion Functions, Manipulating Dates in SQL , Character Functions, Sub queries and Joins : Joins, Equi Joins, Non Equi Joins, Self Joins, Outer Joins, Sub Queries, Correlated Queries, Using Set Operators:- Union , Intersect, Minus.</p>
<b>5</b>	<p><b>Relational Algebra:</b></p> <p>Native Relational Operations (Selection, Projection, Join, Difference), Relational Algebra Examples.</p>

**Course Outcomes:**

1. To understand various fundamental aspects of database management system.
2. To depict a database system using ER diagram.
3. To understand the uses the database schema and need for normalization.
4. To implement and execute SQL Queries.
5. Query representation using Relational Algebra.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**Text Book:**

1. "Database System Concepts", Silberschatz, Korth, Sudarshan, 4th Edition, McGraw Hill Publication.
2. "Fundamentals of Database Systems", Elmsari, Navathe, 4th Edition, Pearson Education (2008)
3. "SQL/PLSQL, The Programming Language of ORACLE", Ivan Bayross, BPB Publication
4. "Database Systems Concepts, Design & Applications", S. K. Singh, Pearson Education.

**Reference Books:**

1. "Database Systems : Design, Implementation and Management", Peter Rob, Carlos Coronel, 7th Edition, Cengage Learning (2007)
2. "An Introduction to Database Systems", C J Date, A Kannan, S Swaminathan, 8th Edition, Pearson Education (2006)
3. Database Management Systems, Ramakrishnan, Gehrke, McGraw Hill, Third Edition.
4. "Database management Systems", Leon and Leon, Vikas Publication.

**Web References:**

1. <https://kakeboksen.td.org.uit.no/Database%20System%20Concepts%206th%20edition.pdf>
2. <https://www.tutorialspoint.com/sql/>

**App References:**

3. [https://play.google.com/store/apps/details?id=in.ajaykhatri.learnbms&hl=en\\_IN](https://play.google.com/store/apps/details?id=in.ajaykhatri.learnbms&hl=en_IN)
4. <https://play.google.com/store/apps/details?id=com.quizmine.androidbms&hl=en>

**Syllabus Coverage from text /reference book & web/app reference:**

Unit No.	Chapter
1	Text Book – 1, Chapter 1: 1.1, 1.2, 1.3, 1.4, 1.8
2	Text Book – 1 , Chapter 2 : 2.1, 2.2, 2.3, 2.5, 2.6, 2.8 Text Book – 2, Chapter 10: 10.2, 10.3, 10.4
3	Text Book – 3 Chapter 7 and Chapter 8
4	Text Book – 3 Chapter 9 and Chapter 10
5	Text Book – 4 Chapter 4: 4.1, 4.3, 4.4

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**Practical List:**

**Practical lab sessions conducted based on the following topics:**

- Create Table, Viewing and Modifying the structure of tables
- Insertion of Data into tables, Viewing data in the tables
- Delete Operations, Update Operations
- Renaming Tables, Destroying Tables
- Data Constraints, Defining integrity constraints in the alter table command
- Grouping Data from tables
- Arithmetic Operators, Logical Operators
- Range Searching, Pattern Matching
- Column Alias
- Aggregate Functions, Scalar Functions
- Date Conversion Functions, Manipulating dates in SQL
- Subqueries
- Joins
- Set Operators: Union, Intersect and Minus Clause

**Requirement of Laboratory Support :**

Students need to install "**Sql Command Line**" using

<https://dev.mysql.com/downloads/shell/>

**FACULTY OF COMPUTER APPLICATIONS**  
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- **Sem.** : 2
- **Subject Code** : 05BC3205
- **Subject** : Communication Skills
- **Course Objectives:** The objectives of this course are
  1. To enable students to enhance their communication skills with reference to workplace communication
  2. To enable students to draft various workplace related documents
  3. To make students aware of common errors and writing and speaking and ways to overcome them
  4. To apply their English language skills for different professional purposes

Course	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
3	9	18	15	15	33	30	70	NA

- **Prerequisites** :

Unit No	Topics Covered
<b>1</b>	<b>Dynamics of Communication:</b> <ul style="list-style-type: none"> <li>– Definition and process</li> <li>– Barriers</li> <li>– Kinesics</li> <li>– Proxemics</li> <li>– Paralinguistic features</li> </ul>
<b>2</b>	<b>Grammar:</b> <ul style="list-style-type: none"> <li>– Tenses</li> <li>– Subject-verb agreement</li> <li>– Articles</li> <li>– Prepositions</li> </ul>

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**Bachelor of Computer Applications**

<b>3</b>	<b>Vocabulary Building:</b> <ul style="list-style-type: none"> <li>- Prefix and suffix</li> <li>- Synonyms and Antonyms</li> <li>- Foreign words</li> <li>- Idioms and Phrases</li> </ul>
<b>4</b>	<b>Enriching Language through Literature</b>  <b>Poems:</b> <ul style="list-style-type: none"> <li>- Captain! My Captain! by Walt Whitman</li> <li>- Where The Mind Is Without Fear by Rabindranath Tagore</li> <li>- The Road Not Taken by Robert Frost</li> </ul> <b>Short Stories:</b> <ul style="list-style-type: none"> <li>- Playing the English Gentleman by Mohandas Karamchand Gandhi</li> <li>- Let's Go Home by KewlinSio</li> <li>- The Meeting Pool by Ruskin Bond</li> <li>- The Bet by Anton Chekhov</li> <li>- A Snake in the Grass by R. K. Narayan</li> </ul>
<b>5</b>	<b>Writing Practices:</b> <ul style="list-style-type: none"> <li>- Report writing</li> <li>- Paragraph writing</li> <li>- Email Etiquettes</li> <li>- Business letters(sales, order, complaint, adjustment, inquiry, recommendation, appreciation, apology, acknowledgement, cover letter)</li> </ul>
<b>6</b>	<b>Speaking Skills:</b> <ul style="list-style-type: none"> <li>- Public speaking skill</li> <li>- Group discussion</li> <li>- Presentation skills</li> <li>- Interview skills</li> </ul>

**Course Outcomes:**

The course will enable students

1. To know the process of communication and its components.
2. To comprehend the dynamics of various rules of grammar and check its validation while they speak and write language correctly.
3. To use various forms of vocabulary in varied situations in oral and written communication
4. To create literature sensibility and learn life skills through it
5. To create various workplace related documents in writing

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**Bachelor of Computer Applications**

6. To apply their speaking skills for various contexts related to workplace communication

**Course Outcomes – Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	2	-	-	1	-
CO3	-	-	-	-	-	-	2	-	1	1	-
CO4	-	-	-	-	-	-	2	-	1	1	-
CO5	-	-	-	-	-	-	3	-	1	1	-
CO6	-	-	-	-	-	-	2	-	1	1	-

**Text Book :**

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**Reference Books :**

1. Communication Skills, Sanjay Kumar and PushpLata, Oxford University Press. 2011
2. *Technical Communication: Principals and Practice*, Meenaxi Raman and Sangita Sharma, Oxford Publication
3. *Technical Writing, Presentation Skills and Online Communication: Professional Tools and Insights*, Greenlaw Raymond, United Naval Academy, USA
4. *Perfect Phrases for Office Professionals*, Meryl Runion and Susan Fenner, McGraw Hill, 2011
5. Ramesh and Ramesh, *The Ace of Soft Skills*, Pearson, UP, 2019
6. Oxford Language Reference, (Indian Edition) OUP
7. Technical English, Dr. M. Hemamalini, Wiley. 2014
8. Spoken English, R K Bansal and J B Harrison, Orient Longman. 2013

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	<i>Technical Communication: Principals and Practice – Minaxi Raman and Sangita Sharma</i>
2	<i>Remedial English Grammar, F.T. Wood, Macmillan. 2007</i>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

3	<a href="https://www.collinsdictionary.com/">https://www.collinsdictionary.com/</a>
4	<a href="https://www.poetryfoundation.org/poems/browse">https://www.poetryfoundation.org/poems/browse</a>
5	<i>Study Writing, Liz Hamp-Lyons and Ben Heasley, Cambridge University Press. 2006</i>
6	<i>Exercises in Spoken English, Parts. I-III. CIEFL, Hyderabad. OUP</i>



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# **Faculty of Computer Applications**

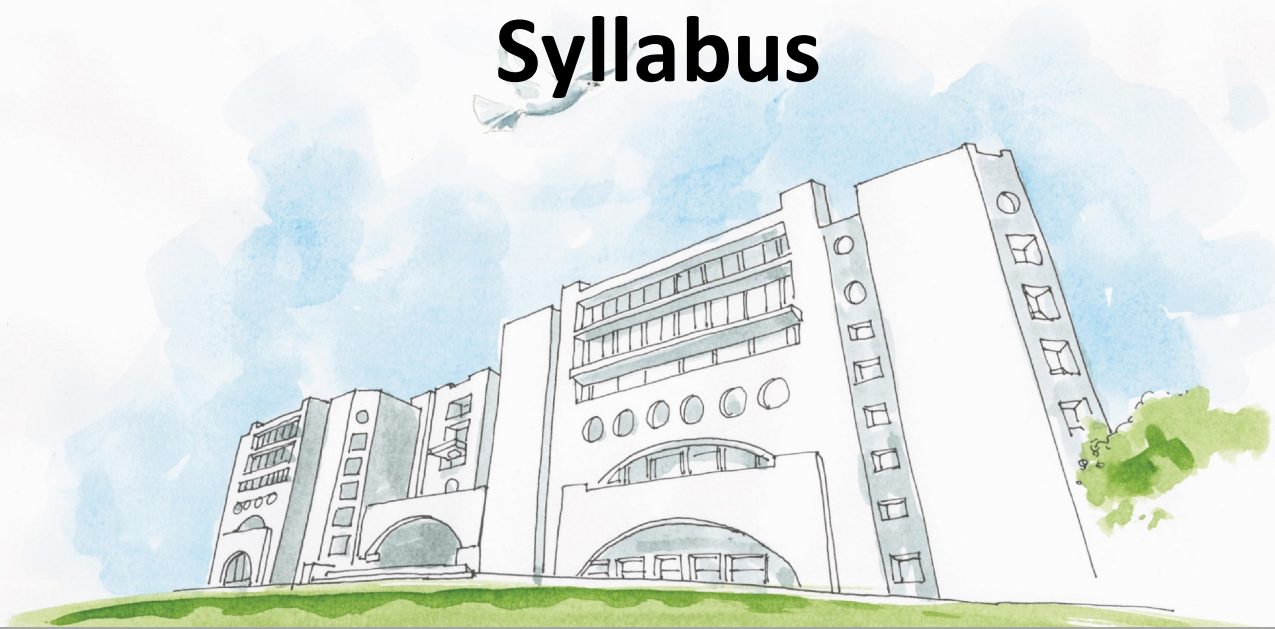
## **Bachelor of Computer Applications**

### **BCA Sem - 3**

## **Teaching Scheme**

# **&**

## **Syllabus**



## FACULTY OF COMPUTER APPLICATIONS

### Bachelor of Computer Applications

### BCA Semester – 3

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05BC3301	DATABASE MANAGEMENT SYSTEM -2	4	12	24	20	20	44	30	40	30
05BC3302	DATA STRUCTURE USING C	4	12	24	20	20	44	30	40	30
05BC3303 ----- 05BC3304	ENTERPRISE RESOURCE PLANNING (ERP) ----- MANAGEMENT INFORMATION SYSTEM (MIS)	3	9	18	15	15	33	30	70	NA
05BC3305	SUMMER INTERNSHIP PROJECT - 1	3	9	18	15	15	33	NA	NA	100
05CR0301	LIFE SKILL 1 (UNIVERSAL HUMAN VALUES)	3	9	18	15	15	33	30	70	NA
05BC3306	PROGRAMMING IN JAVA	4	12	24	20	20	44	30	40	30
	Open Elective	3	9	18	15	15	33	30	70	NA
<b>Total</b>		<b>24</b>	<b>72</b>	<b>144</b>	<b>120</b>	<b>120</b>	<b>264</b>	<b>180</b>	<b>330</b>	<b>190</b>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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- **Sem.** : 3
- **Subject Code** : 05BC3301
- **Subject** : Database Management System - 2 (DBMS-2)
- **Course Objectives** :
  1. To understand the basics of PL/SQL.
  2. To perform cursor management in PL/SQL.
  3. To get familiarized with the concepts of Exception Handling.
  4. To get familiarized with workings of various database objects like stored procedures and functions.
  5. To create and implement database triggers.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	40	30

- **Prerequisites** :
  1. Knowledge of Fundamental Database Management System Concepts.
  2. Working Knowledge of SQL.

Unit No	Topics Covered
<b>1</b>	<b>PL/SQL Basics:</b> Brief introduction to SQL Fundamentals, Basics of PL/SQL, Advantages of PL/SQL, PL/SQL Block Structure. PL/SQL Fundamentals: PL/SQL Variables and PL/SQL Data Types, Variable Attribute (%type, %rowtype). PL/SQL Control Structure: Conditional Control, Iterative Control and Sequential Control.
<b>2</b>	<b>Cursor Management:</b> Introduction to Cursor, Types of Cursors, Implicit Cursor, Cursor Attributes, Explicit Cursors: Cursor declaration, opening, fetching data from cursor, closing, Cursor FOR loop, Parameterized Cursor.
<b>3</b>	<b>Exception Handling:</b> Introduction, Exception Types, Pre-defined Exception with example, Exception Trapping Functions, User Defined Exception with example, Raise_Application_Error procedure.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>4</b>	<b>Stored Procedures and Functions:</b> Introduction to Procedures and Functions, Creating Procedures, Formal and Actual parameters: (IN, OUT and INOUT parameters), Stored Functions, User Defined Functions, Procedures v/s Functions.
<b>5</b>	<b>Triggers:</b> Brief overview of Triggers, Types of triggers, Creating DML Triggers (Row trigger, Statement triggers, Before and after triggers, using OLD and NEW qualifier), Dropping a Trigger, Applications of Triggers.

**Course Outcomes:**

1. Students will be able to understand the basic concept of PL/SQL.
2. Students will be able to manage implicit and explicit cursors.
3. Students will be able to trace and correct the errors by using the concepts of exception handling.
4. Students will be able to work with database objects like stored procedures and functions.
5. Students will develop an ability to create and implement database triggers.

**Course Outcomes - Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	L		L			M		
CO2		H			L			M
CO3				L			M	
CO4	M				M			M
CO5		M		L			H	

**Text Book:**

1. "SQL, PL/SQL the programming Language of Oracle", Ivan Byross, BPB, 4th Edition.

**Reference Books:**

1. "Oracle PL/SQL by Example 5th Edition", Benjamin Rosenzweig, Elena Rakhimov, Pearson Publication, 5th Edition.
2. "Oracle Database 11g: The Complete Reference", Kevin Loney, Oracle Press.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

3. "SQL and PL/SQL for Oracle 11g" Black Book, P.S.Deshpande, Dreamtech Publication.

**Web References:**

1. <https://docs.oracle.com/en/database/oracle/oracle-database/12.2/tutorials.html>
2. <https://www.oracletutorial.com/>
3. <https://www.plsqltutorial.com/>
4. <https://www.guru99.com/pl-sql-tutorials.html>
5. <https://www.techonthenet.com/oracle/index.php>

**App References:**

1. <https://livesql.oracle.com/apex/>
2. <https://apex.oracle.com/en/>
3. <https://www.oracle.com/database/technologies/appdev/plsql.html>
4. <http://orasql.org/2014/12/30/simple-android-oracle-client/>
5. [https://play.google.com/store/apps/details?id=com.msh.plsqllearning&hl=en\\_IN&gl=US](https://play.google.com/store/apps/details?id=com.msh.plsqllearning&hl=en_IN&gl=US)

**Syllabus Coverage from text /reference book & web/app reference:**

<b>Unit No</b>	<b>Chapter Numbers</b>
1	Book - 1: Chapter 15
2	Book - 1: Chapter 16
3	Book - 1: Chapter 17
4	Book - 1: Chapter 18 (Procedures & Functions)
5	Book - 1: Chapter 18 (Triggers)

**Requirement of Laboratory support**

🔗 Student's need to install **SQL Command Line** using following link

<https://dev.mysql.com/downloads/shell/>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**PRACTICALS**

<b>Unit No</b>	<b>List of Practical</b>
<b>1</b>	<p>1) Write a PL/SQL block that calculates the simple interest based on the given principal amount, rate of interest and number of years.</p> <p>2) Write a PL/SQL block to calculate the square and cube of the given number.</p> <p>3) Write a PL/SQL block to accept product name, qty and price from user and then calculate discount in Rs. based on the given (%).</p> <p>4) Write a PL/SQL block which accepts measurement in feet and displays it in cm, inch and meter.</p> <p>5) Write a PL/SQL block which converts temperature from Celsius to Fahrenheit.</p> <p>6) Write a program to generate the numbers using LOOP, FOR LOOP and WHILE LOOP up to the number inputted by the user.</p> <p>7) Write a PL/SQL block to calculate the total, percentage and grade of student based on his/her Rollno from the RESULT table. (Create RESULT table with Rollno, Name, Sub1, Sub2, Sub3, Sub4, Sub5, Total, Per, Grade attributes with appropriate data type).</p> <p>8) Write a PL/SQL block which displays the gross salary of employees as per user input EID. (Consider an EMP table with EID, EName, Deptno, Deptname Gender, Age, BasicSal) with appropriate data types.) Gross_Salary: BASICSAL + (DA + HRA + Medical) - PF. Rules: HRA = 15% of basic, DA = 50% of basic, Medical = Rs. 500, PF = 10% of basic.</p> <p>9) Write a PL/SQL block which displays all records of Male employees working in the HR Dept from the EMP table.</p> <p>10) Write a PL/SQL block to delete the record of an employee for a given EID.</p>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>2</b>	<p>1) Write a PL/SQL block that uses a cursor attribute SQL%ROWCOUNT to raise the basic salary of employees by 10% that are working in department number 10 and also display the appropriate message based on the existence of the record in the EMP table. (Use Implicit Cursor)</p> <p>2) Write a PL/SQL block that uses a cursor attribute %ISOPEN and %NOTFOUND to raise the basic salary of employees of department number 20 by 5% and also display the appropriate message based on the existence of the record in the EMP table. Whenever any such raise is given to the employees, a record for the same is maintained in the emp_update table. (Perform using both Implicit and Explicit Cursor)</p> <p>3) Write a PL/SQL block that uses a cursor attribute %ROWCOUNT to display the name, department and basic salary of the first 5 employees getting the highest basic salary. (Use Explicit Cursor)</p> <p>4) Write a PL/SQL block using a cursor FOR loop to display the name and the basic salary of the top 3 highest paid employees. (Use Cursor For Loop)</p> <p>5) Write a PL/SQL block using a parameterized cursor that displays the department wise basic salary of each employee and department wise total gross salary. (Parameterized Cursor and Use Cursor For Loop)</p> <p>6) Write a program using a cursor to insert the records of employees in the EMP_BACKUP table for given DEPT_NO, also raise a user-defined exception NO_DEPT_FOUND when no records are found for entered DEPT_NO.</p> <p>7) Write a PL/SQL block to display records from the CUSTOMER table using an explicit cursor.</p> <p>8) Write a PL/SQL block to display data with the use of LIKE Operator using cursor FOR Loop.</p> <p>9) Write a PL/SQL block to show the records using ORDER BY clause using cursor.</p> <p>10) Write a PL/SQL block to perform an update operation on the EMPLOYEE table using an implicit cursor.</p>
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**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>3</b>	<ol style="list-style-type: none"><li>1) Write a PL/SQL block that explains the use of the ZERO_DIVIDE exception.</li><li>2) Write a PL/SQL block to accept a student name from a user if it exists, display his/her result from the RESULT table otherwise display appropriate message using exception handling.</li><li>3) Write a PL/SQL block to accept employee name from a user if it exists, display his/her basic salary otherwise display appropriate message using exception handling.</li><li>4) Write a PL/SQL block to display the salary of that employee whose age is 50 years otherwise display appropriate messages using exception handling.</li><li>5) Write a PL/SQL block using a cursor to insert the records of employees in the EMP_BACKUP table for a given department number, also raise a user defined exception NO_DEPT_FOUND when no records are found for entered DEPT_NO. (Use User Defined Exception)</li><li>6) Write a program that explains the use of the NO_DATA_FOUND exception.</li><li>7) Write a program that explains the use of the INVALID_NUMBER exception.</li><li>8) Write a program that explains the use of the ZERO_DIVIDE exception.</li><li>9) Write a program using implicit cursor to display the commission of given EMPNO, also raise a user-defined exception NULL_COMMISSION when no value (NULL) is available for commission. (Use User Defined Exception)</li><li>10) Write a program that explains the use of exception trapping functions SQLCODE and SQLERRM.</li></ol>
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**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>4</b>	<ol style="list-style-type: none"><li>1) Write a simple procedure without any parameter that shows a user defined message on the screen. Call the procedure using a separate PL/SQL block and on the command line.</li><li>2) Write a simple procedure that increases the basic salary of employees for the given department number by percentage inputted by the user using the IN parameter.</li><li>3) Write a procedure that searches whether the given employee id is present or not in the table. If an employee is found then show its name otherwise raise appropriate error messages (Use both IN and OUT mode variables) and also write a PL/SQL block to call the procedure.</li><li>4) Write a function that returns the square of the given number. Execute the function using a separate PL/SQL block and on the command line.</li><li>5) Write a function that returns the balance for a given account number. (Create ACCOUNT table with ACNO, CNAME, BNAME, BALANCE columns using appropriate data types)</li><li>6) Write a simple procedure without any parameter that updates the values in the EMP table.</li><li>7) Write a simple procedure that increases the salary of employees for the given department not by percentage inputted by the user using the IN parameter.</li><li>8) Write a procedure that search“s whether the given employee number is present or not in the table. (Use both IN and OUT mode variables) and also Write a PL/SQL block to call the SEARCH_EMP procedure.</li><li>9) Write a function that returns the square of the given number. Execute this function using a separate PL/SQL block and also without using PL/SQL block on the command line.</li><li>10) Write a function that returns the balance for a given account number.</li></ol>
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**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>5</b>	<ol style="list-style-type: none"><li>1) Write a trigger to restrict users from accessing the table on weekends.</li><li>2) Write a trigger that restricts the entry of records in the EMP table if the salary is greater than Rs 50000.</li><li>3) Write a trigger to insert the values into the NEWEMP table when the records are inserted into the EMP table.</li><li>4) Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is updated in EMP table.</li><li>5) Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is deleted from EMP table.</li><li>6) Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is deleted from EMP table.</li><li>7) Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is updated in EMP table.</li><li>8) Write a trigger that restricts the entry of record if salary is greater than Rs.50000.</li><li>9) Write a trigger that identifies the gender of the employee and according to the gender sets MR. in front of MALE employees and MS. in front of FEMALE employees.</li><li>10) Write a trigger to restrict users from using the table on Sunday.</li></ol>
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Requirement of Laboratory Support :

Students need to install "SQL Plus" using

<https://www.oracle.com/in/database/technologies/oracle-database-software-downloads.html>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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- **Sem.** : 3
- **Subject Code** : 05BC3302
- **Subject** : Data Structure using C
- **Course Objectives** :
  1. To impart a thorough understanding of linear data structures such as stacks, queues and their applications.
  2. To impart a thorough understanding of non-linear data structures such as trees, graphs and their applications.
  3. To impart a thorough familiarity with writing recursive methods.
  4. To design and implement various data structure algorithms.
  5. To introduce various techniques for representation of the data in the real world.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	40	30

- **Prerequisites** : Functional Knowledge of C programming language

Unit No	Topics Covered
<b>1</b>	<b>Introduction of data structure:</b> <ul style="list-style-type: none"> <li>- Introduction of data and data type</li> <li>- Introduction of data structure, primitive and non-primitive data structure</li> <li>- Define Complexity of Data structure - Time and Space complexity, best case, worst case and average case.</li> </ul>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>2</b>	<b>Stacks and Queues:</b> <ul style="list-style-type: none"> <li>- Stack-introduction, operations, applications of stack recursion and polish notation</li> <li>- Queue - introduction, simple queue and its operations</li> </ul>
<b>3</b>	<b>LinkedList:</b> <ul style="list-style-type: none"> <li>- Introduction, types of linked list- singly and doubly</li> </ul>
<b>4</b>	<b>Tree:</b> <ul style="list-style-type: none"> <li>- Basic terminologies</li> <li>- Binary tree- array and linked representation, operations</li> <li>- Tree traversal</li> <li>- conversion of general tree to binary tree</li> <li>- Binary search tree</li> </ul>
<b>5</b>	<b>Graph:</b> <ul style="list-style-type: none"> <li>- Basic terminologies</li> <li>- Representations of graph- adjacency matrix and adjacency list</li> <li>- BFS and DFS traversal</li> </ul>

