UNIVERSITY OF JAMMU

NOTIFICATION
(20/May/Adp/01)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the revised Syllabi and Courses of Study in the subject of **Bachelor Degree of Computer Applications (BCA)** for semesters I to VI under the **Choice Based Credit System** at the Undergraduate level **(as given in the Annexure)** for the examinations to be held in the years indicated against each semester as under:-

Subject	Semester	Course Code	For the examinations to be held in the year	% of Change
BCA	Semester-I	UBCATC-101	Dec.2020, 2021 and 2022	80%
		UBCATC-102	Dec.2020, 2021 and 2022	60%
		UBCAPC-160	Dec. 2020, 2021 and 2022	
		UBCAPC-161	Dec. 2020, 2021 and 2022	
	Semester-II	UBCATC-201	May 2021, 2022 and 2023	70%
		UBCATC-202	May 2021, 2022 and 2023	70%
		UBCAPC-260	May 2021, 2022 and 2023	
		UBCAPC-261	May 2021, 2022 and 2023	
	Semester-III	UBCATC-301	Dec 2021, 2022 and 2023	60%
		UBCATC-303	Dec 2021, 2022 and 2023	100%
		UBCAPC-360	Dec 2021, 2022 and 2023	
		UBCAPC-361	Dec 2021, 2022 and 2023	
		UBCAPS-351	Dec 2021, 2022 and 2023	25%
	Semester-IV	UBCATC-403	May 2022, 2023 and 2024	100%
		UBCATC-404	May 2022, 2023 and 2024	100%
		UBCAPC-460	May 2022, 2023 and 2024	
		UBCAPC-461	May 2022, 2023 and 2024	
		UBCAPS-452	May 2022, 2023 and 2024	90%
	Semester-V	UBCAPS-552	Dec. 2022, 2023 and 2024	80%
		UBCATE-501	Dec. 2022, 2023 and 2024	65%
		UBCAPE-560	Dec. 2022, 2023 and 2024	
		UBCATE-502	Dec.2022, 2023 and 2024	100%
		UBCAPE-561	Dec.2022, 2023 and 2024	
		UBCATE-503	Dec. 2022, 2023 and 2024	100%
		UBCAPE-562	Dec. 2022, 2023 and 2024	

BCA	Semester-VI	UBCAPS-651	May 2023, 2024 and 2025	100%
		UBCAPE-650	May 2023, 2024 and 2025	
		UBCATE-603	May 2023, 2024 and 2025	100%
		UBCAPE-660	May 2023, 2024 and 2025	
		UBCATE-604	May 2023, 2024 and 2025	100%
		UBCAPE-661	May 2023, 2024 and 2025	

The Syllabi of the courses is also available on the University website: www.jammuuniversity.ac.in

Sd/-
DEAN ACADEMIC AFFAIRS

No. F.Acd/II/20/105-148.
Dated: 01-06-2020

Copy to:
1. Dean, Faculty of Mathematical Sciences
2. HOD/Convener, Board of Studies in Computer Science & IT
3. All members of the Board of Studies
4. C.A. to the Controller of Examinations
5. Director, Computer Centre, University of Jammu
6. Asst. Registrar (Conf. /Exams. UG)
7. Incharge University Website for necessary action please

Deputy Registrar (Academic)

DEPARTMENT OF COMPUTER SCIENCE & IT,
UNIVERSITY OF JAMMU, JAMMU

BACHELOR OF COMPUTER APPLICATION (CBCS)

COURSE WISE PERCENTAGE CHANGE IN THEORY COURSES

Semester-I

Course Type	Course No.	Course Name	Percentage Change	Remarks
Core Courses	UMTTC-###	As applicable for B.A./B.Sc. "Mathematics"	-	-
	UBCATC-101	Computer Fundamentals	80%	
	UBCATC-102	Problem solving using C-language	60%	
	UBCAPC-160	Practicals-Based on UBCATC-101		
	UBCAPC-161	Practicals-Based on UBCATC-102		
Ability Enhancement Compulsory Courses (AECC)		EVS-1	-	-
		Communication English-1	-	-
Skill Enhancement Courses (SEC)				
Discipline Specific Elective (DSE)				