**Course Outcomes:**

1. Students can compare different data structures. Pick an appropriate data structure for a design situation.
2. Students can use appropriate data structures like arrays, linked list, stacks and queues to solve real world problems efficiently.
3. Students can represent and manipulate data using nonlinear data structures like trees and graphs to design algorithms for various applications.
4. Students can implement operations like searching, insertion, and deletion, traversing mechanisms etc. on various data structures.
5. Students can determine and analyze the complexity of given Algorithms.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

Course Outcomes- Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	H	L	-	M	-	-	L
CO2	H	-	L	-	M	-	-	-
CO3	M	L	L	-	M	-	-	-
CO4	H	-	L	-	L	-	-	-
CO5	H	H	L	-	H	-	-	L

**Text Book:**

1. Data Structure Using C, Second Edition, Reema Thareja, Oxford University Press.

**Reference Books:**

1. "Introduction to Algorithm", Cormen, Leiserson, Rivest, Stein,, PHI (2003), 2nd Edition,
2. "Design and Analysis of Algorithms" Parag Dave & Himanshu Dave, Pearson Education (2008).
3. "Data Structures using C", A. K. Sharma, Pearson Education (2011).
4. "Data Structures: A Pseudocode Approach with C", Gilberg & Forouzan, Cengage Learning.
5. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-Freed, University Press (2nd edition-2007)
6. "Data Structures Using C & C++", Tenenbaum, PHI. (Mention at least 3 reference books)

**Web References:**

1. <https://www.geeksforgeeks.org/data-structures/>
2. <https://www.javatpoint.com/data-structure-tutorial>

**App References:**

1. Data Structures and Algorithms offline Tutorial- ONAN Mobile Software
2. Data Structure Using C- Super Dream

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**Syllabus Coverage from text/reference book & web/preference:**

Unit#	Chapter Numbers
1	Chapter-2
2	Chapter-7 and Chapter-8
3	Chapter-6
4	Chapter-9
5	Chapter-13

**PRACTICALS**

Unit No	List of Practicals
<b>1</b>	<ol style="list-style-type: none"><li>1. Create an array of size 10, input values and print the array, and search an element in the array.</li><li>2. Create an array of size 10, input values and display sum and average of all elements in the array.</li><li>3. Create arrays A, B and C of size 3, perform <math>C = A + B</math>.</li><li>4. Create arrays A, B of size 3, C of size 6, merge A and B into C.</li><li>5. Create an array of size 10, find the largest value from the array.</li><li>6. Insert an element into the array at user-defined position.</li><li>7. Delete an element from the array from user-defined position.</li><li>8. Sort the array into ascending order.</li><li>9. Sort the array into descending order.</li><li>10. Write a program to multiply two matrices.</li></ol>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>2</b>	<ol style="list-style-type: none"><li>1. Implement stack using array with following operations: push, pop, print, peek, peep, change, exit.</li><li>2. Write a program to find out the factorial of a number using recursion (stack).</li><li>3. Write a program to print strings in reverse order using stack.</li><li>4. Write a program to find the factorial of a given integer number using stack.</li><li>5. Write a program to find the power of a given number using stack.</li><li>6. Write a program to find GCD of two numbers.</li><li>7. Write a program to find the Smallest Common Divisor of a given number.</li><li>8. Write a program to find Minimum and Maximum numbers from the given array using Recursion.</li><li>9. Write a program which performs the following operations using a simple queue. : insert() -&gt; delete() -&gt; display()</li></ol>
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**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>3</b>	<ol style="list-style-type: none"><li>1. Write a program to perform following operation on singly linked list:<ol style="list-style-type: none"><li>a. Create a linked list</li><li>b. Display it</li></ol></li> <li>2. Write a program to perform following operation on singly linked list:<ol style="list-style-type: none"><li>a. Insert a node at the starting of the list</li><li>b. Insert a node at the end of the list</li></ol></li> <li>3. Write a program to perform following operation on singly linked list:<ol style="list-style-type: none"><li>a. Insert a node after the specific node</li><li>b. Insert a node before the specific node</li></ol></li> <li>4. Write a program to perform following operation on singly linked list:<ol style="list-style-type: none"><li>a. Delete first node</li><li>b. Delete last node</li><li>c. Delete specific node</li></ol></li> <li>5. Write a program to perform following operation on Doubly linked list:<ol style="list-style-type: none"><li>a. Create a linked list</li><li>b. Display it</li></ol></li> <li>6. Write a program to perform following operation on Doubly linked list:<ol style="list-style-type: none"><li>a. Insert a node at the starting of the list</li><li>b. Insert a node at the end of the list</li></ol></li> <li>7. Write a program to perform following operation on Doubly linked list:<ol style="list-style-type: none"><li>a. Insert a node after the specific node</li><li>b. Insert a node before the specific node</li></ol></li> <li>8. Write a program to perform following operation on Doubly linked list:<ol style="list-style-type: none"><li>a. Delete first node</li><li>b. Delete last node</li><li>c. Delete specific node</li></ol></li></ol>
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**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>4</b>	<ol style="list-style-type: none"><li>1. Write a program to create a binary tree. Traverse the tree in preorder, postorder and inorder.</li> <li>2. Write a program to perform following operations on Binary search tree:<ol style="list-style-type: none"><li>a. insert</li><li>b. delete</li><li>c. height of the tree</li><li>d. total no. of nodes in the tree</li></ol></li></ol>
<b>5</b>	<ol style="list-style-type: none"><li>1. Write a program to find out BFS</li><li>2. Write a program to find out DFS</li></ol>

**Requirement of Laboratory Support :**

Students need to install "Code Blocks" using the following link :

<https://www.codeblocks.org/downloads/>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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- **Sem.** :3
- **Subject Code** : 05BC3303
- **Subject** : Enterprise Resource Planning (ERP)
- **Course Objectives** :
  1. Describe the terminologies of ERP with its model along with practical case study.
  2. Provide awareness about the ERP concepts and the technologies.
  3. To emphasize the requirements of ERP packages in different industrial domains.
  4. To develop basic skills of the students about importance of ERP to enriches the overall growth of the business organizations.
  5. To prepare the students technological competitive and make them ready about modernize Business Processes.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
3	9	18	15	15	33	30	70	NA

Unit No	Topics Covered
<b>1</b>	<b>Introduction to ERP</b> Overview and Definition of ERP, Need of ERP, History of ERP Application, Advantages of ERP system, ERP Enterprise Applications, Emerging Trends. <b>ERP Implementation:</b> ERP Life Cycle, Methodology for Implementation. Benefits of ERP Implementation, Implementation Strategies.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>2</b>	<p><b>ERP Project Team and Project Organization Structure</b> Project Organization Structure, Roles and Responsibilities of members, Core Team Selection, Consultant Selection</p> <p><b>ERP Project Management</b> Project Scoping, ERP Implementation Project Plan, Resource Plan, Project Charter, Project Risk Management.</p> <p><b>ERP Package Selection</b> ERP Selection - A Two Step Process</p>
<b>3</b>	<p><b>ERP Modules - 1</b> Overview of Human Resources Management, Financial Management, Procurement and Inventory Management</p>
<b>4</b>	<p><b>ERP Modules - 2 Technologies:</b> Supply Chain Planning , Customer Relationship Management,</p> <p><b>Technologies :</b> Data Warehousing, Data Extraction, Transformation using Cleaning, Data Loading, Online Transaction Processing (OLTP), Online Analytical Processing (OLAP)</p>
<b>5</b>	<p><b>ERP for Industries:</b> <b>ERP for manufacturing Industry:</b> ERP for petroleum, GAS companies, ERP for Automobile Industry, ERP for Pharma, ERP for FMCG. <b>ERP for Service Industry:</b> ERP for retail, ERP for healthcare, ERP for Educational Institution, ERP for banks.</p>

**Course Outcomes :**

1. Students will be able to understand basic model of ERP and its terminologies.
2. Students will be able to aware about ERP implementation strategies and methodologies.
3. Students will be able to understand various ERP Modules of business.
4. Students will be able to gain skills and knowledge about ERP technologies.
5. Students will be able to understand importance of ERP in service and manufacturing industries.

Course Outcomes - Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	L			L		M		H
CO2		M		H	M		L	
CO3	M		H			L		M

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

CO4		L		L	H		M	
CO5	M	H		H		M		H

**Text Book :**

- "Enterprise Resource Planning, Text and Cases ", Rajesh Ray, TMH, First Edition**

**Reference Books :**

- David L. Olson, "Managerial issues of Enterprise Resource Planning systems" Of TMH Edition 2004.
- Ellen Mon, Bret Wagner "Concepts in ERP", Second Edition of Cengage Learning.
- Ashim Raj Singla " Enterprise Resource Planning", of Cengage Learning, First Edition

**Web References :**

**[https://en.wikipedia.org/wiki/Enterprise\\_resource\\_planning](https://en.wikipedia.org/wiki/Enterprise_resource_planning)**

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
Unit No.	Chapter Topics
1	Chapter - 1,2
2	Chapter - 6,7,5
3	Chapter - 20,21,22
4	Chapter - 25,28,33
5	Chapter - 35 ,36

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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- **Sem.** 3
- **SubjectCode** : 05BC3304
- **Subject** : Management Information System (MIS)
- **CourseObjectives:**
  1. To give knowledge about organizational structure, management and Information Systems
  2. Explaining importance of ethics and concepts of DBMS
  3. Explaining concepts of KM and Decision making in organization with the use of DSS and KMS
  4. Giving knowledge about various applications at enterprise level and understanding concept of business intelligence in the organization
  5. Imparting knowledge about how to secure enterprise Information Systems

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
3	9	18	15	15	33	30	70	NA

- **Prerequisites** : Basic knowledge of Information Systems

Unit No	Topics Covered
<b>1</b>	<p><b>Introduction to Information and Management Information</b></p> <p>Introduction to Information and Management: Concept of Data &amp; Information Types and Sources of Information, Qualities of Information, need of computer-based information systems, Management structure</p>
<b>2</b>	<p><b>Basics of MIS</b></p> <p>Introduction to MIS, Role of MIS, Impact of MIS, Classification of Information, Model of Human as Information Processor, Decision-making, Decision Making Process, MIS and Decision Making, Decision analysis by analytical Modelling</p>

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**Bachelor of Computer Applications**

<b>3</b>	<p><b>Knowledge management and Decision-Making Process</b></p> <p>Knowledge and knowledge Management System, Knowledge Management, Driving forces behind knowledge management, Key aspects of KM , Designing for businessbenefitsfrom KM, Business Intelligence,Decisionsupportsystem, Group decision supportsystem ,BenefitsofDSS,DSSApplicationsin E- enterprise</p>
<b>4</b>	<p><b>Enterpriseapplicationsand Business Intelligence</b></p> <p>Enterprisesystems, Supplychainmanagement systems, Customerrelationship management systems E-commerce: Business and Technology Whatis BusinessIntelligence, Whyis BI developed, Howis BIused.</p>
<b>5</b>	<p><b>SecuringInformationSystems</b></p> <p>System Vulnerabilityand Abuse, Malicious Software: VIRUSES, worms, Trojan horses, and spyware ,hackers and computercrime, softwarevulnerability Establishing aFrameworkforSecurityandControl, Information Systems Controls , RiskAssessment, SecurityPolicy, DisasterRecoveryPlanning</p>

**CourseOutcomes:**

- 1.Studentswillbeabletounderstandaboutorganizations,managementand roleofInformationSystems
- 2.StudentscandistinguishbetweentheconceptofEthicalandSocialIssuesin InformationSystems
- 3.StudentswillbeabletoapplyandrelateKnowledgeManagementand Decision Making Process
- 4.StudentswillbeabletoanalyzeEnterpriseapplicationsandconceptsof BusinessIntelligence(BI).
- 5.StudentswillbeabletogaintheknowledgeabouthowtosecureInformation Systems

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**Course Outcomes- Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H						L	L
CO2	L	L					L	L
CO3	H	M	M	L	M	M	L	M
CO4	H	L	L	L	M	M	L	M
CO5		L			L	L	L	L

**TextBook :**

1. Analysis and Design of Information Systems, V. Rajaraman, PHI Publication, 2nd Edition
2. Management Information System- Managing the Digital Firm, Kenneth Loudon, Jane Loudon, Pearson Education, 2014, 13th Edition.
3. Management Information Systems- Text & Cases, Waman S. Jawadekar, Tata McGraw Hill Publication, 5th Edition.

**Reference Books:**

1. Management Information System, James O'Brien, George Marakas, McGraw Hill Irwin, 10th Edition.
2. Management Information Systems- For the Information Age, Stephen Haag, Maeve Cummings, Amy Philips, McGraw-Hill Publication, 6th Edition.
3. Management Information Systems: Conceptual Foundations, Structure & Development, Davis, G/ Olson, M., Tata McGraw Hill (TMH) Publications, 2nd edition Edition: 2nd edition
4. Robert G. Murdick, Joel E. Ross, James R. Claggett, "Information Systems for Modern Management", 3rd Edition, PHI Publication.
5. Management Information Systems, Oka M.M., Everest Publishing House India, 14th edition

**Web References:**

1. [https://www.tutorialspoint.com/management\\_information\\_system/index.htm](https://www.tutorialspoint.com/management_information_system/index.htm)
2. <https://www.guru99.com/mistutorial.html>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**App References:**

1. <https://play.google.com/store/apps/details?id=com.eniseistudio.mis&hl=en&gl=US>
2. <https://play.google.com/store/apps/details?id=com.eniseistudio.mis&hl=en&gl=US>

**Syllabus Coverage from Textbook & web / app preference:**

<b>UnitNo</b>	<b>ChapterNumbers</b>
Unit-1	Book-1: Chapter- 1(except 1.3)
Unit-2	Book-3::Chapter-1,6
Unit-3	Book-3: Chapter- 7(7.8,7.9),14(14.1,14.3,14.4,14.5,14.6)
Unit-4	Book-2: Chapter- 9(9.1,9.2,9.3),10(10.2) Book-3: Chapter- 11(11.2,11.4,11.5)
Unit-5	Book-2:Chapter-8(8.1)

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- **Sem. :** 3
- **Subject Code :** 05BC3306
- **Subject :** Programming in Java
- **Course Objectives :**
  1. To develop proficiency in creating console based applications using Java Programming Language.
  2. To interpret the concepts of OOP using java.
  3. To implement multi-threaded applications in Java Programming Language.
  4. To understand and implement working of File Handling in Java. 5. To develop console based applications through Database connectivity.

<b>Delivery of Course and Examination Scheme</b>								
<b>Course Credits</b>	<b>No of Interactive Sessions</b>		<b>Hours of Study Material</b>			<b>Examination Scheme</b>		
	<b>Interactive Live Lectures</b>	<b>Discussion Forum</b>	<b>e-Tutorials in Hours</b>	<b>e-Contents Hours</b>	<b>Self-study &amp; Assessment Hrs</b>	<b>CSE</b>	<b>ESE</b>	<b>ETP</b>
4	12	24	20	20	44	30	40	30

- **Prerequisites :** Knowledge of C and C++ languages.

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**Bachelor of Computer Applications**

<b>Unit No</b>	<b>Topics Covered</b>
1	Introduction to Java and OOP : Features of the Java Language, Object-oriented Programming Creating an Application in Java Compiling and executing Applications in Java Program comments Primitive data types Data Types Scanner Class Operators Type Casting Arrays, single and multi-dimensional arrays Other reference types, classes, interfaces, enums and annotations Unicode escapes in Java source code Understanding super types and sub types Understanding the narrowing and widening Statements-if, if-else, switch-case, for, while, do-while, break, continue and return statements. Members of a class Garbage collector and finalize method Static variables and methods Initializer blocks & Class Initializer blocks

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**Bachelor of Computer Applications**

2	Inheritance and Packages : Types of Inheritance Object Class Defining Subclass Access Specifiers Use of Super Keyword Constructor Overloading Method Overloading and Overriding Use of Abstract and Final Keyword Interface Introduction to Packages Normal import and Static Import String, String Buffer and String Builder Classes from java.lang package. Creating and using User Defined Package and Sub Package Use of ClassPath
3	Exception Handling : Introduction to Exception Handling Use of Try, Catch, Finally, Throw and Throws keywords Creation of User Defined Exception Checked and Unchecked Exceptions

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**Bachelor of Computer Applications**

<b>4</b>	<b>Multi Threading</b> Introduction to Multithreading Thread Life Cycle Creation of new thread in two different ways Synchronization Thread Groups
<b>5</b>	<b>Database Connectivity in Java :</b> Introduction to JDBC JDBC Configuration Driver .jar Files Connecting to the Database Working with Statements Resultsets Prepared Statement

**Course Outcomes:**

1. Describe the basic concepts of OOP with Java
2. Construct console based applications using java
3. Determine how to use Exception handling mechanism in java
4. Determine how to use Multithreading in Java
5. Construct applications based on Database Connectivity.

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**Bachelor of Computer Applications**

Course Outcomes – Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	H	M		H			L
CO2					H			H
CO3					H			H
CO4	H					L	M	
CO5			H	H		H		

**Text Book:**

1. **Java : The complete reference, 12<sup>th</sup> Edition by Herbert Schildt**
2. **Cay S. Horstmann**  
**“Core Java Volume 1 – Fundamentals”, Twelfth Edition, Oracle Press**

**Reference Books:**

1. Ivor Horton's "Beginning Java 2" JDK 5 Edition, Wiley Computer Publishing, (2007).
2. Ken Arnold, JamesGosling, David Holmes, "The Java Programming Language", Addison- Wesley Pearson Education (4th Edition – 2005).
3. Raj Kumar Buyya, S. ThamaraiSelvi, & Xing Chen Chu, "Object Oriented Programming with Java: Essentials & Applications", Tata McGraw Hill
4. Cay Horstmann, "Big Java", Wiley Computer publishing (2nd edition – 2006).
5. Hari Mohan Pandey, "Java Programming", Pearson
6. SharanZakhour, Scott Hommel, Jacob Royal, Isaac Rabinovitch, Tom Risser, Mark Hoerber
7. "The Java Tutorial", Addison-Wesley Pearson Education(4th Edition)
8. Pravin Jain, "The Class of Java", Pearson Education.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications****Web References :**

1. [www.javatpoint.com](http://www.javatpoint.com)
2. [www.java2s.com](http://www.java2s.com)
3. [www.roseindia.net](http://www.roseindia.net)

**App References :**

1. Codegym
2. Easy Coder

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Chapter1 to 6
2	Chapter7 to 9 and15
3	Chapter10,17,18
4	Chapter11,13, 19
5	Chapter21 to 25 and Chapter7,9 from Text book No.2

**Requirement of Laboratory support**

🔗 Student's need to install **JDK/JRE** using following link

[https://www.java.com/download/ie\\_manual.jsp](https://www.java.com/download/ie_manual.jsp)

**FACULTY OF COMPUTER APPLICATIONS**  
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<b>Unit No</b>	<b>List of Practicals</b>
1	<ol style="list-style-type: none"><li>1. Write a simple java program to display message.</li><li>2. Write a java program to get a name from user and display on screen.</li><li>3. Write a java program to get personal information from user and display on screen.</li><li>4. Write a java program to perform different arithmetic operations. (Using     Command Line args)</li><li>5. Write a java program to get different values from user at runtime using Scanner.</li><li>6. Write a java program to get the name from user and print 10 times using loop.</li><li>7. Write a java program to use IF Condition</li><li>8. Write a java program to find ODD or EVEN number using     command line argument</li><li>9. Write a java program to find out students result/grade using IF condition.</li><li>10. Write a java program of 1D array</li></ol>

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**Bachelor of Computer Applications**

<b>2</b>	11. Write a java program to use Interface in java 12. Write a java program to extend one interface into another interface 13. Write a java program to perform simple inheritance. 14. Write a java program to use multilevel inheritance. 15. Write a java program to use Hierarchical inheritance 16. Write a java program to use Abstract class 17. Write a java program to use interface 18. Write a java program to use Multiple inheritance using interface. 19. Write a java program to use method overriding 20. Write a java program to perform overriding of abstract class 21. Write a java program to demonstrate encapsulation
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<b>3</b>	22 Write a java program to implement simple exception handling 23 Write a java program to implement Arithmetic Exception 24 Write a java program to use Finally block in Exception Handling 25 Write a java program to use Multiple Catch Block 26 Write a java program to use Throw Keyword 27 Write a java program to use Throws Keyword 28 Write a java program to implement custom exception 29 Write a java program to implement Exception Propagation 30 Write a java program to implement Exception Chaining 31 Write a java program to use simple inner class in your program 32 Write a java program to use Static Inner Class 33 Write a java program to use Local Inner Class 34 Write a java program to use Nested Interface 35 Write a java program to display date in different format 36 Write a java program to display different calendar information using calendar class 37 Write a java program to add, subtract a days/month into current date and time 38 Write a java program to use Gregorian calendar to display
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	calendar information
<b>4</b>	39. Write a java program to create a thread using Thread Class 40. Write a java program to create a thread using Runnable class 41. Write a java program to set Thread name and priority & test it. 42. Write a java program to create two threads and make them Synchronized (Thread Safe) 43. Write a java program to join two threads which perform loop operations.

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<b>5</b>	<p>44. Write a JDBC program to Insert data into Oracle Table</p> <p>45. Write a JDBC program to Display data into Oracle Table</p> <p>46. Write a JDBC program to Update data into Oracle Table</p> <p>47. Write a JDBC program to Delete data into Oracle Table</p> <p>48. Write a JDBC program to Insert Records Into Oracle Table Using Prepared Statement.</p> <p>49. Write a JDBC program to Display Records Into Oracle Table Using Prepared Statement.</p> <p>50. Write a JDBC program to Update and Delete Records Into Oracle Table Using Prepared Statement.</p>
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**Requirement of Laboratory Support :**

Students need to install "JDK / JRE" using  
[https://www.java.com/download/ie\\_manual.jsp](https://www.java.com/download/ie_manual.jsp)

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- **Sem.** 3
- **SubjectCode** :05CR0301
- **Subject** :Life Skill1(UniversalHumanValues)
- **CourseObjectives**

This course shall enrich students' value system, creativity, competence and confidence. It will enhance the softer aspects of life skills of students through the games, activities, group interactions and videos.