Semester-II

Course Type	Course No.	Course Name	Percentage Change	Remarks
Core Courses	UMTTC-###	As applicable for B.A./B.Sc. "Mathematics"	-	-
	UBCATC-201	Data and File Structures using C-language	70%	
	UBCATC-202	Fundamentals of Digital Electronics	70%	
	UBCAPC-260	Practicals-Based on UBCATC-201		
	UBCAPC-261	Practicals-Based on UBCATC-202		
Ability Enhancement Compulsory Courses (AECC)		EVS-2	-	-
		Communication English-2	-	-
Skill Enhancement Courses (SEC)				
Discipline Specific Elective (DSE)				

Semester-III

Course Type	Course No.	Course Name	Percentage Change	Remarks
Core Courses	UMTTC-###	As applicable for B.A./B.Sc. Mathematics"	-	-
	UBCATC-301	Fundamentals of Operating System	60%	
	UBCATC-303	Object Oriented Programming Using C++	100%	Course Changed
	UBCAPC-360	Practicals-Based on UBCATC-301		
	UBCAPC-361	Practicals-Based on UBCATC-303		
Ability Enhancement Compulsory Courses (AECC)				
Skill Enhancement Courses (SEC)	UBCAPS-351	PC Assembly and Installation	25%	
Discipline Specific Elective (DSE)				

Semester-IV

Course Type	Course No.	Course Name	Percentage Change	Remarks
Core Courses	UMTTC-###	As applicable for B.A./B.Sc. "Mathematics"	-	-
	UBCATC-403	Database Management System& SQL	100%	
	UBCATC-404	Java Programming	100%	
	UBCAPC-460	Practicals-Based on UBCATC-403		
	UBCAPC-461	Practicals-Based on UBCATC-404		
Ability Enhancement Compulsory Courses (AECC)				
Skill Enhancement Courses (SEC)	UBCAPS-452	Information Security	90%	
Discipline Specific Elective (DSE)				

Semester-V

Course Type	Course No.	Course Name	Percentage Change	Remarks
Core Courses				
Ability Enhancement Compulsory Courses (AECC)				
Skill Enhancement Courses (SEC)	UBCAPS-552	Multimedia Computing	80%	
Discipline Specific Elective (DSE)	UBCATE-501 & UBCAPE-560	VB.Net Practicals- Based on UBCATE-501	65%	
	UBCATE-502 & UBCAPE-561	PHP Practicals- Based on UBCATE-502	100%	New Course added
	UBCATE-503 & UBCAPE-562	Computer Network and Internet Practicals- Based on UBCATE-503	100%	New Course added
	UMTTE-###	As applicable for B.A./B.Sc. "Mathematics"	-	-

Semester-VI
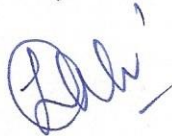
Course Type	Course No.	Course Name	Percentage Change	Remarks
Core Courses				
Ability Enhancement Compulsory Courses (AECC)				
Skill Enhancement Courses (SEC)	UBCAPS- 651	Software Engineering	100%	New Course added
Discipline Specific Elective (DSE)	UBCAPE-650	Project		
	UBCATE-603 & UBCAPE-660	Android Programming Practicals- Based on UBCATE-603	100%	Course Shifted
	UBCATE-604 & UBCAPE-661	Python Practicals- Based on UBCATE-604	100%	New Course introduced
	UMTTE-###	As applicable for B.A./B.Sc. "Mathematics"	-	-

BCA SYLLABUS

UNDER

CHOICE BASED CREDIT SYSTEM

FOR THE STUDENTS TO BE ADMITTED IN THE
SESSIONS 2020-21, 2021-22, 2022-23

UNIVERSITY OF JAMMU, JAMMU

BACHELOR OF COMPUTER APPLICATION
(Choice Based Credit System)
(Effective for the sessions 2020-21, 2021-22 and 2022-23)

1. BCA Programme

The Bachelor of Computer Application (B.C.A.) is an undergraduate programme of three years' duration based on Semester System and consists of **six** semesters. Each semester will be approximately 5 months' duration (minimum 90 working days in a semester). A candidate admitted to the BCA programme will be required to pass the course within the prescribed academic years from the year of admission to the first semester.