UnitNo	TopicsCovered
<b>1</b>	<p><b>Self Awareness, Commitment towards achieving life goals and Vision of Life</b></p> <p><b>Self Awareness</b></p> <ul style="list-style-type: none"> <li>- Introduction to Self Awareness</li> <li>- Johari Windows Technique</li> <li>- S.W.O.T analysis technique,</li> <li>- Self Exploration</li> </ul> <p><b>Commitment towards achieving life goals</b></p> <ul style="list-style-type: none"> <li>- Importance of Commitment in life</li> <li>- Understanding Wheel of Fortune</li> <li>- Kaizen Technique</li> <li>- IKIGAI</li> <li>- WOOP Method</li> </ul> <p><b>Vision of Life</b></p> <ul style="list-style-type: none"> <li>- Creative Visualization Technique</li> <li>- Vision Board</li> </ul>
<b>2</b>	<p><b>Emotional Intelligence</b></p> <ul style="list-style-type: none"> <li>- Understanding Power of thoughts</li> <li>- Understanding different types of thoughts</li> <li>- Dr. Emoto experiment on Positivity</li> <li>- Three Positive of the day activity</li> </ul>

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	<ul style="list-style-type: none"> <li>- Turningnegativeintopositive</li> <li>- ForgiveandForget</li> <li>- AngerManagement</li> <li>- WheelofEmotions</li> <li>- PositiveAffirmationTechnique</li> <li>- CircleofInfluenceTechniques</li> </ul>
<b>3</b>	<p><b>TimeManagement</b></p> <ul style="list-style-type: none"> <li>- ImportanceofTimeManagement</li> <li>- 4StepsTimeManagementTechnique</li> <li>- ABCMethodofPrioritization</li> <li>- TimeManagementMatrixTechnique</li> </ul>
<b>4</b>	<p><b>Body,MindandSoul</b></p> <ul style="list-style-type: none"> <li>- Understanding the difference between mind andbrain.</li> <li>- PowerofBrain</li> <li>- UnderstandingBrainWavesanditsimportance</li> <li>- UnderstandingBrainLobesandits importance</li> <li>- SleepManagement</li> <li>- TypesofMind</li> <li>- ImportanceofSubConsciousMind</li> <li>- ConceptofFlow</li> <li>- Meditationanditsimportance</li> <li>- Mind-BodyCoordinationExercise</li> <li>- Understanding"WHO AM I"</li> <li>- TechniquetomaintainHealthyBody</li> </ul>
<b>5</b>	<p><b>ValuesandEthics</b></p> <ul style="list-style-type: none"> <li>- UnderstandingValuesandEthics</li> <li>- Understanding different Universal Values likehonesty,integrity,selfdiscipline etc.</li> <li>- UnderstandingCreativityanditsimportance</li> <li>- DelayedGratification(MarshmallowTest)</li> <li>- CasestudiesonValuesandEthics</li> </ul>

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**Bachelor of Computer Applications**

**Course Outcomes:**

1. Understanding the basics of human values
2. How to stay focused and committed towards achieving academic and career goals.
3. Develop control on emotions and confidence
4. Effective Time Management
5. Inculcate human values to grow as responsible human beings with proper personality

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
3	9	18	15	15	33	30	70	NA

Course Outcomes–Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1		L			L			
CO2		L		L	M			
CO3		M			L			
CO4				L				
CO5		L						

**Reference Books:**

1. Creating Values in Life: Personal, Moral, Spiritual, Family and Social Values– By Ashok Gulla
2. Stop Worrying & Start Living– By Dale Carnegie
3. Engineering Ethics & Human Values by: M. Govindarajan , S. Natarajan & V.S. Senthilkumar PHI Learning Pvt. Ltd.
4. Professional Ethics by- R. Subramanian
5. Body, Mind, and Soul: 365 Mindful Inspirations to Help You Focus Your Day, Reduce Stress and Anxiety, and Improve Your Well-Being– By Karen Ficarelli
6. Time Management– „Eat that frog“– By Brian Tracy
7. Emotional Intelligence – By Daniel Goleman

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**WebReferences:**

1. "Dr.Emoto Experiment on Positivity",<https://fountainmagazine.com/2019/issue-132-nov-dec-2019/water-the-power-of-positivity-and-education>
2. "Wheel of Emotions"<https://www.berkeleywellbeing.com/emotion-wheel.html>
3. "SleepManagement"  
<https://www.sleepfoundation.org/sleep-hygiene/healthy-sleep-tips>
4. "KAIZEN"  
<https://www.techtarget.com/searcherp/definition/kaizen-or-continuous-improvement>
5. "IKIGAI"  
<https://positivepsychology.com/ikigai/>



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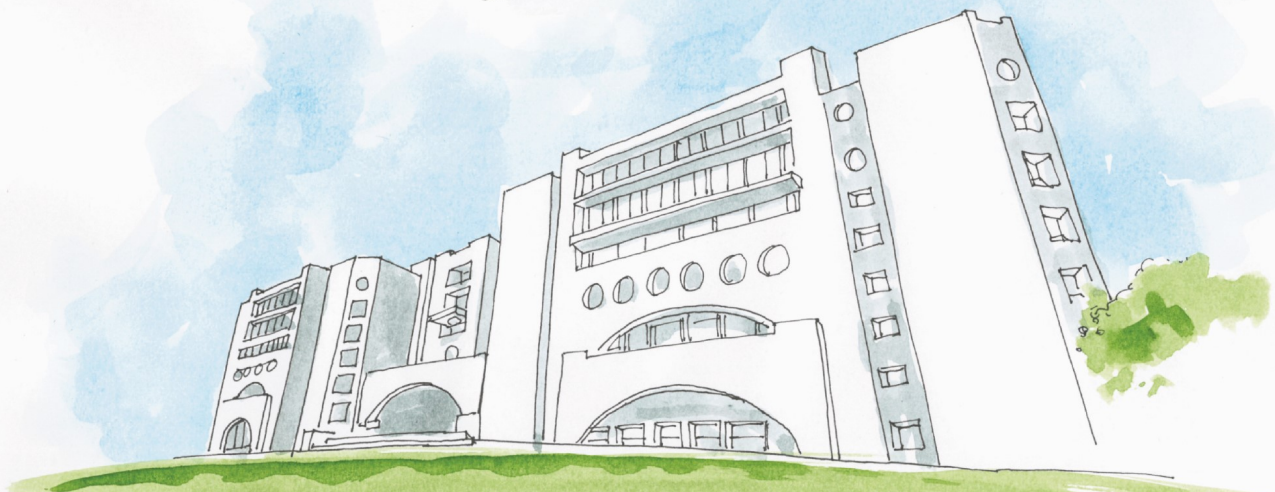
**Bachelor of Computer Applications**

**BCA Sem - 4**

**Teaching Scheme**

**&**

**Syllabus**



## FACULTY OF COMPUTER APPLICATIONS

### Bachelor of Computer Applications

#### BCA Semester-4

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05BC3401	Operating Systems	3	9	18	15	15	33	30	40	30
05BC3402	Computer Networks	3	9	18	15	15	33	30	70	NA
05BC3403 05BC3404	R Programming Programming in C#.Net	2	6	12	10	10	22	30	40	30
05CR0401	Life Skill 2 (Professional Skills)	3	9	18	15	15	33	30	70	NA
05BC3405	Python Programming	2	6	12	10	10	22	30	40	30
	Open Elective 4	3	9	18	15	15	33	30	70	NA
<b>Total</b>		<b>16</b>	<b>48</b>	<b>96</b>	<b>80</b>	<b>80</b>	<b>176</b>	<b>180</b>	<b>330</b>	<b>90</b>





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<b>3</b>	<b>Concurrency &amp; Deadlocks</b> <b>Concurrency:</b> Key terms related to concurrency, Requirements of mutual exclusion, Semaphores	<b>9</b>
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	<p><b>Deadlocks:</b> Principles Of Deadlock, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, Dining philosophers problem: Solution using semaphores</p>	
<b>4</b>	<p><b>Memory Management &amp; Virtual Memory:</b> <b>Memory Management:</b> Requirements of memory management, Memory Partitioning, Simple Paging and Simple segmentation <b>Virtual Memory:</b> Hardware and Control Structures: Need of virtual memory, Virtual Memory paging, Virtual memory segmentation, Address translation in paging, Address translation in segmentation, Page Replacement Policy</p>	<b>9</b>
<b>5</b>	<p><b>Input/ Output and Files</b> I/O Management and Disk Scheduling: I/O Devices, Organization of I/O function, I/O buffering, Disk Scheduling, RAID <b>File Management:</b> Overview, File organization and access, File directories, File sharing, Record blocking, secondary storage management</p>	<b>9</b>

**Course Outcomes :**

Students will be able to

1. Understand the structure and components of Operating System
2. Understand process and thread management.
3. Analyze concurrency problems and to provide solution.
4. Understand the working of main memory and virtual memory.
5. Understand the management of files and I/O devices.

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**Bachelor of Computer Applications**

**Course Outcomes – Program Outcomes Mapping Table :**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	H					L	M	L	L		
CO2	H	M	M			M	M	L	M	H	M
CO3	H	H	M			M	M	L	M	H	M
CO4	H	H	M			M	M	L	M	H	M
CO5	H	H	M			M	M	L	M	H	L

**Text Book :**

1. "Operating Systems", Stalling W, Prentice Hall India, 7th edition

**Reference Books :**

1. "Operating System Principles", Silberschatz A., Peter B. Galvin and Greg Gagne, Wiley-Indian, 8<sup>TH</sup> edition.
2. "Modern Operating Systems", Tanenbaum A.S., PHI, 4th Edition
3. "Unix Shell Programming ", Yashvant Kanetkar , BPB Publications , 1<sup>st</sup> edition.
4. "Unix Concepts and Applications ", Sumitabha Das , McGraw-Hill Publications, 4<sup>th</sup> edition.

**Web References :**

1. <https://www.javatpoint.com/os-tutorial>
2. <https://www.geeksforgeeks.org/operating-systems/>

**App References :**

1. Operating System Tutorials
2. AnLinux : Run Linux on Android
3. Linux Tutorial

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**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	2-2.1 ,2.2, 2.3
2	3-3.1,3.2 4- 4.1 , 4.2 9-9.1 , 9.2
3	5 – 5.1, 5.3, 5.6 6 – 6.1, 6.2, 6.3 , 6.4 , 6.6
4	7-7.1,7.2,7.3,7.4 8 – 8.1 , 8.2
5	11-11.1,11.2,11.4,11.5,11.6 12-12.1,12.2,12.3,12.4,12.5,12.6

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**PRACTICALS**

<b>Sr. No</b>	<b>Command Category</b>
<b>1</b>	Hardware Information
<b>2</b>	User and Group
<b>3</b>	Directory management (ls, pwd, mkdir, rm, cd, dirs, cp, mv)
<b>4</b>	File management (touch, cat, head, tail, more, less)
<b>5</b>	File permissions
<b>6</b>	System management
<b>7</b>	Disk usage and File compression
<b>8</b>	Data Filter and Searching
<b>9</b>	Data Filter and Searching
<b>10</b>	Data Filter and Searching
<b>11</b>	Data Filter and Searching
<b>12</b>	Shell Scripting 1 (Types, Variables, Operators, Conditional Statements)
<b>13</b>	Shell Scripting 2 (Looping)
<b>14</b>	Shell Scripting 3 (File Related commands)
<b>15</b>	Shell Scripting 4 (String test commands, command line arguments)

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- **Sem.** 4
- **Subject Code** : 05BC3402
- **Subject** : Computer Networks
- **Course Objectives:**
  1. To understand the fundamental concepts of networking and Physical layer.
  2. To understand the functionality of Data Link Layer
  3. To understand the functionality of MAC sub layer
  4. To understand the functionality of Network layer
  5. To understand the functionality of transport and application layer.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
3	9	18	15	15	33	30	70	NA

- **Prerequisites:** Basics of Computer, Operating Systems

Unit No	Topics Covered	No of lectures required
<b>1</b>	<b>Introduction to Computer Network and Physical Layer</b> Introduction of computer network, uses of computer network, Network Hardware, Network Software, Reference Models, Example Networks The Theoretical Basis for Data Communication ,Guided Transmission Media, Wireless Transmission, Communication Satellites	<b>7</b>
<b>2</b>	<b>Data Link Layer</b> Design issues of data link layer, framing techniques, Error detection techniques: Parity Bit Checker (LRC, VRC), Checksum, CRC, Error Correction Technique: Hamming Code, Elementary Data Link Protocols: Simplex Stop and Wait Protocols for noisy channel, Sliding Window Protocol	<b>8</b>



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<b>3</b>	<b>The Medium Access Control Sublayer</b> Channel Allocation Problem, Multiple Access Protocols,	<b>10</b>
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**Bachelor of Computer Applications**

	Ethernet, Wireless LANs, Broadband Wireless, Bluetooth	
<b>4</b>	<b>Network Layer</b> Network Layer design issues, Routing Algorithms, Congestion Control Algorithm, Quality of Services, Internetworking	<b>10</b>
<b>5</b>	<b>Transport and Application Layer</b> The Transport Service, Elements of Transport Protocol, The Simple Transport Protocol, The Internet Transport Protocols : UDP and TCP DNS - The Domain Name System, Electronic Mail, The World Wide Web	<b>10</b>

**Course Outcomes:**

Student will be able to:

1. Understand the network hardware, network software, transmission media
2. Understand the framing techniques, error detection and correction techniques, elementary data link protocols.
3. Understand the channel allocation problem, wireless LAN, Broadband, Bluetooth technologies
4. Understand various routing algorithms
5. Understand the transport layer protocols like TCP and UDP, DNS, WWW.

**Course Outcomes–Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	H		M		L	M	M	M	M	L	L
CO2	H	M	M		L	M	M	M	M	L	M
CO3	H	M	M		L	M	M	M	M	L	M
CO4	H	M	M		L	M	M	M	M	L	M
CO5	H	M	M		L	M	M	M	M	L	M

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**Text Book :**

1. "Computer Networks", Andrew S. Tanenbaum, Prentice Hall, Fourth Edition.

**Reference Books :**

1. "Data Communications and Networking", Behrouz A. Forouzan, Tata McGraw-Hill, Fourth Edition.
2. Computer Networking, James F. Kurose and Keith W. Ross International edition, Pearson Education 2012
3. Computer Networks – V.S. Bagad and I.A. Dhotre, Technical Publications.
4. Advanced Programming in Unix Environment, W. Richard Stevens, Pearson Education Publications, Second Edition Web

**References :**

1. <https://www.javatpoint.com/computer-network-tutorial>
2. [https://www.tutorialspoint.com/data\\_communication\\_computer\\_network/index.htm](https://www.tutorialspoint.com/data_communication_computer_network/index.htm)
3. <https://www.wireshark.org/>

**AppReferences:**

1. Computer Networking Tutorial-Complete course IT
2. Computer Networking Dictionary

**Syllabus Coverage from text/referencebook & web/app reference:**

Unit#	ChapterNumbers
1	1.1,1.2,1.3.1,1.3.2,1.3.3,1.4.1,1.4.2,1.5 2.1,2.2,2.3,2.4
2	3.1 to 3.4
3	4.1 to 4.6
4	5.1 to 5.5
5	6.1 to 6.5,7.1 to 7.3

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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- **Sem.** 4
- **Subject Code** : 05BC3403
- **Subject** : R Programming
- **Course Objectives** :
  1. To understand the use of R-software and its fundamental concepts.
  2. To be able to understand R Programming Decision making, functions , control statements and data structures
  3. To be able to understand various data structures of R Programming.
  4. To be able to understand data import from files in R programming.
  5. To learn how to visualize data in form of various charts by R programming.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
2	6	12	10	10	22	30	40	30

- **Prerequisites** : Basic knowledge of programming concepts

Unit No	Topics Covered	No of lectures required
<b>1</b>	<b>Introduction to R Programming:</b> Overview of R programming, Features of R, Applications of R, Introduction and Installation of R Studio, Creation and Execution of R File in R Studio, Clear the Console and the Environment in R Studio , Basic Syntax in R Programming , R Commands, Variables and scope of variables, Data Types, Operators ,Keywords.	<b>07</b>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>2</b>	<b>R Programming Basics:</b> How to take Input from user in R, Output in R using different functions, Decision making statements, Looping statements, Break next, return statements, Switch case.	<b>07</b>
<b>3</b>	<b>Data Structure in R:</b> Understanding of various data structure like : Vectors , Lists , Data frames.	<b>06</b>
<b>4</b>	<b>Data Visualization using R :</b> <b>Reading and getting data into R (External Data):</b> Using CSV files, Excel files.	<b>05</b>
<b>5</b>	<b>Working with R Charts and Graphs:</b> Bar Charts, Line Graphs, Scatter plots, Pie Charts.	<b>05</b>

**Course Outcomes:**

1. To get knowledge about R studio installation and R programming fundamental concepts like variable, data types, commands.
2. To apply the basics in R programming in terms of loops, decisionmaking statement.
3. To apply the basics of various data structure in R programming.
4. To get knowledge about how to take data from external files in R programming.
5. To design various experiments based on graphs and charts for data visualization in R programming.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	M	H			H						
CO2	L			L	M			H	H	H	
CO3			M						M	H	H
CO4	L					H	H		H		H
CO5	M	M	M					H			

**Text Book :**

1. "R for Everyone", Jared P Lander, Pearson Education 2017, Latest Edition.
2. "Beginning R: An Introduction to Statistical Programming"-Larry Pace, Latest Edition.
3. "Big Data Fundamentals" Thomas Erl, Wajid Khattak, and Paul Buhler:: Concepts, Drivers and techniques , Pearson, Latest Edition.

**Reference Books :**

1. "Introductory Statistics with R", P Dalgaard, Second edition.
2. "Beginning R-The statistical Programming language", Mark Gardner, John wiley & sons 2012, Latest Edition.
3. "An Introduction to R" , Notes on R: A Programming Environment for Data Analysis and Graphics. W. N. Venables, D.M. Smith and the R Development Core Team. Version3.0.1 (2013-05-16).

URL: <https://cran.rproject.org/doc/manuals/r-release/R-intro.pdf>

**Web References :**

1. <https://www.geeksforgeeks.org/r-programming-language-introduction/>
2. <https://www.datamentor.io/r-programming/examples/>
3. <https://www.tutorialspoint.com/r/index.htm>

**FACULTY OF COMPUTER APPLICATIONS**

**Bachelor of Computer Applications**

4. <http://tutorials.iq.harvard.edu/R/Rstatistics/datasets>

5. <http://www.r-tutor.com/>

**App References :**

1. [https://play.google.com/store/apps/details?id=com.krazeapps.rprogrammingcompiler&hl=en\\_IN&gl=US](https://play.google.com/store/apps/details?id=com.krazeapps.rprogrammingcompiler&hl=en_IN&gl=US)

2. <https://play.google.com/store/apps/details?id=com.superdream.rprogramming&hl=en&gl=US>

**Syllabus Coverage from text / reference book & web/app reference:**

Unit #	Chapter Numbers ( take only topic mentioned in above units)
1	Book-1 Chapter 1 ,2,3 ,4
2	Book-1: Chapter 4.3-4.7,5,8,9,10
3	Book-1: Chapter 4.3-4.7,5,8,9,10
4	Book-1: Chapter 6 Book-2 :Chapter 5
5	Book 2: Chapter 4,7,10,11,13,14

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**PRACTICALS**

Unit No	List of Practical
	<p><b>Unit-1</b></p> <p>(1) Write R script for some inbuilt functions like : help(),c(),ls(),rm(),sqrt(),seq(),min(),max(),assign(),print().</p> <p>(2) Write R script for some inbuilt functions like : seq(),min(),max(),assign(),print().</p> <p>(3) Write a R program to take input from the user (name and age) and display the values. Also print the version of R installation.</p> <p>(4) Write a program to check prime number.</p> <p>(5) Write a program to create Multiplication table of given number</p> <p>(6) Write a program to use R as a calculator.</p> <p><b>Unit-2</b></p> <p>(7) Write R script to perform arithmetic operations.</p> <p>(8) Write a program to assign value to a variable in difference ways.</p> <p>(9) Write a R program to extract first 10 English letter in lower case and last 10 letters in upper case and extract letters between 22nd to 24th letters in upper case.</p> <p>(10) Write R script to create an array, passing in a vector of values and a vector of dimensions. Also provide names for each dimension.</p> <p>(11) Write R script to create a 4 × 4 matrix , 3 × 3 matrix with labels and fill the matrix by rows and 2 × 2 matrix with labels and fill the matrix by columns.</p> <p><b>Unit-3</b></p> <p>(12) Write R script to create 3 x 3 matrix to perform addition, subtraction, multiplication and division operations.</p> <p>(13) Write R script to print even numbers from 10 to 30 using all available loops in R.</p> <p>(14) Write R script to print result as given below using decision making statements: &gt;70 Distinction, &gt;60 First , &gt;40 pass &lt;40 Fail.</p> <p>(15) Write R script to create data frame "student" with the fields of stud_id, stud_name, email_id and mobile_no. Perform following operations: a. Display data of data frame b. Display summary of data frame</p>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

- c. Display structure of data frame
- d. Extract and display only stud\_name and mobile\_no from data frame

**Unit-4**

- (16) Write R script to create a Data frames which contain details of 5 employees and display the details. Create another data frame with same cols and merge it with first one.
- (17) Write R script to write Excel file
- (18) Write R script to read CSV file
- (19) Write R script to write CSV file

**Unit-5**

- (20) Write R script to create basic bar chart.
- (21) Write R script to create basic bar chart with different formatting
- (22) Write R script to create single Line graph.
- (23) Write R script to create multiple Line graph (3 different styles preferable).
- (24) Write R script to create Line graph with 3 different styles preferable.
- (25) Write R script to create basic scatter plot (3 different styles preferable).
- (26) Write R script to create scatter plot (3 different styles preferable).
- (27) Write R script to create basic pie chart.
- (28) Write R script to create pie chart(5 different styles preferable).

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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- **Sem.** 4
- **Subject Code** : 05BC3404
- **Subject** : Programming in C#.Net
- **Course Objectives** :
  1. To be familiarized with the .NET framework
  2. To be familiarized with the basics of C# Programming Language
  3. To learn how to implement array, control statements and looping statements with C#.
  4. To learn how to implement class and methods in C#.
  5. To learn how to implement OOPs concepts in C#.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
2	6	12	10	10	22	30	40	30

- **Prerequisites:** Basics of Networking and Operating System

Unit No	Topics Covered	No of lectures required
<b>1</b>	<b>The .NET framework</b> Introduction, Common Language Runtime, Common Type System, Common Language Specification, The Base Class Library, The .NET class library Intermediate language, Just-in-Time compilation, garbage collection, Application installation.	<b>6</b>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>2</b>	<b>Basics of C#:</b> History of C# C# Environment How to install C# Features of C# Variables and datatypes of C# Keywords of C# C# program structure Operators Type-Conversion in C#.	<b>6</b>
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**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>3</b>	<b>Use of Control and Looping statements:</b> Control Statement (if-else, switch case) Looping Statements(for, while, do-while, break, continue) Constants and comments in C#	<b>6</b>
<b>4</b>	<b>Methods &amp; Class:</b> Arrays Defining Methods Calling Methods Call by Value Call by Reference Class and Object Class Members this & static constructors and destructors method overloading and overriding Access Modifiers	<b>6</b>
<b>5</b>	<b>Inheritance &amp; Exception Handling:</b> Inheritance C# Base Abstract class Interface Exception Handling	<b>6</b>

**Course Outcomes: (Students will be able to)**

1. Understand the architecture of .Net framework
2. Understand basics of C# programming language
3. Understand use and implementation of control and looping statements.
4. Understand and apply methods and class in C#.
5. Understand and apply Object-Oriented Programming techniques in C#.