PASSING CRITERION

The minimum Grade/Grade Point required to pass each paper in a semester examination under CBCS shall be **Grade D/Grade Point 4** in each theory paper/practical/project (wherever applicable) in External Examination and Internal Assessment separately.

DETERMINATION OF GRADES (Grading System and Computation of SGPA, CGPA)
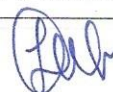
Grading System:

Absolute grading would be used where the marks obtained are converted to grades based on pre-determined class intervals. To implement the following grading system, the colleges /campuses shall use the following UGC recommended 10-point grading system:

Table 1: Letter Grades and Grade Points

Marks (%)	Letter Grades	Grade Points (G)
90-100	O (Outstanding)	10
80 to <90	A+ (Excellent)	9
70 to <80	A (Very Good)	8
60 to <70	B+ (Good)	7
50 to <60	B (Above Average)	6
40 to <50	C (Average)	5
36 to <40	D (Pass)	4
0to < 36	F (Fail)	0
	AB (Absent)	0

(i) A student obtaining Grade F shall be considered failed and will be required to reappear in the examination as per existing rules of the university under Semester System for Under Graduate Courses.

(ii) Grade (D) or percentage of marks (36%) is required to pass in a course, SGPA of

4 to qualify a semester and a minimum CGPA of 4 to qualify for a UG degree.

Computation of SGPA and CGPA

The following procedure shall be used to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

(i) The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e. **SGPA (S)** $= \Sigma (C_i \times G_i) / \Sigma C_i$; where C_i is the number of credits earned and G_i is the grade point scored by the student in the ith course.

(ii) The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e. **CGPA** $= \Sigma (C_i \times S_i) / \Sigma C_i$ where S_i is the SGPA of the ith semester and C_i is the total number of credits in that semester.

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

2. Eligibility:

Admission to Semester-I of BCA course, under CBCS, shall be open to those candidates who have passed Higher Secondary Part-II examination (under 10+2 pattern) of the J&K State Board of School Education or an examination recognized by the University as equivalent thereto with Mathematics as one of the elective subjects and has obtained not less than 50% of the aggregate marks in the qualifying examination in case of General Category and 45% marks in case of SC/ST candidates.

Provided that the admission in the Govt. Colleges/Non-Government Colleges affiliated to University of Jammu shall be made directly by the Admission Committee of the College concerned on the basis of marks obtained by the candidate/s in the qualifying examination.

Provided that Non-Government Colleges shall follow the same admission schedule and procedure/statutes as are applicable for Govt. Colleges.

Provided further that the admission to Non-Local Candidates in Non-Govt. Colleges shall be granted under the second preference category.

3. Course Structure

(SEMESTER-WISE COURSE DISTRIBUTION)

Semester-I

Course Type	Course No.	Course Name	Credits
Core Courses	UMTTC-###	As applicable for B.A./B.Sc. "Mathematics"	6
	UBCATC-101	Computer Fundamentals	4
	UBCATC-102	Problem Solving using C-language	4
	UBCAPC-160	Practical (Based on UBCATC-101)	2
	UBCAPC-161	Practical (Based on UBCATC-102)	2
Ability Enhancement Compulsory Courses (AECC)		EVS-1	2
		Communication English-1	2
Skill Enhancement Courses (SEC)			
Discipline Specific Elective (DSE)			
Total Credits			**22**

Semester-II

Course Type	Course No.	Course Name	Credits
Core Courses	UMTTC-###	As applicable for B.A./B.Sc. "Mathematics"	6
	UBCATC-201	Data and File Structures using C-Language	4
	UBCATC-202	Fundamentals of Digital Electronics	4
	UBCAPC-260	Practical (Based on UBCATC-201)	2
	UBCAPC-261	Practical (Based on UBCATC-202)	2
Ability Enhancement Compulsory Courses (AECC)		EVS-2	2
		Communication English-2	2
Skill Enhancement Courses (SEC)			
Discipline Specific Elective (DSE)			
Total Credits			**22**

Semester-III

Course Type	Course No.	Course Name	Credits
Core Courses	UMTTC-###	As applicable for B.A./B.Sc. "Mathematics"	6
	UBCATC-301	Fundamentals of Operating System	4
	UBCATC-303	Object Oriented Programming using C++	4
	UBCAPC-360	Practical (Based on UBCATC-301)	2
	UBCAPC-361	Practical (Based on UBCATC-303)	2
Ability Enhancement Compulsory Courses (AECC)			
Skill Enhancement Courses (SEC)	UBCAPS-351	PC Assembly and Installation	4
Discipline Specific Elective (DSE)			
Total Credits			22

Semester-IV

Course Type	Course No.	Course Name	Credits
Core Courses	UMTTC-###	As applicable for B.A./B.Sc. "Mathematics"	6
	UBCATC-403	Database Management System & SQL	4
	UBCATC-404	Java Programming	4
	UBCAPC-460	Practical (Based on UBCATC-403)	2
	UBCAPC-461	Practical (Based on UBCATC-404)	2
Ability Enhancement Compulsory Courses (AECC)			
Skill Enhancement Courses (SEC)	UBCAPS-452	Information Security	4
Discipline Specific Elective (DSE)			
Total Credits			22

Semester-V

Course Type	Course No.	Course Name	Credits
Core Courses			
Ability Enhancement Compulsory Courses (AECC)			
Skill Enhancement Courses (SEC)	UBCAPS-552	Multimedia Computing	4
Discipline Specific Elective (DSE)	UBCATE-501 & UBCAPE-560	VB.Net Practical (Based on UBCATE-501)	6 (4+2)
	OR UBCATE-502 & UBCAPE-561	**OR** PHP Practical (Based on UBCATE-502	
	UBCATE-503 & UBCAPE-562	Computer Network and Internet Practical (Based on UBCATE-503)	6
	UMTTE-###	As applicable for B.A./B.Sc. "Mathematics"	6
Total Credits			22

Semester-VI

Course Type	Course No.	Course Name	Credits
Core Courses			
Ability Enhancement Compulsory Courses (AECC)			
Skill Enhancement Courses (SEC)	UBCAPS-651	Software Engineering	4
Discipline Specific Elective (DSE)	UBCAPE-650	Project	6
	UBCATE-603 & UBCAPE-660	Android Programming Practical (Based on UBCATE-603)	6 (4+2)
	OR UBCATE-604 & UBCAPE-661	**OR** Python Practical (Based on UBCATE-604)	
	UMTTE-###	As applicable for B.A./B.Sc. "Mathematics"	6
Total Credits			22

Total Credits =22+22+22+22+22+22=132

4. Scheme for Credit Assignment

Type of Course	No. Credits	No. of hours per week
Theory	2	2
	4	4
Practical	2	4
	4	8

5. Scheme for Examination/Assessment

The evaluation of each course of 4 credits shall contain two parts: Internal or in Semester Assessment (IA) and External or End-Semester Assessment (EA). The internal grade awarded to the students in each course in a semester shall be published on the notice board at least one week before the commencement of end semester examination. The responsibility of evaluating the internal assessment is vested on the teacher(s) who teaches the course. There will be University Examinations at the end of each semester for both theory and Practical. 20% of the marks allotted to each theory paper and 50% of the marks allotted to each practical paper wherever prescribed, shall be reserved for internal assessment. The evaluation of a candidate shall be awarded and record thereof maintained in accordance with the regulations prescribed for the purpose under the CBCS as per the following:

THEORY	Syllabus to be covered in the examination	Time allotted	% Weightage (Marks)
Internal Assessment Test	Upto 50% (after 45 days)	1 hour	20
External End Semester University Examination	Upto 100% (after 90 days)	2 hours 30 minutes	80
Total			**100**
PRACTICAL			
Internal Examination		50 (20% for attendance,20%for Viva-Voce,20%for File and 40% for written test)	
External Examination	100% Syllabus	50 (80% for written test+20%for Viva-Voce)	
Total		**100**	

In case of failure/re-appear category the Internal Assessment earned by the candidate as a regular student shall be carried forward to the subsequent examination.