Course Outcomes – Program Outcomes Mapping Table :

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>
<b>CO1</b>	H		L			H	M	L
<b>CO2</b>	L	L	H			M	L	H
<b>CO3</b>	L	M	H			M	L	H
<b>CO4</b>	L	M	H			M	L	H
<b>CO5</b>	L	L	M	L	L	M	L	H

**Text Book :**

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

1. Unity from Proficiency to Mastery (C# Programming): Master C# with Unity (Volume 2), Patrick Felicia, Latest Edition
2. Shildt, "C#: The Complete Reference", TMH

**Reference Books :**

1. Jeffrey Richter, "Applied Microsoft .Net Framework Programming", (Microsoft)
2. Fergal Grimes, "Microsoft .Net for Programmers", (SPD)
3. Tony Baer, Jan D. Narkiewicz, Kent Tegels, Chandu Thota, Neil Whitlow, "Understanding the .Net Framework", (SPD)
4. Balagurusamy, "Programming with C#", TMH

**Web References :**

1. <https://www.tutorialspoint.com/csharp/index.htm>

**App References :**

1. Learn C# tutorial

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Book No.	Chapter Numbers
1	2	1
2	1	1
3	1	2
4	1	2
5	1	3

**Practical**

Unit	SR. NO.	List of Practical
<b>Unit – 1</b>	<b>1</b>	Installation of C#.net
	<b>2</b>	Understand structure of C#.net
	<b>3</b>	Explore different libraries of C#.net
<b>Unit – 2</b>	<b>1</b>	Write a program to print "Hello world"
	<b>2</b>	Write a program to input 2 number and an arithmetic operator. Display the result accordingly.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>Unit-3</b>	<b>3</b>	Write a program to input Principal Amount, Rate and Year and display Simple Interest.
	<b>4</b>	Write a program to input Principal Amount, Rate and Year and display Compound Interest
	<b>5</b>	Write a program to input radius of a circle, and print area of that circle.
	<b>6</b>	Write a program to input a number and print whether it is Even or Odd Number.
	<b>7</b>	Write a program to input age of person and display message as follows <ul style="list-style-type: none"> <li>- If age &lt; 12 print You are Kid</li> <li>- If age between 12 to 17 print You are teenager</li> <li>- If age between 18 to 60 print you are Adult</li> </ul> If age > 60 print You are Senior Citizen
	<b>8</b>	Write a program to find factorial of a given number.
	<b>9</b>	Write a program to find Fibonacci series up to a number inputted by user.
	<b>10</b>	Write a program to check weather a number inputted by user is prime or not
	<b>11</b>	Write a program to find all prime numbers between two values inputted by the user
	<b>12</b>	Write a program to Calculate sum of the number inputted by the user for e.g. if user has inputted 1234 then it's sum is 10
	<b>13</b>	Write a program to find minimum of three numbers using conditional operator
	<b>14</b>	Write a program to check weather a number is palindrome or not e.g. input: 121, output: It is palindrome input:124, output: It is not palindrome
	<b>15</b>	Write a program to check weather a string is palindrome or not e.g. input:nayan output: it is palindrome e.g. input: virat output: it is not palindrome
	<b>16</b>	Write a program to check weather a number is ArmStrong or not

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

	<b>17</b>	e.g. Input:153 output: It is Armstrong e.g. Input:100 output: It is not Armstrong
	<b>18</b>	Write a program to display maximum number from 5 numbers inputted by user by using the concept of arrays
	<b>19</b>	Write a program to display minimum number from 5 numbers inputted by user by using the concept of arrays
<b>Unit – 4</b>	<b>1</b>	Create a class "Rectangle" that would contain length and width as an instance variable, define constructors [constructor overloading (default, parameterized)]to initialize variables of objects. Define methods to find area and to display variables' value of objects which are created.
	<b>2</b>	Create a class "Vehicle" with instance variable vehicle_type. Inherit the class in a class called "Car" with instance model_type, company name etc. display the information of the vehicle by defining the show() in both super and sub class
	<b>3</b>	Create a class "Account" containing accountNo, and balance as an instance variable .Derive the Account class into two classes named "Savings" and "Current". The "Savings" class should contain instance variable named interest Rate, and the "Current" class should contain an instance variable called overdraft Limit. Define appropriate methods for all the classes to enable functionalities to check balance, deposit, and withdraw amounts in Savings and Current accounts. (Use the concept of Abstract class)
	<b>4</b>	Write a program to implement an interface called Exam with a method Pass (intmark) that returns a boolean. Write another interface called Classify with a methodDivision (int average) which returns a String. Write a class called Result which implements both Exam and Classify. The Pass method should return true if the mark is greater than or equal to 50 else false. The Division method must return "First" when the parameter average is 60 or more, "Second" when average is50 or more but below 60, "No division" when average is less than 50
<b>Unit – 5</b>	<b>1</b>	Write a program to demonstrate use of inheritance.
	<b>2</b>	Write a program to illustrate the use of abstract class.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>Unit-5</b>	<b>3</b>	Describe an abstract class called Shape which has three subclasses say Triangle, Rectangle, and Circle. Define one method area () in the abstract class and override this area () in these three subclasses to calculate for specific objects i.e., area () of Triangle subclass should calculate area of triangle etc. Same for Rectangle and Circle
	<b>4</b>	Write a program to illustrate the use of static constructor.
	<b>5</b>	Write a program to demonstrate the use of try and catch in C#
	<b>6</b>	Write a program to demonstrate the use of try, catch and finally in C#

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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- **Semester** : 4
- **Subject Code** : 05CR0401
- **Subject Name** : Life Skills 2

**Course Objectives**

This course equips you with essential life skills: mental toughness for challenges, a growth mindset for continuous learning, and mastery of focus, communication, teamwork, finances, and more. Navigate social media, build strong networks, and adapt to change with resilience. Thrive in every aspect of life!

<b>Unit No</b>	<b>Topics Covered</b>	<b>No of lectures required</b>
<b>1</b>	<p><b>Significance of Mental Toughness and Assess Mental toughness with Mental toughness assessment tool</b></p> <ul style="list-style-type: none"> <li>- Concept of mental toughness.</li> <li>- Overview of mental toughness in personal and academic contexts.</li> <li>- Detailed explanation of the components and structure of Mental toughness assessment tool.</li> <li>- Assess Mental toughness of students with Mental Toughness assessment tool.</li> </ul>	<b>5</b>
<b>2</b>	<p><b>Significance of Mindset</b></p> <ul style="list-style-type: none"> <li>- Overview of Mindset</li> <li>- Growth VS Fixed Mindset</li> <li>- Abundance VS Scarcity Mindset</li> <li>- Open VS Closed Mindset</li> <li>- Positive VS Negative Mindset</li> <li>- Gratitude Mindset</li> </ul>	<b>4</b>
<b>3</b>	<p><b>Developing Self-Confidence and Self-Esteem</b></p> <ul style="list-style-type: none"> <li>- Building self-confidence.</li> <li>- Recognizing and overcoming self-esteem issues.</li> <li>- Develop Positive self-talk.</li> </ul>	<b>3</b>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>4</b>	<b>Developing and Maintaining Focus</b> <ul style="list-style-type: none"> <li>- Csikszentmihalyi's research on flow</li> <li>- Develop Focus in Academic Learning</li> <li>- Relation between Neuroplasticity and Focus</li> </ul>	<b>3</b>
<b>5</b>	<b>Overcoming Challenges</b> <ul style="list-style-type: none"> <li>- Facing and Welcoming challenges makes you stronger</li> <li>- WOOP Method</li> <li>- Empower limiting beliefs</li> </ul>	<b>2</b>
<b>6</b>	<b>Effective Communication Skills</b> <ul style="list-style-type: none"> <li>- Active listening</li> <li>- Assertive communication</li> <li>- Conflict resolution</li> </ul>	<b>2</b>
<b>7</b>	<b>Team Management and Leadership Skills</b> <ul style="list-style-type: none"> <li>- Leadership styles and their impact</li> <li>- Decision-Making and Problem-Solving</li> <li>- Motivating and Inspiring Teams</li> <li>- Adaptability and Change Management</li> <li>- Ethical Leadership</li> <li>- Building Trust and Cohesion among team members</li> <li>- Celebrating Diversity in Teams</li> <li>- Collaborative Problem-Solving</li> <li>- Team Building activities</li> </ul>	<b>6</b>
<b>8</b>	<b>Developing Social Media Etiquette</b> <ul style="list-style-type: none"> <li>- Leveraging social media for professional growth</li> <li>- Building an online professional presence</li> <li>- Navigating the challenges of social media</li> </ul>	<b>2</b>
<b>9</b>	<b>Financial Literacy</b> <ul style="list-style-type: none"> <li>- Budgeting and financial planning.</li> <li>- Saving and investing.</li> <li>- Managing debt.</li> </ul>	<b>2</b>
<b>10</b>	<b>Networking and Relationship Building</b> <ul style="list-style-type: none"> <li>- Importance of networking in personal and professional life.</li> <li>- Building a professional network.</li> <li>- Networking etiquette.</li> </ul>	<b>3</b>
<b>11</b>	<b>Adaptability and Resilience</b> <ul style="list-style-type: none"> <li>- Adapting and coping with change.</li> <li>- Building resilience in the face of challenges.</li> <li>- Learning from setbacks.</li> </ul>	<b>2</b>
<b>12</b>	<b>Resume Building</b> <ul style="list-style-type: none"> <li>- Overview of Resume format</li> <li>- Understanding the key sections of Resume</li> </ul>	<b>3</b>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>13</b>	<b>Group Discussion</b> - Overview of Resume format	<b>3</b>
<b>14</b>	<b>Interview Skills</b>	<b>3</b>
<b>15</b>	<b>Habits of Highly Effective People</b>	<b>2</b>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**Course Outcomes:**

1. Develop interpersonal Relationship Skills
2. Build resilience and Stress Management Skills
3. Develop leadership and team collaboration Competence
4. Enhance financial literacy and responsibility
5. Develop effective Communication Competence

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
3	9	18	15	15	33	30	70	NA

Course Outcomes – Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1		L			M			
CO2		L		L	L			
CO3		M			M			
CO4								
CO5		L		M	M			

**Reference Books:**

- Mental Toughness in Academics: "Grit: The Power of Passion and Perseverance" by Angela Duckworth (Combines research and practical tips to cultivate resilience and achieve academic goals)
- Mindset: "Mindset: The New Psychology of Success" by Carol Dweck (Explores the power of fixed vs. growth mindsets and how to shift for personal growth)
- Self-Confidence and Self-Esteem: "The Six Pillars of Self-Esteem" by Nathaniel Branden (Offers a foundational framework for building lasting self-esteem and self-worth)
- Maintaining Focus: "Deep Work: Rules for Focused Success in a Distracted World" by Cal Newport (Provides actionable strategies for minimizing distractions and maximizing your productivity)

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### **Bachelor of Computer Applications**

- Overcoming Challenges: "Man's Search for Meaning" by Viktor Frankl (A powerful testament to resilience and finding purpose in the face of adversity)
- Effective Communication: "Nonviolent Communication: A Language of Life" by Marshall B. Rosenberg (Promotes empathy and understanding through clear, respectful communication)

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### **Bachelor of Computer Applications**

- Team Management and Leadership Skills: "The Leadership Pipeline: Five Essential Stages of Leadership Development" by Ram Charan, Noel Tichy, and Stephen Drotter (Offers a clear roadmap for developing your leadership skills and capabilities)
- Social Media Etiquette: "Netiquette: The Etiquette of the Net" by Virginia Shea (A timeless guide to online etiquette and respectful communication in the digital age)
- Financial Literacy: "I Will Teach You to Be Rich" by Ramit Sethi (Actionable steps for budgeting, investing, and achieving financial security)
- Networking and Relationship Building: "Never Eat Alone: And Other Secrets to Success in Business and Life" by Keith Ferrazzi (Practical strategies for building and nurturing connections that benefit your career and personal life)
- Adaptability and Resilience: "Daring Greatly: How Courage Makes Us Vulnerable, Dare to Lead, and Give Wholeheartedly" by Brené Brown (Connects vulnerability and courage to building resilience and thriving in ever-changing environments)

#### **Web References :**

##### Mental Toughness in Academics:

- The Greater Good Science Center - Grit: The Power of Passion and Perseverance: <https://ggia.berkeley.edu/> (Provides research-backed strategies for developing grit)

##### Mindset:

- Khan Academy - Mindset Matters: <https://www.khanacademy.org/college-careers-more/learnstorm-growth-mindset-activities-us> (Interactive lessons and resources on fixed vs. growth mindsets)

##### Self-Confidence and Self-Esteem:

- Psychology Today - 10 Tips to Boost Your Self-Esteem: <https://www.psychologytoday.com/intl/blog/social-instincts/202301/5-healthy-habits-to-improve-your-self-esteem> (Practical tips and exercises for building self-confidence)

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#### Maintaining Focus:

- TED Talk - Cal Newport: Deep Work: <https://www.youtube.com/watch?v=3E7hkPZ-HTk> (Inspiring talk on the importance of deep focus and avoiding distractions)

#### Overcoming Challenges:

- Headspace - 3 Ways to Build Resilience: <https://www.headspace.com/articles/how-to-relieve-stress> (Mindfulness practices for overcoming challenges and cultivating mental strength)

#### Effective Communication:

- Toastmasters International - Effective Communication Tips: <https://www.toastmasters.org/magazine/magazine-issues/2022/june/communication-style> (Resources and guidance on improving communication skills in various settings)

#### Team Management and Leadership Skills:

- Harvard Business Review - 10 Must-Have Skills for Effective Leadership: <https://hbr.org/2018/10/the-6-fundamental-skills-every-leader-should-practice> (Insights and frameworks for developing strong leadership skills)

#### Social Media Etiquette:

- Netiquette - The Emily Post Institute: <https://emilypost.com/> (Classic guide to online etiquette and respectful communication)

#### Financial Literacy:

- Mint.com - Financial Resources and Tools: <https://mint.intuit.com/> (Free platform for budgeting, tracking spending, and achieving financial goals)

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Networking and Relationship Building:

- LinkedIn Learning - Building and Maintaining Relationships: <https://www.linkedin.com/business/sales/blog/strategy/5-best-practices-for-building-relationships-on-linkedin> (Online course with actionable strategies for networking and building strong connections)

Adaptability and Resilience:

- The American Psychological Association - Building Resilience: <https://uncw.edu/studentaffairs/committees/pdc/documents/the%20road%20to%20resilience.pdf> (Tips and resources for adaptivity and resilience in the face of change and challenges)

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- **Sem.** 4
- **Subject Code** : 05BC3405
- **Subject** : Python Programming
- **Course Objectives** :
  1. To be familiarized with the basics of Python Programming
  2. To understand Functions and modules in python
  3. To implement the concepts of File Handling in Python
  4. To learn the concepts of Object-Oriented Programming in Python
  5. To be able to visualize the data in Python.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
2	6	12	10	10	22	30	40	30

- **Prerequisites:** OOP concepts, Basic understanding of any Programming Language

Unit No	Topics Covered	No of lectures required
<b>1</b>	<b>Basics of Python:</b> <ul style="list-style-type: none"> <li>• Features of Python</li> <li>• Installing Python</li> <li>• What is IDLE and its basics</li> <li>• Python Built-in Data Types (Numbers, Lists, Tuples, Strings, Dictionaries, Sets, File Objects, etc.)</li> <li>• Indentation and Block Structuring</li> <li>• Comments</li> <li>• Variables and assignments</li> <li>• Getting input from user</li> <li>• Built-in Operators</li> <li>• Control Flow (if-else-if, while, for loop, statement blocks, writing simple programs using all above)</li> <li>• List, Tuples, Dictionary, Strings in Python</li> </ul>	<b>8</b>

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<b>2</b>	<b>Functions &amp; Modules:</b> <ul style="list-style-type: none"> <li>• Function basics, positional parameters, passing arguments by parameter name, variable length arguments</li> <li>• Local, nonlocal and global variables</li> <li>• Assigning functions to variables</li> <li>• Lambda expressions / Lambda Functions</li> <li>• Basics of modules</li> <li>• Import statement (different ways of importing module)</li> <li>• Library and third-party modules</li> </ul>	<b>5</b>
<b>3</b>	<b>File handling:</b> <ul style="list-style-type: none"> <li>• Introduction to Files</li> <li>• Type of Files</li> <li>• Path and path names, absolute and relative path</li> <li>• Manipulating path names</li> <li>• Useful constants and functions</li> <li>• Import files</li> </ul>	<b>7</b>
<b>4</b>	<b>Classes and Object-oriented Programming:</b> <ul style="list-style-type: none"> <li>• Basics of Object-Oriented Programming with features</li> <li>• Defining class</li> <li>• Instance variables, methods</li> <li>• Class variables, methods</li> <li>• Static methods and class methods</li> </ul>	<b>6</b>
<b>5</b>	<b>Visualization</b> <ul style="list-style-type: none"> <li>• Line Plot,</li> <li>• Bar Plot,</li> <li>• Pie Chart,</li> <li>• Box plot,</li> <li>• Scatter Plot</li> </ul>	<b>5</b>

**Course Outcomes:**

1. Describe basics of Python Programming
2. Design a Python Program using Functions & Modules
3. Develop understanding of File Handling in Python
4. Build their ability to develop Python Programs using Object-Oriented concepts
5. Visualization of various graphs to get insight of the data.

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Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H							
CO2	H	M					M	
CO3	L	M		M			H	
CO4		H	H			M	H	M
CO5							L	H

**Text Book** :

- 1. Core Python Programming, Wesley J. Chun, Prentice Hall. Second Edition**
- 2. R Nageswara Rao, Core Python Programming, Dreamtech Press, Second Edition**

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**Reference Books :**

- 1. Python Programming for Absolute Beginners, Michael Dawson, Premier Press, First Edition**
- 2. Head First Python, Paul Berry, O'REILLY , First Edition**
- 3. The Quick Python Book, Vernon L. Ceder, Manning, First Edition**

**Web References :**

- 1. <https://docs.python.org/3/tutorial/>**
- 2. <https://www.tutorialspoint.com/python/index.htm>**

**App References :**

- 1. Learn Python Programming Tutorial**
- 2. Learn Python**

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Text Book 1 - 1,2,3,4,5,6,7,8
2	Text Book 1 - 9,10
3	Text Book 1 - 12,13,14
4	Text Book 1 - 15
5	Text Book 2 - 18

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**PRACTICALS**

No	List of Practicals
<b>Unit-1</b>	
1	Write a simple Python Program to INPUT two variables and print Addition, Subtraction, Multiplication and Division of both numbers.
2	Write a program to input 2 number and an arithmetic operator. Display the result accordingly.
3	Write a program to input Principal Amount, Rate and Year and display Simple Interest.
4	Write a program to input Principal Amount, Rate and Year and display Compound Interest
5	Write a program to input radius of a circle, and print area of that circle.
<b>Unit-2</b>	
6	Write a program to input a number and print whether it is Even or Odd Number.
7	<p>Write a program to input age of person and display message as follows</p> <ul style="list-style-type: none"> <li>- If age &lt; 12 print You are Kid</li> <li>- If age between 12 to 17 print You are teenager</li> <li>- If age between 18 to 60 print you are Adult</li> </ul> <p>If age &gt; 60 print You are Senior Citizen</p>
8	Write a Python Program to input marks of 4 subjects and display Total, Percentage, Result and Grade. If student is fail (<40) in any subject then Result should be displayed as "FAIL" and Grade should be displayed as "With Held**"

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<b>9</b>	Write a program to input a number and display Table of that number.
<b>10</b>	Write a program to print all numbers which are divisible by 7 between 1 to 200.
<b>Unit-3</b>	
<b>11</b>	Write a program to input a number and display Factorial of that number. For example, Factorial of 5 = $5 * 4 * 3 * 2 * 1 = 120$ .
<b>12</b>	Write a program to input a number and display whether number is prime or not.
<b>13</b>	Write a program which will find all such numbers which are divisible by 7 but are not a multiple of 5, between 2000 and 3200 (both included).
<b>14</b>	Write a program to print all prime numbers between 1 to 100.
<b>15</b>	Write a program to print factorial number using function
<b>Unit-4</b>	
<b>16</b>	Write a program to create list in such a way that it should add square roots of number between 1 to n in the list... At the end, the list shall be displayed.  Example : [1, 4, 9, 16, 25, ]
<b>17</b>	Write a program to create dictionary in such a way that it should add number as a key and square root of number as a value between 1 to n in the dictionary... At the end, the data shall be displayed.  Example : {1:1, 2:4, 3:9, 4:16, 5:25, ...}
<b>18</b>	Write a program which accepts a sequence of comma-separated numbers from console and generate a list and a tuple which contains every number.

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<b>19</b>	Write a Python Program to create a function which accepts 3 arguments. (2 numbers and one arithmetic operator). Display answer accordingly
<b>20</b>	Write a program to read names from keyboard and store into text file
<b>21</b>	Write a program to read any text file line by line
<b>22</b>	Write a program to read text file having number and display all numbers with total and average at the last. (Manually prepare a file having some numbers and then read it)
<b>23</b>	<p>Write a program to compute the frequency of the words from the input. The output should output after sorting the key alphanumerically.</p> <p>Suppose the following input is supplied to the program: "Hello There this is Python. Python is good"</p> <p>Then output shall be as follows :</p> <p>Hello : 1 There : 1 This : 1 is : 2 Python : 2 Good : 1</p>
<b>24</b>	Write a Python Program that creates a class with function overloading
<b>25</b>	Demo for import module in python
<b>Unit-5</b>	
<b>26</b>	Python program of Barplot with all parameters of a sample data
<b>27</b>	Python program of Pie-chart with all parameters of a sample data.
<b>28</b>	Python program of Line plot with all parameters of a sample data.
<b>29</b>	Python program of Box Plot with all parameters of a sample data.

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<b>30</b>	Python program of Scatter Plot with all parameters of a sample data.
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## **Bachelor of Computer Applications**

### **BCA Sem - 5**

## **Teaching Scheme**

# **&**

## **Syllabus**



## FACULTY OF COMPUTER APPLICATIONS

### Bachelor of Computer Applications

### BCA Semester-5

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05BC2501	Management Information System	4	12	24	20	20	44	30	70	NA
05BC2502	Software Testing	5	15	30	25	25	55	30	40	30
05BC2504	Web Application Development-1 (PHP)	6	18	36	30	30	66	30	40	30
-	Elective - 1: 1. 05BC2503 - Data Analytics using R 2. 05BC2505 - Computer Graphics 3. 05BC0508 - C# .NET	5	15	30	25	25	55	30	40	30
05BC0509	Mini Project - 4 (Python)	2	6	12	10	10	22	NA	NA	100
<b>Total</b>		<b>22</b>	<b>66</b>	<b>132</b>	<b>110</b>	<b>110</b>	<b>242</b>	<b>120</b>	<b>190</b>	<b>190</b>

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**Bachelor of Computer Applications**

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- **Sem.** : 5
- **Subject Code** : 05BC2501
- **Subject** : Management Information System
- **Course Objectives:**
  1. To give knowledge about organizational structure, management and information systems
  2. Explaining importance of ethics, and concepts of DBMS
  3. Explaining concepts of KM and Decision making in organization with the use of DSS and KMS
  4. Giving knowledge about various applications at enterprise level and understanding concept of business intelligence in the organization
  5. Imparting knowledge about how to secure enterprise information systems

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	70	NA

- **Prerequisites** : Basic knowledge of information systems and development

Unit No	Topics Covered
<b>1</b>	<b>Organizations, Management and Role of Information systems</b> The Role of Information Systems in Business, Perspectives on Information Systems, Hands-on MIS projects, Business Processes and Information Systems, Types of Information Systems, The Information Systems Function in Business, Organizations and Information Systems, How Information Systems Impact Organizations and Business Firms, Using Information Systems to Achieve Competitive Advantage, The Business Value Chain Model

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<b>2</b>	<p><b>Ethical and Social Issues in Information Systems &amp; DBMS</b></p> <p>Understanding Ethical and Social Issues Related to Systems, The moral Dimensions of Information Systems, Property rights: intellectual property, quality of life: equity, access, and boundaries</p> <p>The Database Approach to Data Management, The Challenge of Big Data, Business Intelligence Infrastructure</p> <p>Analytical Tools: Relationships, Patterns, Trends, Data warehouses, Multidimensional Data Analysis and Data Mining, Managing Data Resources, Establishing an Information Policy, Ensuring Data Quality</p>
<b>3</b>	<p><b>Knowledge management and Decision Making Process</b></p> <p>Knowledge and knowledge Management System, Knowledge Management, Driving forces behind knowledge management, Key aspects of KM , Designing for business benefits from KM, Business Intelligence, Decision support system, Group decision support system, Artificial Intelligence, Knowledge Based Expert System, Benefits of DSS,DSS Applications in E-enterprise</p>
<b>4</b>	<p><b>Enterprise applications and Business Intelligence</b></p> <p>Enterprise systems, Supply chain management systems, Customer relationship management systems, Enterprise Applications, E-commerce: Business and Technology</p> <p>What is Business Intelligence, Why is BI developed, How is BI used</p>
<b>5</b>	<p><b>Securing Information Systems</b></p> <p>Business value of Security and Control, System Vulnerability and Abuse, Malicious Software: virus, worms, Trojan horses, and spyware ,hackers and computer crime, software vulnerability</p> <p>Establishing a Framework for Security and Control , Information Systems Controls , Risk Assessment , Security Policy , Disaster Recovery Planning and Business Continuity Planning , The Role of Auditing, Technologies and Tools for Protecting Information Resources , Identity Management and Authentication , Firewalls, Intrusion Detection Systems, and Antivirus Software , Securing Wireless Networks , Ensuring , System Availability , Security Issues for Cloud Computing and the Mobile Digital Platform, Ensuring Software Quality</p>

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**Course Outcomes:**

1. Students will be able to understand the term organizations, management and role of information systems
2. Students will be able to understand the concept of Ethical and Social Issues in Information Systems & apply DBMS
3. Students will be able to understand Knowledge management and apply Decision Making Process.
4. Students will understand Enterprise applications and concepts of Business Intelligence (BI)
5. Students will be able to understand about how to secure Information Systems

**Course Outcomes – Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	H						L	L	L		
CO2	L	L					L	L	H	L	L
CO3	H	M	M	L	M	M	L	M		M	
CO4	H	L	L	L	M	M	L	M			
CO5		L			L	L	L	L	L		M