BCA-FIRST SEMESTER

Total Marks	=	100	Int. Assessment	=	20 marks
No. of Credits	=	4	Semester Exam.	=	80 marks

Time allotted for Major Test = 2 ½ Hrs
Examination to be held: December 2020, 2021, 2022

COURSE NO. : **UBCATC-101**
COURSETITLE : **COMPUTER FUNDAMENTALS**

UNIT-I

Computer and its Characteristics, Applications of Computer, Digital and Analog Computer, Generation of Computer, Computer Types: Mainframe Computer, Super Computer, Mini Computer. Memory: RAM, ROM, EEPROM, UVPROM, Units of Measurement of Storage. Hard Disk Drives, Floppy Disk, Magnetic Tapes, Optical Disks: CD, DVD, Input and Output Devices: Keyboard, Mouse, Joystick, Scanner, OCR, OMR, Web Camera, Monitor, Printer and its Types.

UNIT-II

Software and its Types (System Software, Application Software, Firmware) Computer Languages and its Types (Machine Language, Assembly Language, High Level Language: Merits and Demerits of Computer Languages), Translators: Compiler, Linker, Interpreter, Loader, Computer Virus and its Types (Trojan, Malware, Spyware), Antivirus Software.

UNIT-III

Number System: Decimal, Binary, Octal, Hexadecimal, Conversion of One Number System to another, Arithmetic Operations: Addition, Subtraction, Multiplication. Complement Methods: r's and (r-1)'s Complement, Fractional Numbers, Conversion of Fractional Number.

UNIT-IV

Operating System and Its Types, Functions of Operating System, Windows Operating System and its Features, Desktop Elements: Icons, My Computer, Recycle Bin, Taskbar, Network Places, My Documents, Anatomy of Window: Title Bar, Menu Bar, Tool Bar, Control Buttons, Scroll Bars, Document Area and Status Bar. Control Panel, Boot Options, Disk Formatting, Disk Partitioning, Defragmentation, Disk Clean-Up, Magnifier, Narrator, On-Screen Keyboard.

UNIT-V

Introduction to Computer Network, Centralized vs. Distributed Processing System, Network Operating Systems and their features, Data Communication, Components of Data Communication, Network Protocols, Data Transmission Mode, LAN, MAN, WAN, LAN Topologies: Ring, Bus, Star, Mesh and Tree Topologies, Internet, Intranet, IP Address, DNS, Web Page, Website, Browsers, URL, E-Mail, Applications of Internet.

SUGGESTED READINGS:

1. Pradeep K. Sinha and Priti Sinha, "Computer fundamentals", BPB publications, 2010.
2. A. Leon, A and L. Mathews, "Fundamentals of information technology", Leon Press, 1999.
3. Suresh K. Basandra, "Computers today", Galgotia publications, 2002.
4. Peter Norton, "Introduction to computers", Sixth Edition Tata McGraw-Hill, 2007.

BCA-FIRST SEMESTER

Contd.

Total Marks	=	100	Int. Assessment	= 20 marks
No. of Credits	=	4	Semester Exam.	= 80 marks

Time allotted for Major Test = 2 ½ Hrs

Examination to be held: December 2020, 2021, 2022

COURSE NO. : **UBCATC-101**

COURSE TITLE : **COMPUTER FUNDAMENTALS**

5. Joyce Coax, Joan Preppernau, Steve Lambert and Curtis Frye, "2007 microsoft® office system step by step", Microsoft Press, 2008.

6. R. K. Taxali, "PC Software for Windows", Tata McGraw-Hill Publishers Pvt. Ltd.

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A

Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B

Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C

It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-FIRST SEMESTER

Total Marks = 100	Int. Assessment : 20 marks
No. of Credits = 4	Semester Exam. : 80 marks
Time allotted for Major Test = 2 ½ Hrs	
Examination to be held: December 2020, 2021, 2022	

COURSE NO. : *UBCATC-102*
COURSE TITLE : *PROBLEM SOLVING USING C-LANGUAGE*

UNIT-I

Basics of Programming: Steps for Problem Solving, Program Design tools: Algorithm, Pseudo code and Flowchart Designing.
Programming Errors: Syntax, Run-time, Logical Errors.
Basics of C language: Structure of C Program, Data Types, Identifiers, Keywords, Variables, Constants, Tokens, Operators, sizeof(), Operator Precedence and Associativity, Type Conversion, C-Preprocessor, Pre-processor Directives, Symbolic Constants, Input-Output Functions.

UNIT-II

Control Statements: if, if-else, Nested if, Ternary Operator, if-else-if ladder, switch-case, goto statement.
Loops Control Statements: Loop Control, while(), do-while(), for(), break statement, continue statement, Nested Loops.
Introduction to Arrays, Single and Double Dimensional Arrays, Initializing and Accessing Arrays, Bounds Strings, Array of Strings.

UNIT-III

Functions: Types of Functions, Function Prototype, Function Declaration, Function Definition, Scope, Local and Global Variables, Static Variables, Passing Parameters to Functions, Call by Value and Call by Reference, Passing String to Functions, Passing Array to Functions, String Handling Functions, Macro Substitution.
Pointers: Introduction to Pointers, Pointer Arithmetic, Accessing Arrays using Pointers, String Manipulation using Pointers.

UNIT-IV

User Defined Data Types: Introduction to Structures, Array of Structures, Nesting of Structures, Pointer to Structures, Passing Structure to a Function, Unions and Enumerations, Pointer to Structure, Self-Referential Structure.
Storage Classes, Types of Storage Classes with Examples.

UNIT-V

Data and File Handling: Introduction to Data Files, File Opening Modes, File Handling Functions: fopen(), fprintf(), fscanf() etc., Managing Records in a File, File Accessibility (Sequential and Random Access), Command Line Arguments, Managing Text Files.

BCA-FIRST SEMESTER

Contd.		
Total Marks = 100	Int. Assessment :	20 marks
No. of Credits = 4	Semester Exam. :	80 marks
Time allotted for Major Test = 2 ½ Hrs		
Examination to be held: December 2020, 2021, 2022		

COURSE NO. : **UBCATC-102**
COURSE TITLE : **PROBLEM SOLVING USING C-LANGUAGE**

SUGGESTED READINGS:

1. B. Kernighan and D. Ritchie, "The ANSI C Programming Language", PHI, 2000.
2. Shubhnandan S. Jamwal, "Programming in C", Pearson Publications, 2014.
3. Yashwant Kanetkar, "Let us C", BPB Publications, 2002.
4. Behrouz A. Forouzan and Richard F. Gilberg, "Computer Science: A Structured Programming Approach Using C", PHI, 3rd Edition, 2007.
5. E. Balaguruswamy, "Programming in ANSI C", Tata McGraw-Hill publications, 4th Edition, 2008.
6. Jeri R. Hanly and Elliot B. Koffman, "Problem Solving and Programming in C", Pearson, 5th Edition 2007.
7. S. K. Srivastava and Deepali Srivastava, "C in depth", BPB Publications, 2018.