**Text Book :**

1. Kenneth Loudon, Jane Loudon, "Management Information System – Managing the Digital Firm", 13th Edition, Pearson Education, 2014
2. Waman S. Jawadekar, "Management Information Systems – Text & Cases", 5th Edition, Tata McGraw Hill Publication

**Reference Books :**

1. James O'Brien, George Marakas, " Management Information System", 10th Edition, McGraw Hill Irwin
2. Stephen Haag, Maeve Cummings, Amy Philips, "Management Information Systems – For the Information Age", 6th Edition, McGraw-Hill Publication
3. Sanjay Mohapatra, "Cases in Management Information Systems", PHI Publication
4. Robert G. Murdick, Joel E. Ross, James R. Claggett, "Information Systems for Modern Management", 3rd Edition, PHI Publication

**Syllabus Coverage from Text book & web/app reference:**

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

<b>Unit No</b>	<b>Chapter Numbers</b>
Unit – 1	Book-1: Chapter - 1(1.1 , 1.2) ,2(2.1 ,2.2, 2.4) , 3
Unit – 2	Book-1:: Chapter - 4(4.3) , 6(6.3 ,6.4)
Unit – 3	Book-2 : Chapter - 7 (7.8,7.9),14(14.1,14.3,14.4,14.5,14.6)
Unit – 4	Book-1: Chapter - 9(9.1,9.2 ,9.3), 10(10.2) Book-2: Chapter - 11(11.2,11.4,11.5)
Unit – 5	Book-1: Chapter – 8(8.1,8.3,8.4)

**Case Study:**

Information system based case study (Dell, Reliance)

Big data based case study (Netflix, Uber)

Knowledge management case study (Infosys Technologies)

Decision support system based case study

Supply chain system based case study (Amazon, Zara clothing company)

Information security (Mahindra and Mahindra Financial Services Ltd)

Sr. No.	Case Study	Title of Case Study	Unit Relevance	Reference

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- **Sem.** : 5
- **Subject Code** : 05BC2502
- **Subject** : Software Testing
- **Course Objectives** :
  1. Understand the basic view of software quality and quality factors.
  2. Understand the Software Quality Assurance (SQA) architecture and the details of its components.
  3. Understand of how the SQA components can be integrated into the project life cycle..
  4. Understand the fundamentals of testing.
  5. Understand the concepts of Unit testing and equivalence class testing.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisites** : Software Engineering Basics

Unit No	Topics Covered

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor Of Computer Applications**  
**B.C.A.**

<b>1</b>	<p><b>Introduction to Software Quality</b> Introduction, Constraints of Software Product Quality Assessment, Customer is a King, Quality and Productivity Relationship, Requirements of a Product, Organization Culture, Characteristics of Software, Software Development Process, Types of Products, Schemes of Criticality Definitions, Problematic Areas of Software Development Life Cycle, Software Quality Management, Why Software Has Defects? Processes Related to Software Quality, Quality Management System Structure, Pillars of Quality Management System, Important Aspects of Quality Management.</p>
<b>2</b>	<p><b>Components of SQA</b> The components of the software quality assurance system – overview <b>Pre-project Software Quality Components</b> Contract review, Development and quality plans</p>
<b>3</b>	<p><b>SQA Components in the Project Life Cycle and Strategies</b> Integrating quality activities in the project life cycle, Reviews, Software testing – strategies</p>
<b>4</b>	<p><b>Fundamentals of testing:</b> Introduction, Necessity of testing, What is testing? Fundamental test process, The psychology of testing, Historical Perspective of Testing, Definitions of Testing, Approaches to Testing, Testing During Development Life Cycle, Requirement Traceability Matrix, Essentials of Software Testing, Principles of Software Testing, Salient Features of Good Testing, Test Policy, Test Strategy or Test Approach, Test Planning, Testing Process and Number of Defects Found in Testing, Test Team Efficiency, Mutation Testing, Challenges in Testing, Test Team Approach, Process Problems Faced by Testing, Cost Aspect of Testing</p>
<b>5</b>	<p><b>Unit Testing: Boundary Value Testing:</b> Normal Boundary Value Testing, Robust Boundary Value Testing, Worst-Case Boundary Value Testing, Special Value Testing, Examples, Random Testing, Guidelines for Boundary Value Testing <b>Equivalence Class Testing:</b> Equivalence Classes, Traditional Equivalence Class Testing, Improved Equivalence Class Testing, Edge Testing, Guidelines and Observations</p>

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**Bachelor Of Computer Applications**  
**B.C.A.**

**Course Outcomes: (Students will be able to)**

1. Understand basics of Software Quality.
2. Analyze the components of Software Quality Assurance.
3. Implement Software Quality components in project life cycle.
4. Understand the fundamentals concepts of testing.
5. Understand the concepts of Unit testing and Equivalence class testing.

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	H			H		M					H
CO2	H			M				L		L	L
CO3		H		M		M					L
CO4	H			M	L				L	M	
CO5		H		H		L			H	M	

**Text Book :**

- 1) Daniel Galin, “Software Quality Assurance”, Pearson Publication, 2009.
- 2) Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black, “Foundations of Software Testing”, Cengage Learning 3

**Reference Books :**

- 1) KshirsagarNaik and PriyadarshiTripathy, Software Testing & Quality AssuranceTheory and Practice, Wiley Student edition
- 2) William E. Perry, Effective Methods for Software Testing, WILLEY, . 3rd Edition
- 3) Alan C. Gillies, “Software Quality: Theory and Management”, International Thomson Computer Press, 1997.
- 4) M G Limaye, Software Testing, Tata McGraw-Hill Education, 2009

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**Bachelor Of Computer Applications**  
**B.C.A.**

**Web References :**

[www.softwaretestinghelp.com](http://www.softwaretestinghelp.com)

[www.softwareqatest.com](http://www.softwareqatest.com)

**App References :**

- 1. Simplilearn**
- 2. GeeksforGeeks**

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Book-1 - 1,2,3,26
2	Book-1 - 4,5,6
3	Book-1 - 7,8,9
4	Book-2 - 1
5	Book-2 - 4

**Practicals**

Sr. No	Command Category
part-1	<p><b>TASK-1</b></p> <p>In Airline reservation system, the following features need to be tested namely,</p> <ol style="list-style-type: none"> <li>a. Login</li> <li>b. Search and book flights</li> <li>c. Search and book packages</li> <li>d. Register Feature not in scope,</li> <li>e. Search and book hotels</li> </ol> <p>-Prepare the Test Plan for the above with all the possible criteria need to be considered.</p> <p>- Prepare the Test Cases for the features in scope to be tested.(At</p>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor Of Computer Applications**  
**B.C.A.**

least one for each above mentioned feature)  
- Prepare the Defect Report.

**TASK-2**

Consider a School Management System, which allows Parent to download Children's Progress Report and Results from School's website So How can we authenticate the User (parent)?  
& it has dual Authentication system integrated on LogIn page.

**TASK-3**

Notepad "Save As" Functionality What are the different scenarios that can be identified for testing a simple notepad save as functionality? The Save as does navigate to the file name and file path. Given these two fields what are the various scenario that can be applied for testing?

-Prepare test cases of above tasks.  
Suggested Template for Test case creation.

Sr#	Test condition / Steps	Input	Expected Result	Actual Result	Pass/Fail

**PART-2**

**TASK-1**

Write script and perform Following list of activities / test scenarios using offline and online web application ( Permissible)

- 1 Open URL in different browsers (Chrome, Firefox, IE)
- 2 Perform mouse hovers and other events
- 3 To take snapshots.
- 4 Getting current time-stamp
- 5 To Handle a drop-down.
- 6 Handling 2 3 steps at a time like Website Registration+login+logout at a time in single run.
- 7 To Upload File.

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**Bachelor Of Computer Applications**  
**B.C.A.**

	<p>8 Storing and fetching data from excel (E.g Registration data)</p> <p>9 Radio button selection.</p> <p>10 Checkbox Selection</p> <p>11 Selection</p> <p>12 Absolute/Relative XPath</p> <p>13 Basic Selenium framework (Advance).</p> <p>14 Generate Reports (Advance)</p> <p>15 Logging (Advance).</p> <p>16 Handling multiple browser tabs.</p> <p>17 Handling multiple div./frames of page. (Advance)</p> <p>18 Handling browser's parent and child window.(Advance)</p> <p>19 verifies an expected page title, UI Element, Text and Table content</p> <p>20 Handling mouse over menu/sub-menu.</p> <p>21 To Provide meaningful messages in assertions!</p> <p>22 Test Login of any web application</p> <p>23 Test Shopping cart</p> <p>24 Test using excel file data as input</p> <p>25 Generate test report</p>
<p><b>Part-3</b></p>	<p><b>TASK -1</b></p> <p>Software Testing (Automated)</p> <p>– script creation and execution</p> <p>Tools: Selenium</p> <p><b>Concepts</b></p> <p>1 Introduction to Selenium , Installation and Setup</p> <p>2 Selenium WebDriver Commands</p> <ul style="list-style-type: none"> <li>• Browser Commands</li> <li>• Navigation Commands</li> <li>• WebElement Commands</li> <li>• FindElement and FindElements Command</li> <li>• CheckBox &amp; Radio Button Operations</li> <li>• DropDown &amp; Multiple Select Operations</li> <li>• Handle Dynamic WebTables in Selenium Webdriver</li> </ul> <p>3 Navigate back/forwards, get, refresh</p> <ol style="list-style-type: none"> <li>1. loading a page in current window / New window</li> <li>2. Move back and forward</li> <li>3. Refresh Page             <ol style="list-style-type: none"> <li>1. Interrogation:</li> <li>2. get window title</li> <li>3. current url</li> <li>4. Page source</li> </ol> </li> </ol>



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**Bachelor Of Computer Applications**  
**B.C.A.**

Requirement of Laboratory Support :

Students need to install "Selenium" using  
<https://www.selenium.dev/downloads/>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications (B.C.A.)**

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**Sem.** : 5

**Subject Code** : 05BC2504

**Subject** : Web Application Development - 1 (PHP)

**Course Objectives** :

1. To be able to develop web application using open source technologies.
2. To learn scripting language with conditional and iterative statements.
3. To learn design forms to take user input with validations in PHP.
4. To learn MySQL database deployment for web application.
5. To learn JQuery and AJAX for more interactive web pages.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
6	18	36	30	30	66	30	40	30

**Prerequisites:** Knowledge of Web, HTML, JavaScript, CSS and Database.

Unit No	Topics Covered
<b>1</b>	<p><b>PHP Configuration with Flow and Building Blocks</b></p> <p><b>PHP Installation and Configuration:</b> Current version of PHP &amp; MySQL, Apache Log file, PHP.INI file, XAMPP installation and basics of PHP scripts.</p> <p><b>PHP Overview Flow control and building blocks:</b> Variables, Data types, Operators and expressions, Constants, Switching flow, Loops, Code blocks and browser Output. Comments, Include &amp; require function</p>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications (B.C.A.)**

<b>2</b>	<p><b>Working with Functions, Arrays:</b> What is a function, Calling function, Defining a function, Returning values from User-defined functions, Variable scope, arguments, Testing for the existence of a function, What are Arrays, Creating arrays, Some array related functions.</p> <p><b>Working with Strings, Date and Time:</b> Formatting Strings with PHP, Investigating Strings in PHP, Manipulating Strings with PHP, Using Date and Time functions in PHP, Other String, Date and Time Functions.</p>
<b>3</b>	<p><b>Working with Forms, Cookies and User Sessions:</b> Creating a Simple Input Form, Accessing Form Input with User-Defined Arrays, Combining HTML and PHP Code on a Single Page, Using Hidden Fields to Save State, Redirecting the User, Working with File Uploads.</p> <p>Introducing Cookies, Setting a Cookie with PHP, Deleting a Cookie with PHP Session Function(s) Overview, Starting a Session, Working with Session Variables, Passing Session IDs in the Query String, Destroying Sessions and Un-setting Variables, Using Sessions in an Environment with Registered Users.</p>
<b>4</b>	<p><b>Interacting with MySQL</b> Learning the MySQL Data Types, Frequently used String functions in MySQL, Using Date and Time functions in MySQL, Interacting with MySQL using PHP, MySQL Versus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data, PHPMyAdmin interface.</p>
<b>5</b>	<p><b>AJAX and JQUERY</b></p> <p><b>AJAX:</b> Exploring AJAX, AJAX Web Application Model, How AJAX works? Creating a simple AJAX Application. Exploring interactions between AJAX and PHP, Validating Fields using AJAX and PHP, retrieving data from a Database using PHP and AJAX</p> <p><b>JQUERY:</b> Exploring Fundamentals of JQUERY, Loading and using JQUERY, Describing call back functions, Exploring JQUERY Selectors, Methods, Manipulators, events and effects, Exploring JQuery and AJAX</p>

**Course Outcomes:**

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications (B.C.A.)**

1. Students will be accomplished to learn develop web application using open source technologies.
2. Students will be able to understand the concept of conditional and iterative statements.
3. Students will be efficient to design forms to take user input with validations in PHP.
4. Students will competent PHP scripting language and deploying application on web Server.
5. Students will be capable to integrate JQuery and AJAX for interactive web pages in PHP.

**Course Outcomes – Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	L	M	H	L							M
CO2					H	H		H	M		
CO3			M			H				M	
CO4	M				L		H				H
CO5				H				L	H	M	

**Text Book:**

1. Julie C Meloni, "Sams Teach Yourself PHP, MySQL and Apache All in One" 4<sup>th</sup> edition, Pearson Education.
2. HTML5 Black Book: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and Jquery, 2ed, by Kogent Learning Solutions Inc.

**Reference Books:**

1. James Lee and Brent Ware, "Open source web development with LAMP" , Pearson Education
2. Jason Gerner, Morgan Owens, Elizabeth Naramore, Matt Warden, "Professional LAMP: Linux, Apache, MySQL and PHP5 Web Development" WROX publication
3. PHP6 and MySQL Bible –Steve Suehring, Tim Converse and Joyce Park – Wiley India Edition.
4. PHP and MySQL Web Development – Luke Welling, Laura Thomson – Pearson
5. Beginning Ajax with PHP From Novice to Professional, By Lee BabinApress
6. Head First AJAX by Rebecca Riordan , O'Reilly Media
7. Head First PHP& MySQL by Lynn Beighley, Michael Morrison, O'Reilly Media
8. Head First jQuery by Ryan Benedetti and Ronan Cranley, O'Reilly Media

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications (B.C.A.)**

9. Learning jQuery By Jonathon chaffer and Karl Swedberg, O'Reilly Media

**Web References:**

1. <http://www.codecademy.com/learn>
2. <https://www.udemy.com/learn-html5-programming-from-scratch/>
3. <http://www.w3schools.com>
4. <http://www.tutorialspoint.com/ajax/>
5. <http://www.tutorialspoint.com/jquery/>
6. <http://www.tutorialspoint.com/php>

**App References:**

1. Udemy
2. Tutorialspoint
3. SoloLearn

**Syllabus Coverage from text /reference book & web/app reference:**

Book#	Unit	Topics
1	1	Chapter 2 ( Page 21 to 32), 3, 4
	2	Chapter 5,6
	3	Chapter 7,8,9,10
	4	Chapter 11, 16,17,18
	5	Chapter 12,13,14
2	6	Chapter 33 ( Page 916 to 932), Chapter 37 ( Page 1043 to 1068)
	6	Chapter 39

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications (B.C.A.)**

<b>PRAC TICAL SUnit No</b>	<b>List of Practical</b>
<b>1</b>	1.1 Write a PHP program for print Previous semester Result using variables & constants in PHP. 1.2 Write a PHP program to find out maximum and minimum number 1.3 Write a PHP program for operators in PHP. 1.4. Write a PHP program to print current month using if..else& switch case. 1.5 Write a PHP program to print 5 to 10 using For and ForEach. 1.6 Write a PHP program to print 15 to 20 using While and Do While. 1.7 Write a PHP program to include a file using include and require function 1.8 Write a PHP Program to print the values of array entered by user. 1.9 Write a PHP Program to reverse an array values entered by user. 1.10 Write a PHP Program to merge to arrays.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications (B.C.A.)**

<p><b>2</b></p>	<p>2.1 Write a PHP code to create numeric array for Monday to Saturday, associative array for month with total days of month such as January=&gt;30,February=&gt;28 upto December and multidimensional array for laptop along with company name inside that model and price(any two companies).</p> <p>2.2 Write a PHP code for sorting an array entered by user.</p> <p>2.3 Write a program to perform following array functions:</p> <ol style="list-style-type: none"><li>1) array_change_key_case(\$var, CASE_LOWER/CASE_UPPER).</li><li>2) array_chunk(\$var,size) //array of months</li><li>3) array_count_values()</li><li>4) array_pop()</li><li>5) array_push()</li><li>6) array_unshift()</li><li>7) array_shift()</li></ol> <p>2.4 Write a that demonstrate the use of following string functions:</p> <ol style="list-style-type: none"><li>1) strlen() // any string</li><li>2) strpos() //find some specific word,letter</li><li>3) str_word_count()</li><li>4) strrev()</li><li>5) strtolower()</li><li>6) strtoupper()</li></ol> <p>2.5 Write a PHP code for Type casting with settype, gettype function</p> <p>2.6 Write a PHP code for user define function for calculator, take input from user by creating simple html form.</p> <p>2.7 Write a PHP code to use mysql string manipulation functions as given bellow:</p> <ol style="list-style-type: none"><li>1) Length()</li><li>2) concat()</li><li>3) concat_ws()</li><li>4) trim(),rtrim(),ltrim()</li><li>5) lpad(),rpad(),locate()</li></ol> <p>2.8 Write a PHP code to use mysql date and time functions as given bellow:</p> <ol style="list-style-type: none"><li>1) DAYOFWEEK()</li><li>2) WEEKDAY()</li><li>3) DAYOFMONTH()</li><li>4) DAYOFYEAR()</li><li>5) DAYNAME()</li></ol> <p>2.9 Write a PHP code to use mysql date and time functions as given bellow:</p> <ol style="list-style-type: none"><li>1) HOUR()</li><li>2) MINUTE()</li><li>3) SECOND()</li><li>4) DATE_FORMAT()</li><li>5) DATE_SUB()</li></ol> <p>2.10 Write a PHP code to use mysql date and time functions as given bellow:</p> <ol style="list-style-type: none"><li>1) CURDATE()/CURRENT_DATE,</li><li>2) CURTIME()/CURRENT_TIME(),</li><li>3) UNIX_TIMESTAMP(),</li><li>4) FROM_UNIXTIME()</li></ol>
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**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications (B.C.A.)**

<p><b>3</b></p>	<p>3.1 Write a PHP script to create cookie in a form.  3.2 Write a PHP script to read the cookie of a form  3.3 Write a PHP script to use cookie with header  3.4 Write a PHP script to delete a cookie  3.5 Write a PHP script to create a session  3.6 Write a PHP script to destroy a session  3.7 Write a PHP script to create a session when the user log in using the form of Practical 12. Provide an option to logout. Once the user logs out then he/she should not be able to open the home page using the URL.  3.8 Write a PHP script to create a PHP script, which will store a cookie on the client's device to identify whether the user is a new one or a repeated one.  3.9 Create a PHP script, which will help the user to remember his/her username and password on the login form.  3.10 Write a PHP script to store the details of a registration form into the users table of a database.</p>
<p><b>4</b></p>	<p>4.1 Write a program that established Database connection  4.2 Create a MySQL Table Using MySQLi and PDO  4.3 Write a PHP program that Insert Data Into MySQL Using MySQLi and PDO  4.4 Write a program that Demonstrate PHP MySQL Prepared Statements  4.5 Write a PHP program that Select Data From a MySQL Database  4.6 Write a PHP code that Delete Data From a MySQL Table Using MySQLi and PDO  4.7 Write a program that Update Data In a MySQL Table Using MySQLi and PDO  4.8 Write a program that demonstrate the Limit Data Selections From a MySQL Database  4.9 Write a PHP script to authenticate the user using a login form where the user will provide a username and password. Find these username and password in the users table to see if the user is registered or not. If yes then take him to the home page otherwise give an error message.  4.10 Write a PHP script to provide an edit profile page to the user where he/she can see the existing details and if he/she wants to change details then he/she can change them.</p>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications (B.C.A.)**

<b>5</b>	<p>5.1 Create a simple XMLHttpRequest, and retrieve data from a TXT file.</p> <p>5.2 Create a XMLHttpRequest with a callback function, and retrieve data from a TXT file.</p> <p>5.3 How to Retrieve all header information of a resource (file)</p> <p>5.4 How a web page can communicate with a web server while a user type characters in an input field.</p> <p>5.5 How a web page can fetch information from a database with AJAX.</p> <p>5.6 Create a simple HTML page that includes the jQuery library. Write a script to check if jQuery is successfully loaded. Display a message indicating whether jQuery is available or not.</p> <p>5.7 Design a button on your web page. When the user clicks the button, use jQuery to smoothly scroll to the top of the page. Implement this feature to enhance user experience.</p> <p>5.8 Select a few HTML elements (e.g., paragraphs, headings, buttons) and set their background color to red using jQuery. Experiment with different selectors and styles.</p> <p>5.9 Create an input field for search suggestions. As the user types, use jQuery to make asynchronous requests</p> <p>5.10 Build a navigation menu with links to different sections of your website. Use jQuery and AJAX to load content dynamically when the user clicks on a menu item. Fetch data from a server (e.g., blog posts, product details) and display it without refreshing the entire page.</p>
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Requirement of Laboratory Support :

Students need to install "Xampp" using  
<https://www.apachefriends.org/download.html>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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- **Sem.** : 5
- **Subject Code** : 05BC2503
- **Subject** : Data Analytics using R
- **Course Objectives** :
  1. To learn about Data analytics and its application areas.
  2. To understand the use of R-software and its fundamental concepts for data analytics.
  3. To be able to understand R Programming Decision making, functions ,control statements and data structures.
  4. To be able to understand data visualization using R programming.
  5. To learn statistical methods and models for data analytics.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisites** : Basic knowledge of programming concepts

Unit No	Topics Covered
<b>1</b>	<b>Introduction to Data Analysis:</b> Overview of Data Analytics, Need of Data Analytics, Nature of Data, Classification of Data: Structured, Semi-Structured, Unstructured, Characteristics of Data, Applications of Data Analytics.
<b>2</b>	<b>R Programming Basics:</b> Introduction and Installation of R and RStudio, Variables, Data Types, How to take Input from user in R, Output in R using different functions, Decision making statements, Looping statements , Break next, return statements, Switch case,

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

	Data Structure in R: Vectors, Lists, Data frames, Matrices
<b>3</b>	<p><b>Data Visualization using R :</b>  <b>Reading and getting data into R (External Data):</b>          Using CSV files, XML files, Web Data, JSON files, Databases, Excel files.  <b>Working with R Charts and Graphs:</b> Bar Charts, Line Graphs, Scatter plots, Pie Charts, Box plots, Histograms</p>
<b>4</b>	<p><b>Data Visualization with ggplot2</b>          Introduction to ggplot2 for static data visualization          Understanding the grammar of graphics</p> <p><b>Creating basic plots:</b> scatter plots, bar plots, line plots ,          Customizing plots with themes and aesthetics</p>
<b>5</b>	<p><b>Statistics with R:</b>          Mean, Median and Mode, Variance and Standard Deviation, Descriptive Analysis, Normal Distribution, Binomial Distribution, Analysis of Variance (ANOVA) Test :One Way &amp; Two Way ANOVA,          Regression: Linear and Multiple Linear Regression, Logistic Regression. Time Series Analysis, Survival Analysis.</p>

**Course Outcomes:**

1. Understanding about Data analytics, its types and its applications.
2. Knowledge about R studio installation and R programming fundamental concepts like variable, data types, commands.
3. Application of the basics in R programming in terms of functions , loops ,decision making and data structure.
4. Design various experiments based on graphs and charts for data visualization in R programming.
5. Application of statistical computations for data analytics.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	L	L			M						
CO2				M					L		
CO3			M				M				
CO4					H					M	
CO5						M		H			H

**Text Book :**

1. "R for Everyone", Jared P Lander, Pearson Education 2017
2. "Beginning R: An Introduction to Statistical Programming"-Larry Pace.
3. "Big Data Fundamentals" Thomas Erl, Wajid Khattak, and Paul Buhler:: Concepts, Drivers and techniques , Pearson

**Reference Books :**

1. "Introductory Statistics with R", PDalgaard, Second edition
2. "Beginning R-The statistical Programming language", Mark Gardner, John Wiley & sons 2012.
3. "An Introduction to R" , Notes on R: A Programming Environment for Data Analysis and Graphics. W. N. Venables, D.M. Smith and the R Development Core Team. Version 3.0.1 (2013-05-16).

URL: <https://cran.rproject.org/doc/manuals/r-release/R-intro.pdf>

**Web References :**

1. <https://www.geeksforgeeks.org/r-programming-language-introduction/>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

2. <https://www.datamentor.io/r-programming/examples/>
3. <https://www.tutorialspoint.com/r/index.htm>
4. <http://tutorials.iq.harvard.edu/R/Rstatistics/datasets>
5. <http://www.r-tutor.com/>

**App References :**

1. [https://play.google.com/store/apps/details?id=com.krazeapps.rprogrammingcompiler&hl=en\\_IN&gl=US](https://play.google.com/store/apps/details?id=com.krazeapps.rprogrammingcompiler&hl=en_IN&gl=US)
2. <https://play.google.com/store/apps/details?id=com.superdream.rprogramming&hl=en&gl=US>

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Book-3 Chapter 1 : Page no 5-11,Page no 7-20
2	Book-1 Chapter 1 ,2,3 ,4.1 ,4.2& 4.3
3	Book-1: Chapter 4.3-4.7,5,8,9,10
4	Book-1: Chapter 6 Book-2 :Chapter 5
5	Book 2: Chapter 4,7,10,11,13,14

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

**PRACTICALS**

<b>Unit No</b>	<b>List of Practical</b>
<b>1</b>	<p>(1) Write R script for some inbuilt functions like : help(),c(),ls(),rm(),sqrt(),seq(),min(),max(),assign(),print().</p> <p>(2) Write a R program to take input from the user (name and age) and display the values. Also print the version of R installation.</p> <p>(3) Write a program to use R as a calculator.</p> <p>(4) Write R script to perform arithmetic and logical operations</p> <p>(5) Write a program to assign value to a variable in difference ways.</p> <p>(6) Write a R program to extract first 10 English letter in lower case and last 10 letters in upper case and extract letters between 22nd to 24th letters in upper case.</p>
<b>2</b>	<p>(7) Write R script to create an array, passing in a vector of values and a vector of dimensions. Also provide names for each dimension.</p> <p>(8) Write R script to create a 4 × 4 matrix , 3 × 3 matrix with labels and fill the matrix by rows and 2 × 2 matrix with labels and fill the matrix by columns.</p> <p>(9) Write R script to create 3 × 3 matrix to perform addition, subtraction, multiplication and division operations.</p> <p>(10) Write R script to print even numbers from 10 to 30 using all available loops in R.</p> <p>(11) Write R script to print result as given below using decision making statements:&gt;70 Distinction,&gt;60 First ,&gt;40 pass &lt;40 Fail.</p> <p>(12) Write R script to create data frame "student" with the fields of stud_id, stud_name, email_id and mobile_no. Perform following operations: a. Display data of data frame</p>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

	<p>b. Display summary of data frame  c. Display structure of data frame  d. Extract and display only stud_name and mobile_no from data frame</p> <p>(13) Write R script to create a Data frames which contain details of 5 employees and display the details. Create another data frame with same columns and merge it with first one.</p>
<b>3</b>	<p>(14) Write R script to read and write excel  (15) Write R script to read and write csv file.  (16) Write R script to read and write XML file.  (17) Write R script to read and download Web data file.  (18) Write R script to work JSON file.  (19) Write R script to work with Database file.</p>
<b>4</b>	<p>(20) Write R script to create bar chart(3 different styles preferable).  (21) Write R script to create single and multiple Line graph (3 different styles preferable).  (22) Write R script to create scatter plot.(3 different styles preferable).  (23) Write R script to create pie chart(5 different styles preferable).  (24) Write R script to create boxplot (2 different styles preferable).  (25) Write R script to create Histogram.</p>
<b>5</b>	<p>(26) Write R script to calculate mean , median and mode of given data.  (27) Write R script for finding probability by using Normal distribution.  (28) Write R script for finding probability by using Binomial distribution.  (29) Write R script for Analysis of Variance (ANOVA) Test :One Way &amp; Two Way ANOVA.  (30) Write R script for Linear and Multiple Regression.  (31) Write R script for Logistic Regression  (32) Write R script for Time Series Analysis.  (33) Write R script for Survival Analysis.</p>



**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

Requirement of Laboratory Support :

Students need to install "R Studio, Python, Visual Studio" using  
<https://code.visualstudio.com/download>

**FACULTY OF COMPUTER  
APPLICATIONS**

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- **Sem.** 5
- **Subject Code** : 05BC2505
- **Subject** : Computer Graphics
- **Course Objectives** :
  1. Basic understanding of the core concepts of computer graphics.
  2. Understand the basic principles of implementing computer graphics primitives.
  3. Familiarity with key algorithms for modeling and rendering graphical data.
  4. Gain experience in constructing interactive computer graphics programs
  5. Develop design and problem solving skills with application to virtual reality.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisites** : Knowledge of Linear Algebra, Matrices & Geometry

Unit No	Topics Covered
<b>1</b>	<b>Fundamentals of Computer Graphics:</b> Introduction to Computer Graphics, Applications of computer graphics, Graphics input devices, Graphics hardcopy devices, Video Display Devices, Raster-Scan Displays, Random-Scan Displays

**FACULTY OF COMPUTER  
APPLICATIONS**

<b>2</b>	<b>Output Primitives:</b> Introduction, Points and Lines, Line-Drawing Algorithms DDA Algorithm, Bresenham's Line Algorithm, Circle-Generating Algorithm, Polynomials and Spline Curves, Boundary-Fill Algorithm, scan-line polygon filling, Flood-Fill Algorithm, Character Generation
<b>3</b>	<b>2D concepts and transformation:</b> Basic Transformations (translation, rotation, scaling), matrix representation, homogeneous coordinates, reflection and shearing, The Viewing Pipeline, Window-to viewport Coordinate transformation, Point Clipping, Cohen-Sutherland Line Clipping
<b>4</b>	<b>3D concepts and transformations:</b> Basic Transformations (translation, rotation, scaling, Reflections, Shears), Composite Transformations, viewing pipeline and coordinates, parallel and perspective transformation, View Volumes and General Projection Transformations, General Parallel-Projection Transformations
<b>5</b>	<b>Virtual Reality</b> Introduction to VR, Bird's eye view of VR, The geometry of the Virtual worlds, Light and Optics, Tracking in VR

Course Outcomes:

1. Understand and implement graphics terms and concepts.
2. Understand and apply various graphics algorithms.
3. Apply the 2D graphics operations into the objects.
4. Apply the 3D graphics concepts and its transformation methods.
5. Understand the Virtual Reality models and recent trends.

**Course Outcomes – Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	M	L				M	M		H		H
CO2	L	H	M			L	H	H	H	L	
CO3			L				M			M	L
CO4		M	L					M		M	L
CO5				L		M	H	L	M		

**Text Book :**

1. Computer Graphics, D. Hearn and P. Baker, Pearson Education, 2<sup>nd</sup> Edition.
2. Virtual Reality, Steven M. LaValle, Cambridge University Press, Latest

**FACULTY OF COMPUTER  
APPLICATIONS**

Edition, 2019

**Reference Books :**

1. Computer Graphics, Sinha, Amarendra N., Udai, Arun D, Tata McGraw Hill Pvt Ltd, Latest Edition, 2008.
2. Principles of Computer Graphics, Shalini Govil-Pai, Springer, Latest Edition, 2004.
3. Computer Graphics - A programming approach, Harrington & Steven, Tata McGraw Hill Pvt Ltd, 2<sup>nd</sup> edition.

**Web References:**

1. <https://www.javatpoint.com/computer-graphics-tutorial>
2. <https://www.tutorialandexample.com/computer-graphics-tutorial>
3. <http://www.opengl-tutorial.org/beginners-tutorials/tutorial-3-matrices>

App References:

1. [https://play.google.com/store/apps/details?id=com.faadooengineers.free\\_computergraphics&hl=en\\_IN&gl=US](https://play.google.com/store/apps/details?id=com.faadooengineers.free_computergraphics&hl=en_IN&gl=US)
2. <https://play.google.com/store/apps/details?id=com.akb.cgm&hl=en&gl=US>

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Reference	Chapter Numbers
1	Textbook 1	Ch 1,2
2	Textbook 1	Ch 3
3	Textbook 1	Ch 5,6
4	Textbook 1	Ch 9,10
5	Textbook 2	Ch 1,3,8,10

**PRACTICALS Based on 'C'**

Unit no.	List of Practicals
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**FACULTY OF COMPUTER  
APPLICATIONS**

<p><b>1</b></p>	<ol style="list-style-type: none"> <li>1. Introduction to Graphics.h Library and syntax</li> <li>2. Write a C program to draw Point.</li> <li>3. Write a C program to draw circle and fill the color.</li> <li>4. Write a C program to draw rectangle and fill the color.</li> <li>5. Write a C program to draw circle and fill the color.</li> <li>6. Write a C program to draw polygon and fill the color.</li> <li>7. Write a C program to draw Ellipse and fill the color.</li> <li>8. Write a C program to draw Arc and fill the color.</li> <li>9. Write a C program to draw Line and fill the color.</li> <li>10. Write a C program to draw Triangle and fill the color.</li> </ol>
<p><b>2</b></p>	<ol style="list-style-type: none"> <li>1. Write a C program to draw a bar chart using graphics.</li> <li>2. Write a C program to draw pie chart.</li> <li>3. Write a C program to write text in rectangle and fill the color.</li> <li>4. Write a C Program to draw animation using increasing circles filled with different colors and patterns.</li> <li>5. Write a Program to print your name in Hindi script on console output in C.</li> <li>6. Write a C Program to create Indian flag.</li> <li>7. Write a C Program to create house and fill the specified color.</li> <li>8. Write a Program to make a moving colored car using inbuilt functions.</li> <li>9. C graphics program which performs countdown for 30 seconds.</li> <li>10. Write a C Program to implement Digital Clock.</li> </ol>
<p><b>3</b></p>	<ol style="list-style-type: none"> <li>1. Write a C Program to perform 2D translation.</li> <li>2. Write a C Program to perform 2D rotation.</li> <li>3. Write a C Program to perform 2D Scaling.</li> <li>4. Write a C Program to perform 2D reflection.</li> <li>5. Write a C Program to perform 2D shearing.</li> <li>6. Write a C Program to implement Cohen–Sutherland Line clipping.</li> <li>7. Write a program for DDA line Method.</li> <li>8. Write a program for Bresnham’s line drawing Algorithm.</li> <li>9. Write a program for Bresnham’s circle drawing Algorithm.</li> <li>10. Write a program for drawing a polygon.</li> </ol>
<p><b>4</b></p>	<ol style="list-style-type: none"> <li>1. Write a C Program to perform 3D translation.</li> <li>2. Write a C Program to perform 3D rotation.</li> <li>3. Write a C Program to perform 3D scaling.</li> <li>4. Write a program for composite Transformation.</li> <li>5. Write a program to write your name in Hindi using any character generation method.</li> </ol>

**FACULTY OF COMPUTER  
APPLICATIONS**

<b>5</b>	<ol style="list-style-type: none"><li>1. Introduction to unity software</li><li>2. Intro to 2D Game system in unity</li><li>3. Sprite Animation in Unity</li><li>4. 2D Components</li><li>5. UI system in Unity</li><li>6. 2D Game Project</li></ol>
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Requirement of Laboratory Support :  
Students need to install "R Studio, Python, Visual Studio" using  
<https://code.visualstudio.com/download>

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**FACULTY OF COMPUTER APPLICATIONS**  
**Course**

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- **Sem.** : 5
- **Subject Code** : 05BC0508
- **Subject** : C#.NET
- **Course Objectives** :
- 1. To be familiarized with the .NET framework
- 2. To be familiarized with the basics of C# Programming Language
- 3. To learn how to implement array, control statements and looping statements with C#
- 4. To learn how to implement class and methods in C#
- 5. To learn how to implement OOPs concepts in C#

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisites** : Basic knowledge of programming language

Unit No	Topics Covered
<b>1</b>	<b>The .NET framework</b> <ul style="list-style-type: none"> <li>• Introduction to .NET Framework Features / Advantages</li> <li>• MS .NET Architecture</li> <li>• Types of Projects in IDE (Console, Windows, Web, Setup, etc.)</li> <li>• Components of the .NET Architecture: <ul style="list-style-type: none"> <li>○ Common Language Runtime</li> <li>○ Common Type System</li> <li>○ Common Language Specification</li> <li>○ Base Class Library</li> <li>○ CTS and CLS BCL / FCL CLR, JIT Compiler</li> </ul> </li> </ul>

**FACULTY OF COMPUTER APPLICATIONS**

**Course**

	<ul style="list-style-type: none"> <li>○ Microsoft Intermediate Language</li> <li>○ Managed v/s Unmanaged Code</li> <li>○ Garbage Collection</li> <li>○ Assembly</li> <li>○ Namespaces</li> </ul>
<b>2</b>	<p><b>Basics of C#:</b></p> <ul style="list-style-type: none"> <li>● History ofC#</li> <li>● C#Environment</li> <li>● How to installC#</li> <li>● Features ofC#</li> <li>● Variables and datatypes ofC#</li> <li>● Keywords ofC#</li> <li>● C# programstructure</li> <li>● Operators</li> <li>● Type-Conversion in C#</li> </ul>
<b>3</b>	<p><b>Use of Control and Looping statements:</b></p> <ul style="list-style-type: none"> <li>● Control Statement (if-else, switch case)</li> <li>● Looping Statements(for, while, do-while, break, continue)</li> <li>● Nested loop</li> <li>● Constants and comments inC#</li> </ul>
<b>4</b>	<p><b>Methods &amp; Class:</b></p> <ul style="list-style-type: none"> <li>● Arrays</li> <li>● Structure, Enumeration</li> <li>● Defining Methods</li> <li>● Calling Methods</li> <li>● Call byValue</li> <li>● Call by Reference</li> <li>● Class and Object</li> <li>● Class Members</li> <li>● this &amp;static</li> <li>● constructors and destructors</li> <li>● Access Modifiers</li> </ul>
<b>5</b>	<p><b>Inheritance &amp; Exception Handling:</b></p> <ul style="list-style-type: none"> <li>● Inheritance</li> <li>● Method Overloading, Overriding Methods</li> <li>● Properties and Indexer</li> <li>● Delegates</li> <li>● C#Base</li> <li>● Sealed class</li> </ul>

**FACULTY OF COMPUTER APPLICATIONS**  
**Course**

	<ul style="list-style-type: none"> <li>• Abstract class</li> <li>• Interface</li> <li>• Exception Handling</li> </ul>
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**Course Outcomes :**

1. Understand the architecture of .Net framework
2. Understand basics of C# programming language
3. Understand use and implementation of control and looping statements.
4. Understand and apply methods and class in C#.
5. Understand and apply Object-Oriented Programming techniques in C#.

Course Outcomes – Program Outcomes Mapping Table : (Change as per the program)

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	H		L			H	M	L	H		M
<b>CO2</b>	L	L	H			M	L	H		H	
<b>CO3</b>	L	M	H			M	L	H		L	
<b>CO4</b>	L	M	H			M	L	H	M		H
<b>CO5</b>	L	L	M	L	L	M	L	H	L	M	

**Text Book :**

1. Herbert Schildt, "C#: The Complete Reference", Mc GrawHill, 2010

**Reference Books :**

1. Jeffrey Richter, "Applied Microsoft .Net Framework Programming", (Microsoft)
2. Fergal Grimes, "Microsoft .Net for Programmers", (SPD)
3. Tony Baer, Jan D. Narkiewicz, Kent Tegels, ChanduThota, Neil Whitlow, "Understanding the .Net Framework", (SPD)
4. Balagurusamy, "Programming with C#", TMH, 2017

**Web References :**

**FACULTY OF COMPUTER APPLICATIONS**  
**Course**

1. <https://www.tutorialspoint.com/csharp/index.htm>
2. <https://www.geeksforgeeks.org/csharp-programming-language/>

**App References :**

1. Learn C# tutorial

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Book 1 Chapter 1
2	Book 1 Chapter 2
3	Book 1 Chapter 5
4	Book 1 Chapter 7,8
5	Book 1 Chapter 9,10,11,12,13

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**Course**  
**PRACTICALS**

<b>Unit No</b>	<b>Sr.No.</b>	<b>List of Practicals</b>
<b>1</b>	<b>1</b>	Installation of C#.net
	<b>2</b>	Understand structure of C#.net
	<b>3</b>	Explore different libraries of C#.net
<b>2</b>	<b>1</b>	Write a program to print "Hello world"
	<b>2</b>	Write a program to input 2 number and an arithmetic operator. Display the result accordingly.
	<b>3</b>	Write a program to input Principal Amount, Rate and Year and display Simple Interest.
	<b>4</b>	Write a program to input Principal Amount, Rate and Year and display Compound Interest
	<b>5</b>	Write a program to input radius of a circle, and print area of that circle.
<b>3</b>	<b>1</b>	Write a program to input a number and print whether it is Even or Odd Number.
	<b>2</b>	Write a program to input age of person and display message as follows - If age < 12 print You are Kid - If age between 12 to 17 print You are teenager - If age between 18 to 60 print you are Adult If age > 60 print You are Senior Citizen
	<b>3</b>	Write a program to find factorial of a given number.
	<b>4</b>	Write a program to find Fibonacci series up to a number inputted by user.
	<b>5</b>	Write a program to check weather a number inputted by user is prime or not
	<b>6</b>	Write a program to Calculate sum of the number inputted by the user for e.g. if user has inputted 1234 then it's sum is 10
	<b>7</b>	Write a program to find minimum of three numbers using conditional operator
	<b>8</b>	Write a program to check weather a number is palindrome or not e.g. input: 121, output: It is palindrome input:124, output: It is not palindrome

**FACULTY OF COMPUTER APPLICATIONS**
**Course**

	<b>9</b>	Write a program to check whether a string is palindrome or not e.g. input:nayan output: it is palindrome e.g. input: virat output: it is not palindrome
	<b>10</b>	Write a program to find all prime numbers between two values inputted by the user.
<b>4</b>	<b>1</b>	Write a program to display maximum number from 5 numbers inputted by user by using the concept of arrays.
	<b>2</b>	Write a program that demonstrates the use of jagged array.
	<b>3</b>	Write a program to create structure of Employee with data members empno, name and salary. Create the methods getdata() and display() to enter and display information of employees.
	<b>4</b>	Write a program to swap the value of 2 variables using the concept of call by reference method.
	<b>5</b>	Write a program to create a class BankAccount with the instance variable Account_no and Balance. Define method Deposit and withdraw as per the minimum balance required.
	<b>6</b>	Write a program to enter 5 employees information for above given definition (no. 4) using object array.
	<b>7</b>	Write a program to create a class Student with data members enroll_no, name and age. pass the value by object using constructor and display the information using display().
	<b>8</b>	Rewrite program no. 6 using this pointer to initialize value of data member enroll_no ,name and age.
	<b>9</b>	Write a program to create a class Account with instance variable accout_no,holder_name,balance. Define the method display() to display account information and calculate() to calculate interest amount. Set rateofintrest=8.0f as static variable.
	<b>10</b>	Rewrite above give program (prog. 9) using static constructor.

**FACULTY OF COMPUTER APPLICATIONS**
**Course**

<b>5</b>	<b>1</b>	Create a class "Rectangle" that would contain length and width as an instance variable, define constructors [constructor overloading (default, parameterized)]to initialize variables of objects. Define methods to find area and to display variables' value of objects which are created.
	<b>2</b>	Create a class "Vehicle" with instance variable vehicle_type. Inherit the class in a class called "Car" with instance model_type, company name etc. display the information of the vehicle by defining the show() in both super and sub class
	<b>3</b>	Create a class "Account" containing accountNo, and balance as an instance variable .Derive the Account class into two classes named "Savings" and "Current". The "Savings" class should contain instance variable named interest Rate, and the "Current" class should contain instance variable called overdraft Limit. Define appropriate methods for all the classes to enable functionalities to check balance, deposit, and withdraw amount in Savings and Current account. (Use the concept of Abstract class)
	<b>4</b>	Write a program to implement an interface called Exam with a method Pass (int mark) that returns a boolean. Write another interface called Classify with a method Division (int average) which returns a String. Write a class called Result which implements both Exam and Classify. The Pass method should return true if the mark is greater than or equal to 50 else false. The Division method must return "First" when the parameter average is 60 or more, "Second" when average is 50 or more but below 60, "No division" when average is less than 50
	<b>5</b>	Describe abstract class called Shape which has three subclasses say Triangle, Rectangle, and Circle. Define one method area () in the abstract class and overridethis area () in these three subclasses to calculate for specific object i.e., area () of Triangle subclass should calculate area of triangle etc. Same for Rectangle and Circle

**FACULTY OF COMPUTER APPLICATIONS****Course**

	<b>6</b>	Write a program to store the values in array. Use out of the index exception handling and display proper message if exception will occur.
	<b>7</b>	Write a program for the division of two numbers. Use divide by zero exception handling and display porpoer message if exception will occur.
	<b>8</b>	Write a program to demonstrate the use of nested try block.
	<b>9</b>	Write a program to demonstrate the use of finally block in exception handling.

Requirement of Laboratory Support:

Students need to install “R Studio, Python, Visual Studio” using <https://code.visualstudio.com/download>.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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- **Sem.** : 5
- **Subject Code** : 05BC0509
- **Subject** : Mini Project - 4 (Python)
- **Course Objectives** :
  1. To be familiarized with the basics of Python Programming
  2. To understand Functions and modules in python
  3. To implement the concepts of Exception Handling and File Handling in Python
  4. To learn the concepts of Object-Oriented Programming in Python
  5. To be able to use regular expressions in Python.

6. Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
2	6	12	10	10	22	NA	NA	100

- **Prerequisites** : Knowledge of Python language.

**Guidelines**

- The project definition should be finalized internally at the beginning of semester.
- It is recommended that the team should be of 3-4 students.
- Project plan along with the division of work amongst teammates would have been prepared and got approved within a week of the starting of semester from internal guide or project coordinator.
- It is advisable to use different functionalities of exception handling, file handling or database connectivity for making a project attractive.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

- A complete code is mandatory to present at the end of semester for evaluation.
- Student may be asked to write the code related to the project during examination.
- Students need to furnish final project report document, ppt along with code to respected project guide at the end of semester in soft copy.

**Accomplishments of the student after completing the course:**

- The Mini Project is not only a part of the coursework, but also a mechanism to demonstrate your abilities and specialization.
- It provides the opportunity for you to demonstrate originality, teamwork, inspiration, planning and organization in a software project, and to put into practice some of the techniques you have been taught throughout the previous courses.
- The Mini Project is important for a number of reasons. It provides students with:
  - Opportunity to specialize in specific areas of computer science.
  - Opportunity to demonstrate a wide range of skills and knowledge learned.
  - Encourages integration of knowledge gained in the previous course units.

**Course Outcomes:**

1. Enable students to proficiently navigate Python Libraries and Modules for enhanced programming capabilities.
2. Equip students with the skillset to architect Python Programs utilizing functions effectively.

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**Bachelor of Computer Applications**

3. Foster students' comprehension of Exceptions and File Handling methodologies within the Python environment.
4. Cultivate students' proficiency in leveraging Object-Oriented principles to construct sophisticated Python Programs.
5. Empower students to undertake the development of comprehensive Python applications, integrating various programming concepts and methodologies.

Course Outcomes – Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	H	-	-	-	-	-	-	-	-	-	-
CO2	H	M	-	-	-	-	M	-	H	L	-
CO3	L	M	-	M	-	-	H	-	L	M	M
CO4	M	M	H	-	-	M	H	M	M	L	H
CO5	L	-	-	-	-	-	L	H	-	-	-

**Text Book:**

1. Core Python Programming, Wesley J. Chun, Prentice Hall. Second Edition
2. R Nageswara Rao, Core Python Programming, Dreamtech Press, Second Edition

**Reference Books:**

1. Python Programming for Absolute Beginners, Michael Dawson, Premier Press, First Edition
2. Head First Python, Paul Berry, O'REILLY , First Edition
3. The Quick Python Book, Vernon L. Ceder, Manning, First Edition

**Web References:**

1. <https://docs.python.org/3/tutorial/>
2. <https://www.tutorialspoint.com/python/index.htm>

**App References :**

1. Learn Python Programming Tutorial
2. Learn Python



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**Bachelor of Computer Applications**

Requirement of Laboratory Support :

Students need to install "Python" using  
<https://www.python.org/downloads/>



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# **Faculty of Computer Applications**

**Bachelor of Computer Applications**

**BCA Sem - 6**

**Teaching Scheme**

**&**

**Syllabus**



## FACULTY OF COMPUTER APPLICATIONS

### Bachelor of Computer Applications

### BCA Semester-6

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05BC2601	Cloud Computing	4	12	24	20	20	44	30	70	NA
05BC2602	Cyber Security Essentials	5	15	30	25	25	55	30	70	NA
05BC0608	Mobile Computing using Android	6	18	36	30	30	66	30	40	30
-	Elective 2 : 1. 05BC0609 Data Visualization 2. 05BC2605 Image Processing 3. 05BC0610 ASP .NET	5	15	30	25	25	55	30	40	30
05BC0611	Mini Project - 5 ( PHP)	2	6	12	10	10	22	NA	NA	100
<b>Total</b>		<b>22</b>	<b>66</b>	<b>132</b>	<b>110</b>	<b>110</b>	<b>242</b>	<b>120</b>	<b>220</b>	<b>160</b>

**FACULTY OF COMPUTER APPLICATIONS**  
**BACHELOR OF COMPUTER APPLICATIONS**

- **Sem.** :6
- **Subject Code** :05BC2601
- **Subject** :Cloud Computing
- **Course Objectives** :
  1. To understand the principles and paradigm of cloud computing
  2. To learn cloud architecture, service models to utilize cloud the resources.
  3. To identify the role of virtualizations in cloud computing
  4. To understand Service Level Agreements in the cloud for reliable and efficient service delivery
  5. To identify fundamental concepts of Amazon Web Services for cloud computing solutions.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	70	NA

- **Prerequisites:** Basic knowledge of computer network and operating system

Unit No	Topics Covered
<b>1</b>	Introduction to Cloud Computing  Overview, Why Cloud Computing, Roots of Cloud Computing, Types of Cloud Computing, Advantage and disadvantage of Cloud Computing, Types of cloud - Private cloud, Public cloud, community cloud, Hybrid cloud

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<b>2</b>	<p>Cloud Architecture and Services</p> <p>Exploring the Cloud Computing Stack, Communication Protocols, IaaSWorkload , SOA , Cloud ecosystem, Service management, Computing on demand ,Infrastructure as a service, Platform as a service, Software as a service, Identity as a Service, Compliance as a Service</p>
<b>3</b>	<p>Virtualization and Provisioning</p> <p>Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hyper visors, Understanding Machine Imaging, Virtual Machines Provisioning and Manageability, Virtual Machine Migration Services, Virtualization of CPU, Memory, I/O Devices.</p>
<b>4</b>	<p>SLA with Cloud Service Providers</p> <p>The concept of SLA, SLA Aspects and Requirements, ServiceAvailability, Cloud Outages, Credit calculation for SLABreaches, Sample SLA for Amazon, Rackspace, Google,HP etc.</p>
<b>5</b>	<p>Introduction to AWS</p> <p>AWS history, AWS Infrastructure, AWS services, AWS ecosystem, Basic Understanding of APIs -AWS programming interfaces, Web services, AWS URL naming, Matching interfaces and services, Elastic block store -Simple storage service, Glacier -Content delivery platforms.</p>

**Course Outcomes :**

1. Students will be able to understand the core concepts of cloud computing paradigm, including various models and services.
2. Students will be able to describe various services offered in cloud computing.
3. Students will be able to illustrate virtualization and its types in cloud computing.
4. Students will be able to understand the role of Service Level Agreements in business needs of cloud environments.

**FACULTY OF COMPUTER APPLICATIONS**  
**BACHELOR OF COMPUTER APPLICATIONS**

5. Students will be able to understand concepts of Amazon Web Services fundamentals.

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	L								L		
CO2		M								L	
CO3			H								
CO4			M		H						M
CO5						L		M			

**Text Book :**

1. Rajkumar Buyya et. al., Cloud Computing: Principles and Paradigms, Wiley India ,First Edition
2. Cloud Computing Bible. Barrie Sosinsky. John Wiley & Sons. ISBN-13: 978-0470903568, First Edition
3. Amazon Web Services For Dummies. Bernard Golden. For Dummies. ISBN-13: 978-1118571835, First Edition

**Reference Books :**

1. Mastering Cloud Computing by Rajkumar Buyya, C. Vecchiola & S. Thamarai Selvi ,McGRAW Hill Publication, First Edition
2. Cloud Computing: A practical approach by Anthony T. Vetle ,Tata McGraw Hill Education Private Limited (2009)
3. Cloud Computing: Black Book , Kailash Jayaswal, Jagannath Kallakurchi, Donald J Houde, Dr. Deven Shah , Dreamtech Publications (ISBN 978-93-5119- 418-7)

**Web References :**

1. <http://www.cloudbus.org/>
2. <https://aws.amazon.com/>



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BACHELOR OF COMPUTER APPLICATIONS**

**References :**

1. Coursera
2. Udemy

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Book 1 Chapter 1 and 2
2	Book 2 Chapter 2
3	Book 2 Chapter 3
4	Book 1 Chapter 16
5	Book 3 Chapter 1

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**Bachelor of Computer Applications**

- **Sem.:**6
- **Subject Code:**05BC2602
- **Subject:** Cyber Security Essentials
- **Course Objectives:**
  1. Acquire a foundational understanding of cyber security concepts.
  2. Gain insights into the various types of cyber attacks and cybercrimes, recognizing their mechanisms and impacts.
  3. Learn about different cyber attack methodologies and the strategies for their prevention.
  4. Understand the application and effectiveness of diverse tools and technologies in cybercrime prevention and security enhancement.
  5. Understand legal aspect of Cyber Crime and Security.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	70	NA

**Prerequisites:**Basic knowledge of computers, Internet, Operating System and Networking.

Unit No	Topics Covered
<b>1</b>	<b>Introduction to Cyber Security</b> Cybercrime and origins of the world, Cybercrime and information security, Classifications of cybercrime, Cybercrime and the Indian ITA- 2000, A global Perspective on cybercrimes.
<b>2</b>	<b>Cyber offenses</b> Strategic Planning and Execution of cyber attacks by Cybercriminals, Social Engineering, Cyber stalking, Cyber café and Cybercrimes, Botnets, Attack vector
<b>3</b>	<b>Phishing and Identity Theft</b>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

	<p>Introduction, Phishing: Methods of Phishing, Phishing Techniques, Spear Phishing, Types of Phishing Scams, Phishing Toolkits and Spy Phishing, Phishing Countermeasures</p> <p>Identity Theft (ID Theft):</p> <p>Personally, Identifiable Information (PII), Types of Identity Theft, Techniques of ID Theft, Identity Theft-Countermeasures.</p>
<b>4</b>	<p><b>Systems and Network Vulnerability Scanning</b></p> <p>Overview of vulnerability scanning, Open Port/Service Identification, Banner / Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools -Datapipe, Fpipe, WinRelay, Network Reconnaissance –Nmap, THC-Amap and System tools. Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping.</p>
<b>5</b>	<p><b>Tools and Methods Used in Cybercrime</b></p> <p>Introduction, Proxy Servers and Anonymizers, Password Cracking, Keyloggers, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQLInjection.</p> <p><b>Cybercrimes and Cybersecurity: The Legal Perspectives</b></p> <p>Introduction, Why Do We Need Cyberlaws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Amendments to the Indian IT Act, Cybercrime and Punishment. Digital Personal Data Protection (DPDP) Act, 2023 – Salient Features.</p>

**Course Outcomes:**

1. Demonstrate understanding of basic concepts in cyber security
2. Analyze threats and risks within context of the cyber security architecture.
3. Examine the performance and troubleshoot Network and Cyber security systems.
4. Make use of various tools and methods used in cybercrime
5. Evaluate cyber activities which are considered as crime as per IT Act.

**Course Outcomes – Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1				H		M	M	L	L	L	L
CO2				H		M	M	L	M	L	M
CO3	H	H	H	M		H	M	H	H	M	H

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

CO4	H	H	H	M		H	M	H	H	M	H
CO5	L			H			M		L	L	L

**Text Book:**

1. “Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, Nina Godbole and SunitBelpure, Wiley Publication, 1st Edition.
2. “Anti-Hacker Tool Kit (Indian Edition)”, Mike Shema, Mc. Graw Hill Publication, 4th Edition.

**Reference Book:**

1. “Cyber Security Essentials”, James Graham, Richar Howard,Ryan Olson, CRC Press, Tailor and Francis Group, 1st Edition.
2. “Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions”, Kenneth J. Knapp, IGI Global, 2009-1st Edition.
3. Cyber Security and Cyber Laws Paperback”, Alfred Basta, Nadine Basta, Mary Brown, Ravinder Kumar, Cengage publication, 1st Edition.

**Web References :**

4. <https://www.sans.org/cybersecurity>
5. <https://www.tecmint.com/>
6. <https://www.meity.gov.in/content/cyber-laws>

**Syllabus Coverage from Main reference:**

Unit #	Chapter Numbers
<b>1</b>	Book 1 Chapter 1
<b>2</b>	Book 1 Chapter 2
<b>3</b>	Book 1 Chapter 5
<b>4</b>	Book 2: Chapter 4: 4.1 and 4.2, Chapter 7, 8, 9 ,10.1 to 10.5
<b>5</b>	Book 1Chapter 4: 4.1 to 4.10, Chapter 6

**TUTORIALS:**

Instructor should conduct the tutorials on the advanced topics on Cyber Security once in a week. Some of the sample topics may involve for the discussion and presentations from the students are–

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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1. **Online Credit Card Fraud Analysis:** Investigate the methods of online credit card fraud, including fraudster tactics, with a focus on the legal consequences for perpetrators under current laws.
2. **Ransomware Attack Investigation:** Delve into ransomware attack methodologies, their development, and the specific legal penalties attackers face according to cybersecurity laws.
3. **Email Spoofing Examination:** Analyze email spoofing techniques within phishing schemes, discussing case studies and legal actions against fraudsters.
4. **Social Media Scams Insight:** Explore the dynamics of social media scams, specifically the MySpace Suicide case, and examine legal frameworks for prosecuting such offenses.
5. **Online Lottery Scam Exploration:** Study the operation of online lottery scams, identifying scammer strategies and outlining the legal repercussions upon conviction.

**FACULTY OF COMPUTER APPLICATIONS**  
**Course**

- **Sem.** : 6
- **Subject Code** : 05BC0608
- **Subject** : Mobile Computing using Android
- **Course Objectives** :
  1. To be familiarized with mobile development and basics of android
  2. To understand UI designing and Fragment in android
  3. To integrate menus, animation, multimedia and background threads in Android Application
  4. To implement the concepts of SQLite, Content Provider and Shared Preferences in Android Application
  5. To learn how to publish Android App on Google Play store

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
6	18	36	30	30	66	30	40	30

- **Prerequisites:** Functional Knowledge of Java technology.

Unit No	Topics Covered
<b>1</b>	<b>Mobile Application Development</b> <ul style="list-style-type: none"> <li>● Defining Mobile Applications</li> <li>● The History of the Development of Mobile Apps</li> <li>● The History of Mobile Phones</li> <li>● Wireless Markup Language</li> <li>● History and Introduction of Android</li> <li>● Android API Versions History</li> </ul>

**FACULTY OF COMPUTER APPLICATIONS**  
**Course**

<b>2</b>	<p><b>Basics of Android</b></p> <ul style="list-style-type: none"> <li>● OHA (Need of OHA, Members of OHA)</li> <li>● Android Development Tools</li> <li>● Android SDK</li> <li>● Building Blocks of Android</li> <li>● Android Architecture</li> <li>● Activity Life-Cycle</li> <li>● AndroidManifest.xml file</li> <li>● Android Application File Structure</li> <li>● Building a Sample Android App</li> </ul>
<b>3</b>	<p><b>Android UI Design Essentials</b></p> <ul style="list-style-type: none"> <li>● Working with Intents, Types of Intents</li> <li>● Explicit Intent, Implicit Intent</li> <li>● Fundamentals of android UI design</li> <li>● Layouts (Linear, Relative, Table, Frame, <b>Constraint</b>)</li> <li>● Introduction to adapters <ul style="list-style-type: none"> <li>○ Array Adapter</li> <li>○ Base Adapter</li> <li>○ Custom Adapter</li> </ul> </li> <li>● Widgets in android like TextView, EditText,</li> <li>● RadioButton, RadioGroup, Spinner, ListView, Button, ImageButton, ToggleButton, GridView.</li> <li>● Working with WebView <ul style="list-style-type: none"> <li>○ Chrome Client</li> </ul> </li> <li>● AOSP Client</li> </ul>
<b>4</b>	<p><b>Expanding the User Experience</b></p> <ul style="list-style-type: none"> <li>● Menu (Options, Context)</li> <li>● Working with Telephony API <ul style="list-style-type: none"> <li>○ Calling Intent</li> </ul> </li> <li>● Working with VideoView</li> <li>● Introduction to styles and themes</li> <li>● MDC Android</li> </ul>

**FACULTY OF COMPUTER APPLICATIONS**  
**Course**

<b>5</b>	<b>Working with Data and Storage in Android</b> <ul style="list-style-type: none"> <li>● Shared Preferences           <ul style="list-style-type: none"> <li>○ Editor</li> <li>○ Modes</li> </ul> </li> <li>● Creating Database with SQLiteOpenHelper Class</li> <li>● Managing Database with SQLiteDatabase Class</li> <li>● Introduction to Monetization of Android App</li> <li>● Signing and Publishing Android App</li> </ul>
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**Course Outcomes:**

1. Describe mobile development and basics of android.
2. Design UI and develop Fragment for Android App
3. Develop an Android App using multimedia, menus, animation and background threads.
4. Build their ability to develop Database Application by applying the concepts of SQLite and Content Providers.
5. Demonstrate how to publish Android App on Google Play store

Course Outcomes – Program Outcomes Mapping Table: (Change as per the program)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H		L			H	M	L			L
CO2	L	L	H			M	L	H		M	
CO3	L	M	H			M	L	H		M	
CO4	L	M	H			M	L	H	L		
CO5	L	L	M	L	L	M	L	H			H

**Text Book:**



**FACULTY OF COMPUTER APPLICATIONS  
Course**

1. **Professional Android 2 Application Development, Reto Meier Wiley India Pvt Ltd, First Edition**

**Reference Books:**

1. **Android Wireless Application Development, Darcey Lauren and Shane Conder, Pearson Education, Second Edition**
2. **Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd, First Edition**
3. **Beginning Android Application Development, Wei-Meng Lee, Wiley India Pvt. Ltd., First Edition**

**Web References:**

1. <https://developer.android.com>
2. <https://www.tutorialspoint.com/android/index.htm>

**App References:**

1. **Learn Android – Android App Development**
2. **Android Tutorial – Learn Android Online**

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	1,2,3
2	1,2,3
3	4,5
4	9,10,11,15,17
5	7,8,10,19

**FACULTY OF COMPUTER APPLICATIONS**  
**Course****PRACTICALS**

<b>Unit No</b>	<b>List of Practicals</b>
<b>1 &amp; 2</b>	<ol style="list-style-type: none"><li>1. Installing "Android Studio IDE" and "Android SDK Steps</li><li>2. Write your First Android App</li><li>3. Create First application. That will display “Hello World” in the middle of the screen also change the text color and background color of the text</li><li>4. Create an application that designs a layout with a text box and button named Submit. The user should enter the text in the text box. When the submit button is clicked then the text in the text box should be displayed in the toast</li><li>5. Create an application to demonstrate Android Activity Life Cycle.</li></ol>

**FACULTY OF COMPUTER APPLICATIONS**  
**Course**

3	<ol style="list-style-type: none"><li>6. Create an application with login module (Check username and password) On successful login, go to next screen. And when login fails, alert user using Toast. Also pass username to next screen.</li><li>7. Create an application that designs a layout having two text boxes user name and password. The user and password will be taken from the user. The username and password will be verified. If the verification is successful then a new layout will appear which will display username and password.</li><li>8. Create an application to call specific entered number by user in the Edit Text</li><li>9. Create an application that will show List of Countries in One fragment, when we click on the name of any country, the second fragment should display the flag of the Country whose name is clicked in the first fragment</li><li>10. Create an android application which helps us to create a simple calculator with basic functions of clear, add, multiply, subtract, divide and mod</li><li>11. Create an application to demonstrate the use of ToggleButton</li><li>12. Create an application to demonstrate the use of ImageButton</li><li>13. Create an application to demonstrate the use of ListView</li><li>14. Create an application to demonstrate the use of Spinner</li><li>15. Create an application to demonstrate the use of CheckBox</li><li>16. Create an application to demonstrate the use of RadioButton</li><li>17. Create an application to demonstrate the use of RadioGroup</li><li>18. Create an application to demonstrate the use of ImageView</li><li>19. Create an application to demonstrate the use of TextView, EditText and Button</li><li>20. Create an application to demonstrate the use of RelativeLayout</li><li>21. Create an application to demonstrate the use of TableLayout.</li><li>22. Create an application where the UI consists of an EditText and a Button when the user clicks on the Button the URL entered in the EditText should be displayed on the screen</li><li>23. Create an application to demonstrate the use of AbsoluteLayout</li><li>24. Create an application to demonstrate the use of WebView.</li><li>25. Create an application that designs a layout to display contact label (name) and phone no stored in the contacts using content provider. When the user selects any contact label (name) from the list view dialer application should be launched and call should be made using dialer application</li></ol>
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**FACULTY OF COMPUTER APPLICATIONS**  
**Course**

<p><b>4</b></p>	<p>26. Create an application to demonstrate the use of Context Menu</p> <p>27. Create an application where a user takes an ImageView, and buttons, the number of buttons depends on Tween animation effects the user wants, on clicking a particular button the particular effect of tween animation should be applied on an ImageView.</p> <p>28. Create an application that will change color of the layout, based on selected options from the menu</p> <p>29. Create an application to demonstrate the use of Frame-by-Frame animation</p> <p>30. Create an application to demonstrate the use of ActionBar</p> <p>31. Create an application that works like an alarm</p> <p>32. Create an application to demonstrate the use of VideoView</p> <p>33. Create an application that designs a layout with 3 text boxes and an options menu. The options menu should contain options like Simple Interest and compound Interest. The text boxes should be used for the input of information like the principal amount, rate of interest and number of years. Then clicking on the option from menu appropriate operation should be performed and correct result should be displayed</p>
<p><b>5</b></p>	<p>35. Create an application to demonstrate the use of SharedPreferences.</p> <p>36. Create an application to demonstrate the use of AlertDialog</p> <p>37. Create an application that designs a layout having text boxes and button submit. The details of doctor like doctor's id, first name, last name, mobile number, address, city and specialization should be entered by the user in the textboxes and on clicking on the button submit the data should be saved into the database.</p> <p>38. Create another layout that contains a text box, a button search and a text view that gives searching facility. User can search doctor's full information by providing doctor's id in the text box. On clicking on button search the information of the doctor should be displayed in text view. Doc_detail (doc_id, firstname, lastname, mob, add, city, specialization)</p> <p>39. Create an application to demonstrate the CRUD operation of SQLite</p> <p>40. Create an application to use Native content provider in android</p> <p>41. Create an application to use another native content provider in android</p>



**FACULTY OF COMPUTER APPLICATIONS**  
**Course**

Requirement of Laboratory Support :

Students need to install "Android Studio" using  
[https://developer.android.com/studio?gad\\_source=1&gclid=CjwKCAjwydSzBhBOEiwAj0XN4L16lzVQU7mJnJrcwMEdVtY-kyd3LuBP64TG-B5LnsEbMscnZcVvXBoCG1UQAvD\\_BwE&gclsrc=aw.ds](https://developer.android.com/studio?gad_source=1&gclid=CjwKCAjwydSzBhBOEiwAj0XN4L16lzVQU7mJnJrcwMEdVtY-kyd3LuBP64TG-B5LnsEbMscnZcVvXBoCG1UQAvD_BwE&gclsrc=aw.ds)

**FACULTY OF COMPUTER APPLICATIONS  
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- **Sem.** : 6
- **Subject Code** : 05BC2604
- **Subject** : Data Visualization
- **Course Objectives** :
  1. To understand fundamental concepts data science and its processes.
  2. To explore different types of charts and plots using matplotlib.
  3. To learn data visualization using excel and various functions of excel.
  4. To explore knowledge and skills using Tableau
  5. To learn data visualization using Looker Studio(Google Data Studio).

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisites:** Basic knowledge of Python Programming

Unit No	Topics Covered
<b>1</b>	<b>Introduction to Data Science</b>  Defining data science, Recognizing the different types of data , Gaining insight into the data science process ,Fields of data science.
<b>2</b>	<b>Data Visualization Using Matplotlib</b>  Quick setup and importing Matplotlib's essential modules, , Understanding Figure Structure, Creating plots like lines, scatter plots, bars, and histograms, Saving and Exporting, Customizing Aesthetics.

**FACULTY OF COMPUTER APPLICATIONS**  
**BACHELOR OF COMPUTER APPLICATIONS**

<b>3</b>	<p><b>Data Visualization in Microsoft Excel</b></p> <p>Introduction to MS Excel, various techniques and tools available in Excel for creating effective and impactful visual representations of data, hands-on exercises and practical examples for following charts and graphs using MS Excel.</p> <p>Bar Chart , Column Chart, Line Chart, Pie Chart, Scatter Plot ,Histogram Plot, Area Chart, Static Pareto Chart, Dynamic Pareto Chart , Gantt Chart</p>
<b>4</b>	<p><b>Data Visualization using Tableau</b></p> <p>Introduction to Tableau, installation of Tableau , File types , Data Terminology. Follow given steps to create various charts and Dashboard in Tableau.</p> <p>Connect to your data , Drag and drop to take a first look , Focus your results ,Explore your data geographically ,Step 5: Drill down into the details , Build a dashboard to show your insights ,Build a story to present , Share your findings with others</p>
<b>5</b>	<p><b>Looker Studio (Formerly Google Data Studio)</b></p> <p>Introduction to Looker Studio , Integration with Google Ecosystem ,Connecting to Looker Studio,Looker Studio Templates,Connect A Data Source, Create various charts as given below:</p> <p>Time series, Bar chart , Pie chart , Tables , Scorecards , Bullet charts.</p>

**Course Outcomes :**

1. Students will be able to understand the role of data science in Data Visualization.

**FACULTY OF COMPUTER APPLICATIONS**  
**BACHELOR OF COMPUTER APPLICATIONS**

2. Students will be able to gain proficiency in Matplotlib Library for visualization.
3. Students will gain understanding of effective data visualization in Excel.
4. Students will be able to demonstrate proficiency in applying data science techniques using Tableau Software
5. Students will be able to create charts and graphs in Looker Studio.

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	L	L			M						
CO2				M					L		
CO3			M				M				
CO4					H					M	
CO5						M		H			H

**Text Book :**

“Introducing Data Science” , By Davy Cielen ,Arno D. B. Meysman , Mohamed Ali ,Manning Publications , ISBN: 9781633430037

**ReferenceBooks:**

1. “Introduction to Computation and Programming Using Python”, JohnVGuttag.,2ndEdition,PrenticeHallofIndia
2. CorePythonProgramming,RNageswaraRao,2ndEdition,DreamtechPress
3. Core Python Applications Programming, Wesley J Chun,3rd Edition.Pearson

**WebReferences:**

1. “Matplotlib Tutorial” , <https://matplotlib.org/stable/tutorials/index.html>
2. “MS Excel Tutorial ” ,“<https://www.datacamp.com/tutorial/visualizing-data-in-excel>
3. “Tableu Tutorial”,<https://help.tableau.com/current/guides/get-started->

**FACULTY OF COMPUTER APPLICATIONS**  
**BACHELOR OF COMPUTER APPLICATIONS**

tutorial/en-us/get-started-tutorial-home.htm

4. "Looker Studio Tutorial" , <https://support.google.com/looker-studio/answer/9171315?hl=en>

**AppReferences:**

1. [https://play.google.com/store/apps/details?id=com.androfrenzy.datasience&hl=en\\_IN&gl=US](https://play.google.com/store/apps/details?id=com.androfrenzy.datasience&hl=en_IN&gl=US)
2. [https://play.google.com/store/apps/details?id=com.admob9931.python\\_panda&hl=en\\_IN&gl=US](https://play.google.com/store/apps/details?id=com.admob9931.python_panda&hl=en_IN&gl=US)

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Book 1 - Chapter 1
2	Web reference - 1
3	Web reference - 2
4	Web reference - 3
5	Web reference - 4

**PRACTICALS**

**List of Practicals**

- 1) Write a program to create bar plot for sample data using matplotlib.
- 2) Write a program to create stacked-bar plot for sample data using matplotlib.
- 3) Write a program to create pie plot for sample data using matplotlib.
- 4) Write a program to create pie plot using explode parameter for sample data using matplotlib.
- 5) Write a program to create scatter plot for sample data using matplotlib.
- 6) Write a program to create line plot for sample data using matplotlib.

**FACULTY OF COMPUTER APPLICATIONS**  
**BACHELOR OF COMPUTER APPLICATIONS**

- 7) Write a program to create Multi-line plot for sample data using matplotlib.
- 8) Write a program to create Histogram for sample data using matplotlib.
- 9) Write a program to create box plot for sample data using matplotlib.
- 10) Write a program to create 3D plot for sample data using matplotlib.
- 11) Write a program to create bar chart for sample data using Excel.
- 12) Write a program to create column chart for sample data using Excel.
- 13) Write a program to create line chart for sample data using Excel.
- 14) Write a program to create pie chart for sample data using Excel
- 15) Write a program to create scatter plot for sample data using Excel.
- 16) Write a program to create histogram plot for sample data using Excel.
- 17) Write a program to create area chart for sample data using Excel.
- 18) Write a program to create static Pareto Chart for sample data using Excel.
- 19) Write a program to create Dynamic (Interactive) Pareto Chart for sample data using Excel.
- 20) Write a program to create Gantt for sample data using Excel.
- 21) Write a program to reads data from a CSV file and generates a simple bar chart using Tableau, representing a basic comparison between different categories.
- 22) Write a program that reads time series data from a database or API and creates a line chart in Tableau to visualize trends over time.
- 23) Write a program that takes categorical data as input and generates a pie chart in Tableau to show the distribution of different categories.
- 24) Write a program that reads data related to different categories over

**FACULTY OF COMPUTER APPLICATIONS**  
**BACHELOR OF COMPUTER APPLICATIONS**

time and generates a stacked area chart in Tableau to visualize the cumulative values.

25) Write a program that reads two sets of numerical data and creates a scatter plot in Tableau to visualize the relationship between them.

26) Write a program that reads numerical data and generates a histogram in Tableau to visualize the distribution of values.

27) Write a program that reads three sets of numerical data and generates a bubble chart in Tableau, where the size of the bubble represents the third variable.

28) Write a program that reads numerical data and generates a box plot in Tableau to visualize the distribution of values along with key statistics.

29) Write a program that reads two categorical variables and one numerical variable, and generates a heat map in Tableau to visualize the relationship between the variables.

30) Write a program that reads data related to tasks and their durations, and generates a Gantt chart in Tableau to visualize the timeline of tasks.

**Case Studies for Looker Studio :**

Basic Bar Chart:

31) Case Study 1 : Visualizing sales data by region.

Steps:

Connect to your data source in Looker Studio.

Write a LookML view or explore to retrieve sales data grouped by region.

Use Looker's visualization tools to create a bar chart, with regions on the x-axis and sales on the y-axis.

(Line Chart with Time Series Data)

32) Case Study 2: Tracking website traffic over time.

Steps:

Connect to your data source and retrieve website traffic data with timestamps.

Group the data by date or time period.

Create a line chart in Looker Studio, with time on the x-axis and traffic metrics (such as page views or unique visitors) on the y-axis.

(Pie Chart for Categorical Data)

**FACULTY OF COMPUTER APPLICATIONS**  
**BACHELOR OF COMPUTER APPLICATIONS**

33) Case Study 3: Distribution of product categories in sales.

Steps:

Fetch sales data grouped by product category.

Create a pie chart in Looker Studio, with product categories represented as slices of the pie.

(Stacked Area Chart)

34) Case Study 4 : Visualizing revenue streams over time.

Steps:

Retrieve revenue data categorized by different streams (e.g., product sales, service revenue).

Create a stacked area chart in Looker Studio, with time on the x-axis and revenue streams stacked on the y-axis.

(Scatter Plot)

35) Case Study 5: Examining the relationship between advertising spend and sales.

Steps:

Fetch data on advertising spend and corresponding sales figures.

Create a scatter plot in Looker Studio, with advertising spend on the x-axis and sales on the y-axis.

(Histogram)

Requirement of Laboratory Support :

Students need to install "Python, Visual Studio" using

<https://code.visualstudio.com/download>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

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- **Sem.** : 6
- **Subject Code** : 05BC2605
- **Subject** : Image Processing
- **Course Objectives** :
  1. To provide foundational principles of digital image processing
  2. To analyze and comprehend images in both numerical and graphical representations.
  3. To understand and implement the geometric relationships of pixels along with their operations.
  4. To understand the various steps pre and post image processing.
  5. To understand the various applications of image processing.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisites:** Basic knowledge of Matrix operations, Linear Algebra & probability theory , Basic Programming knowledge of C / Python

Unit No	Topics Covered
<b>1</b>	<b>Terminology of Digital Image Processing</b> <ul style="list-style-type: none"> <li>• Concept of Pixel and its value, Image size and resolution, Image Acquisition, Image Coordinate System,</li> <li>• Various Image File formats: Raster Vs Vector Data, Concept of GIF, PNG, JPEG, BMP image formats.</li> </ul>
<b>2</b>	<b>Digital Image representation</b>

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

	<ul style="list-style-type: none"> <li>• Image Sensing and Acquisition,</li> <li>• Basic concepts of Sampling and Quantization, Representing Digital Images, Spatial and Intensity Resolution,</li> <li>• Some Basic Relationships between Pixels.</li> <li>• Array Vs Matrix Operations, Image Transforms</li> </ul>
<b>3</b>	<p><b>Intensity Transformation and Spatial Filtering</b></p> <ul style="list-style-type: none"> <li>• Fundamentals of Spatial Filtering. Image Negatives, Log Transformation,</li> <li>• Histogram Processing and Equalization, Local Histogram Processing,</li> <li>• Smoothing Spatial Filters</li> <li>• Sharpening Spatial Filters</li> </ul>
<b>4</b>	<p><b>Filtering in Frequency domain</b></p> <ul style="list-style-type: none"> <li>• Preliminary concepts of Complex Numbers and Fourier Series, The Fourier Transform, Convolution, A model of the Image Degradation / Restoration Process &amp; Noise Model</li> </ul>
<b>5</b>	<p><b>Introduction to Color Image Processing</b></p> <ul style="list-style-type: none"> <li>• Color Fundamentals and Color Models :The RGB Color Model, The CMY and CMYK color Models, The HSI Color Model</li> <li>• Pseudo color Image Processing :Intensity Slicing, Intensity to color Transformations</li> </ul>

**Course Outcomes:**

1. Students will be able to understand image representation & fundamental terminologies of Image processing.

**FACULTY OF COMPUTER APPLICATIONS**  
**Bachelor of Computer Applications**

2. Students will be able to understand Intensity transformation and Histogram processing to analyze image structure.
3. Students will be able to apply filter on given image using frequency domain filtering technique
4. Students will be able to identify the proper image restoration technique to remove degradation from given image.
5. Students will be understood and representation of color image processing with various models.

**Course Outcomes – Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1		L		M		L			H	L	
CO2			L		L		H	L	M		
CO3	M		M							M	M
CO4		M		L		H		H	M	H	L
CO5			L		M		L		H		L

**Text Book:**

1. Principles of Digital Image Processing, Wilhelm Burger, Mark J. Burge, Springer Science + Business Media
2. Digital Image Processing, Gonzalez & Wood, 3rd Edition

**Reference Books :**

1. Fundamentals Digital Image Processing, Jain Anil K., Prentice Hall India, 2010.
2. Digital Image Processing ,Pratt W.K, 3rd ed., John Wiley & Sons, 2007
3. The Image Processing Hand book, John C. Russ, CRC Press,2007.

**Web References :**

1. <https://nptel.ac.in/courses/106/105/106105032/>
2. [https://www.python-course.eu/python\\_image\\_processing.php](https://www.python-course.eu/python_image_processing.php)

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3. <https://www.tutorialspoint.com/dip/index.htm>
4. <https://www.javatpoint.com/digital-image-processing-tutorial>

**App References :**

1. Digital Image Processing, Engineering App
2. Image Processing Tutorials, Galaxy Production

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Text Book : 1, Chapter : 1
2	Text Book : 2, Chapter : 2
3	Text Book : 2, Chapter : 3
4	Text Book : 2, Chapter : 4 , 5
5	Text Book : 2, Chapter : 6

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**PRACTICALS**

**Unit – 1**

Perform practical to read and display digital image using Python

1. Introduction to OpenCV, Scikit-image, SciPy libraries of Python with Basic commands.
2. Read at least five images and displays on screen.
3. Change size of the image.
4. Convert color image into gray-scale image
5. Convert color image into black & white
6. Display image profile.
7. Separate color image in three R G & B planes
8. Create color image using R, G and B three separate planes
9. Crop image.
10. Rotate Image.

**Unit : 2**

Perform image processing programs :

1. Convert Negative image
2. Convert Flip image
3. Apply Thresholding on image.
4. Array Vs Matrix Operations on Image
5. Transform the gray levels of an image
6. Write a program which apply Zoom In Operation.
7. Write a program which apply Zoom Out Operation.
8. Write a program to apply translation effect on image.
9. Write a program to apply rotation effect on image.
10. Write a program to apply scaling effect on image.

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**Unit : 3**

Perform the following operations on image :

1. Addition & Subtraction of two images
2. Calculate mean value of image .
3. Apply Brightness to image by changing mean value.
4. Water Marking effect using EX-OR operation
5. NOT operation (Negative image)
6. Apply spatial filtering on Image.
7. Create histogram of image.
8. Display equalization of an image.
9. Write a programs to remove noise using spatial filters
10. Write a program to perform canny edge detection.

**Unit : 4**

To write a programs for image restoration based on various image noise models.

1. Apply Minimize Gaussian noise
2. Apply Median filter on Image.
3. Perform Image degradation operation
4. Create image with noise removal.
5. Perform Image restoration operation.
6. Apply Max Filter on Image.
7. Apply Min Filter on Image.
8. Apply Image sharpening effect on image.
9. Write a program to detect edge through Sobel Edge detection method.
10. Write a program to calculate Fourier spectrum of an image.

**Unit : 5**

To write a program which apply the following geometric transformation on colourimage .

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1. Write program to convert color image in a Red shade image.
2. Write program to convert color image in a blue shade image.
3. Write program to convert color image in a Green shade image.
4. Write a program to apply color on black and white image.
5. Write a program to retrieve RGB values from Color image.

Requirement of Laboratory Support :

Students need to install "Python, Visual Studio" using  
<https://code.visualstudio.com/download>

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- **Sem.** : 6
  - **Subject Code** :05BC0610
  - **Subject** : ASP.Net
  - **Course Objectives** :
1. To understand and gain knowledge about .Net framework.
  2. To learn and create web application development using ASP.Net
  3. To learn concept of state management and error handling.
  4. To develop interaction of front end with database using ADO.NET platform.
  5. To get overview of MVC, AJAX and Web Services for web application development.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisites** : Knowledge of basic web application development with object oriented concepts.

Unit No	Topics Covered
<b>1</b>	<b>Introduction of .Net Framework</b> <ul style="list-style-type: none"> <li>● Concept of .Net Programming Framework, CLR, .Net Class Library, Data Types, Object Based Manipulation, Overview about Namespace, APS.Net Applications: ASP.Net File Types, Various files behind the web applications, ASP.Net Configuration with web.config file.</li> </ul>
<b>2</b>	<b>Web form fundamentals with web controls</b> <ul style="list-style-type: none"> <li>● Introduction of Web Controls: Basic web control classes and web control tags, Concept of AutoPostBack and Web control Events, How to access web controls.</li> <li>● Web controls: Basic Web controls, List Controls, Rich Controls, Validation Controls.</li> </ul>

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<b>3</b>	<p><b>State Management &amp; Error Handling</b></p> <ul style="list-style-type: none"> <li>● Concept of View state, Transferring Information, Custom Cookies, Session State and its configuration, Application State.</li> <li>● Overview of Common Error, .Net Exception object, Handling Exceptions, Throwing your own exception.</li> <li>● Managing User Interface Consistency : Concept of ASP.NET Master Page, Theme, Skins</li> </ul>
<b>4</b>	<p><b>Database Connectivity using ADO.Net &amp; Data Binding</b></p> <ul style="list-style-type: none"> <li>● Introduction of ADO.Net with Characteristics, ADO.Net Object Model, SQL Basics with executing various SQL statements, Connection with database, accessing records and managing database connectivity in web application.</li> <li>● Data Binding with List Control Based controls, Tree View Control, Menu Control, Grid View Control, Data List Control</li> </ul>
<b>5</b>	<p><b>Introduction of MVC, Ajax and Web services</b></p> <ul style="list-style-type: none"> <li>● Overview of The Model-View-Controller (MVC) Architecture, ASP.Net and MVC</li> <li>● Concept of AJAX, Overview of Client and server side support for AJAX.</li> <li>● Introduction of Web Service Architecture. Configuring a web services.</li> </ul>

**Course Outcomes:**

1. Students will be able to understand the architecture of .Net framework.
2. Students will be able to develop web application using ASP.Net.
3. Students will be able to understand and implement the state management and error handling.
4. Students will be able to implement database connectivity using ADO.NET.
5. Students will be able to get overview of MVC, AJAX and Web Services for web application development.

**Course Outcomes – Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
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CO1		L				L			H		
CO2			M		H			L			
CO3	L			M						L	
CO4	L			L			M				
CO5		M			L			M			M

**Text Book :**

1. ASP.Net The Complete Reference, Matthew MacDonald, Tata McGraw Hill Edition, First Edition
2. Microsoft ASP.Net 4 Step by Step, George Shepherd, Microsoft Press, First Edition

**Reference Books :**

1. Professional ASP .NET 2.0, Alex Homer, Dave Sussman, and Rob Howard Wrox Publication, Second edition.
2. ASP.Net core in action, Andrew lock, manning Publication, Second edition, 2021.
3. Programming ASP.NET core, Dino Esposito, Microsoft publishers, First Edition.

**Web References:**

1. <http://www.tutorialspoint.com>
2. <http://www.microsoft.com/learning/en/us/certification/mcsd.aspx>
3. [https://www.w3schools.com/asp/asp\\_ajax.asp](https://www.w3schools.com/asp/asp_ajax.asp)
4. <https://docs.microsoft.com/en-us/aspnet/core/?view=aspnetcore-5.0>
5. <https://asp.net-tutorials.com/>

**App References:**

1. Learn ASP.NET, Sky Apper
2. Learn ASP.Net Offline, JustForYouLimited
3. ASP.NET Tutorial Offline, Nestic

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Book – 1 Chapter : 1,2,5
2	Book – 1 Chapter : 7,27

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3	Book – 1 Chapter : 10,11 Book – 2 Chapter : 7
4	Book – 1 Chapter : 12,13 Book – 2 Chapter : 10
5	Book – 2 Chapter : 22,23 Book – 1 Chapter : 18

**PRACTICALS**

<b>Unit No.</b>	<b>List of practical</b>
<b>1</b>	<ol style="list-style-type: none"> <li>1. Prepare only GUI of Login screen with appropriate control.</li> <li>2. Prepare only User interface design of Registration form.</li> <li>3. Prepare only user interface design of contact us page.</li> <li>4. Prepare only user interface design of your blog page.</li> <li>5. Prepare only user interface of password change.</li> </ol>
<b>2</b>	<ol style="list-style-type: none"> <li>1. In login screen, when user press login button then compare user id and password with static data and give appropriate message to user.</li> <li>2. Design a web form of student admission form with appropriate controls. Also give proper validation in the form and when user presses submit button then it should be displays registration successful message on screen.</li> <li>3. Create a web form of students mark sheet with appropriate validation as per below fields : Student Roll No, Name, Course, semester , email id , mobile number , Marks of five subjects, total, per , grade and result (Pass / Fail)When user input details up to marks and press submit button then on the next page, it should be displayed Roll No, Name, Result , Per , grade and result.</li> <li>4. Create a web form of simple calculator with basic facility and validation.</li> <li>5. Create a web form of billing which contains the following controls: ListBox, Button , Image, Label, Text box or any other required control</li> <li>6. The listbox is used to list items available in the hardware store. When the user clicks on an item in the listbox, its image is displayed in the image control &amp; price in the label. Also entry quantity of that item in the text box and when the user clicks the button, the cost of the selected item is displayed in the label control.</li> </ol>
<b>3</b>	<ol style="list-style-type: none"> <li>1. Create a web page which illustrates the concept of cascading style sheets in ASP.NET.</li> <li>2. Create a web page which illustrates the concept of Theme &amp; Skin in ASP.NET</li> <li>3. Design a simple web application home page to illustrate the concept of master page in ASP.NET</li> <li>4. Develop a web page which implements the concept of state management using Cookies, Session and Application.</li> </ol>

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	<ol style="list-style-type: none"> <li>5. Create a web page to implement the concept of state management using ViewState and QueryString.</li> <li>6. Create a web application which demonstrates the various tags in Web.config file for ASP.NET configuration.</li> <li>7. Apply an appropriate exception handling in login page</li> <li>8. Apply an appropriate exception handling in student Mark sheet web portal.</li> <li>9. Apply an appropriate exception handling in Calculator webpage.</li> <li>10. Apply various themes on web page and change as per user selection.</li> </ol>
<b>4</b>	<ol style="list-style-type: none"> <li>1. Create one user sign up form and store details in database. After that, compare user id and password of login screen using database connectivity.</li> <li>2. Design a web form of student registration with appropriate fields. When student press submit button then all the details should be stored in database and generate user id (same as email) and password.</li> <li>3. Design a web form of Password change with appropriate controls. When user enter user id and password then it should be compare from database , once it is successful then display appropriate message .</li> <li>4. Design a web form of Employee recruitment form with appropriate controls and Write a code of database connectivity (connection object), Fetching and inserting data from database (command object) and using Data Reader. Provide a facility of add, update, delete and search option button in the form.</li> <li>5. Design a web form of Students mark sheet with appropriate controls &amp; Write a code to allow the admin to ADD, UPDATE, MODIFY, DELETE &amp; SEARCH facility, once he has logged into the website using Bound and Unbound Controls.</li> </ol>
<b>5</b>	<ol style="list-style-type: none"> <li>1. Implement the concept of AJAX in Student Mark sheet project.</li> <li>2. Implement the concept of AJAX in Employee Recruitment web portal.</li> <li>3. Implement the concept of AJAX in billing project.</li> <li>4. Create a web form which implements the concept of Web services.</li> <li>5. Create a web application which will use the data from other web portal using web services.</li> </ol>

**Case Study**

Create a web application of Online MCQ base examination with appropriate facilities like students registration, list of subjects and questions entries , schedule a test with date and time limit, conduct exam and display result with correct ,incorrect and skip questions at the end of exam.



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Requirement of Laboratory Support :

Students need to install "Python, Visual Studio" using  
<https://code.visualstudio.com/download>

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- **Course** : B.C.A.
  - **Sem.** : 6
  - **Subject Code** : 05BC0611
  - **Subject** : **Mini Project – 5 (PHP)**
  - **Objective** : The objectives are as follows:
    1. To apply programming knowledge for solving Industrial (or society) problems.
    2. To collect, analyze requirement, plan, schedule, and monitor the software project.
    3. Development and coding software modules.
    4. Testing of large project cohesively.
    5. Documentation of project.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
2	6	12	10	10	22	NA	NA	100

- **Prerequisites** : Basic knowledge of HTML, JS, CSS and PHP.

**Guidelines**

- The project definition should be finalized internally at the beginning of semester.
- It is recommended that the team should be of 1-3 students. Project plan along with the division of work amongst team mates would have been prepared and got approved within a week of the starting of semester from internal guide or project coordinator.
- It is recommended to follow different software engineering framework activities for the project development like requirement collection, designing model, coding, testing etc.
- Coding standards should be followed meticulously. At the minimum, the code should be self-documented, modular, and should use the meaningful naming convention.
- It is advisable that object-oriented methodology is used with reusability of classes and code, etc.



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- A complete code is mandatory to present at the end of semester for evaluation. Student may be asked to write the code related to the project during examination.

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- Project can be developed using PHP Subject of previous semester which has been already learnt and coding should be in cooperated during project development.

**Accomplishments of the student after completing the course:**

- Doing the project will enable the student to go through rich experience in developing projects & application of programming knowledge. Such an experience will include encountering various technical issues, finding sources to resolve the issues and finally finding the solution of all these issues satisfactorily.
- Thinking analytically, analyzing and synthesizing requirements and complicated information for getting a good comprehension of the solution methodology to be adopted.
- Ability to document and write well.
- Organizing the time effectively.
- Working with teammates and generating substantial output of the efforts.
- It will prepare the students for analyzing and programming for industrial problem and large projects working future.

**Course Outcomes:**

1. Students will be able to learn the Apache Web Server configuration
2. Students will be able to understand the concept of Conditional, Looping and Array notion in Web Application Design and development.
3. Students will be able to develop web application using session and cookie concepts in PHP.
4. Students will learn PHP scripting language and deploying application on Apache Web Server.
5. Students will be able to integrate AJAX and JQuery implementation in PHP.

**Course Outcomes – Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	L	M	H	L							M
CO2					H	H		H	M		
CO3			M			H				M	
CO4	M				L		H				H
CO5				H				L	H	M	

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**Text Book:**

1. Julie C Meloni, "Sams Teach Yourself PHP, MySQL and Apache All in One" 4<sup>th</sup> edition, Pearson Education.
2. HTML5 Black Book: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and Jquery, by Kogent Learning Solutions Inc.

**Reference Book:**

1. James Lee and Brent Ware, "Open source web development with LAMP" , Pearson Education. 2.
2. Jason Gerner, Morgan Owens, Elizabeth Naramore, Matt Warden, "Professional LAMP: Linux, Apache, MySQL and PHP5 Web Development" WROX publication.
3. PHP6 and MySQL Bible –Steve Suehring, Tim Converse and Joyce Park – Wiley India Edition.
4. PHP and MySQL Web Development – Luke Welling, Laura Thomson – Pearson
5. Beginning Ajax with PHP From Novice to Professional, By Lee BabinApress
6. Head First AJAX by Rebecca Riordan , O’Reilly Media
7. Head First PHP & MySQL by Lynn Beighley, Michael Morrison, O’Reilly Media
8. Head First jQuery by Ryan Benedetti and Ronan Cranley, O’Reilly Media
9. Learning jQuery By Jonathon chaffer and Karl Swedberg, O’Reilly Media

**Web References:**

1. <http://www.codecademy.com/learn>
2. <https://www.udemy.com/learn-html5-programming-from-scratch/>
3. <http://www.w3schools.com>
4. <http://www.tutorialspoint.com/ajax/>
5. <http://www.tutorialspoint.com/jquery/>
6. <http://www.tutorialspoint.com/php>

**App References:**

1. Udemy
2. Tutorialspoint
3. SoloLearn

Requirement of Laboratory Support :

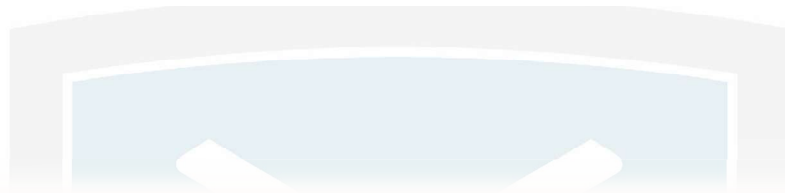
Students need to install "Xampp" using

**<https://www.apachefriends.org/download.html>**



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University  
Marwadi Chandarana Group

NAAC



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[www.marwadiuniversity.ac.in](http://www.marwadiuniversity.ac.in)

For Admission Enquiries, Call or WhatsApp:  
 **8980030090**

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