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A
Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B
Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C
It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

-x-

BCA-FIRST SEMESTER

TITLE: Practical (Based on UBCATC-101)

Course No. :	**UBCAPC-160**	Duration of Examination	: 3 Hrs
No. of Credits =	2	Total Marks	= 50
Examination to be held: December 2020, 2021, 2022			

In this course the students shall be exposed to various practical problems based on the above topic and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct one internal evaluation test for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on written test, viva-voce, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:

External Examination = 25 marks

- Written Test = 20 marks
- Viva Voce = 5 marks

Internal Examination = 25 marks

- Written Test = 10 marks
- Viva Voce = 5 marks
- Practical File = 5 marks
- Attendance = 5 marks

-X-

BCA-FIRST SEMESTER

TITLE: Practical (Based on UBCATC-102)

Course No.	: UBCAPC-161	Duration of Examination	: 3 Hrs
No. of Credits	= 2	Total Marks	= 50
Examination to be held: December 2020, 2021, 2022			

In this course the students shall be exposed to various practical problems based on the above topic and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct one internal evaluation test for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on written test, viva-voce, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:

External Examination = 25 marks

- Written Test = 20 marks
- Viva Voce = 5 marks

Internal Examination= 25 marks

- Written Test = 10 marks
- Viva Voce = 5 marks
- Practical File = 5 marks
- Attendance = 5 marks

-X-

BCA-SECOND SEMESTER

Total Marks = 100
No. of Credits = 4
Time allotted for Major Test = 2 ½ Hrs
Examination to be held: May 2021, 2022, 2023

Int. Assessment = 20 marks
Semester Exam. = 80 marks

COURSE NO.   : UBCATC-201
COURSE TITLE : DATA AND FILE STRUCTURES USING C-LANGUAGE

UNIT-I

Basics of Data Structures: Structure and Problem Solving, Data Structures, Data Structure Operations, Algorithm: Complexity, Time- Space Trade-Off, Complexity Measures: Big O Notation.
Arrays: Introduction, Insertion and Deletion in Arrays, Multidimensional Arrays and Operations, Array Access Formula.

UNIT-II

Linked List: Linked Lists, Representation of Linked Lists in Memory, Basic Operations Traversing a Linked List, Searching, Insertion and Deletion in a Linked List, Types of Linked List, Header Linked List, Doubly Linked List. Application of Linked List, Representation of Sparse Array and Sparse Matrix, Representation of Polynomials.

UNIT-III

Stack: Introduction, Array Representation of Stack, Linked List Representation of Stack, Basic Operations: Push, Pop.
Applications of Stack: Polish Notation, Infix to Postfix, Infix to Prefix, Evaluation of Expressions, Recursion, Applications of Recursion.
Queues: Array Representation and Linked List Representation of Queues, Basic Operations, Enqueue, Dequeue.

UNIT-IV

Trees and Graphs: Definitions and Concepts, Binary Trees, Representation of Binary Tree, Tree Traversal Techniques, Binary Search Trees, Complete Binary Tree, Heaps, Graph, Sequential and Linked Representation of Graph, Graph Traversal.

UNIT-V

Searching Techniques: Internal and External Search, Linear Search, Binary Search and their Complexities.
Sorting Techniques: Internal and External Sort, Bubble Sort, Quick Sort, Selection Sort, Insertion Sort, Heap Sort, Merge Sort and their Complexities.
File Structure: Byte, Field, Record, File, File Organization and File Access Methods, Sequential, Random, Direct and Indexed Sequential Organization Method.

SUGGESTED READINGS:

1. G. A. V. Pai, "Data Structures and Algorithms: Concepts, Techniques and Applications", Tata McGraw-Hill, July 2017.
2. Vishal Goyal, "A Simplified Approach to Data Structures", Shroff Publishers Pvt. Ltd, 2014.

BCA-SECOND SEMESTER

Contd.

Total Marks = 100	Int. Assessment = 20 marks
No. of Credits = 4	Semester Exam. = 80 marks
Time allotted for Major Test = 2 ½ Hrs	
Examination to be held: May 2021, 2022, 2023	

COURSE NO. : UBCATC-201
COURSE TITLE : *DATA AND FILE STRUCTURES USING C-LANGUAGE*

3. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, "Fundamentals of Data Structures in C", Universities Press, 2nd Edition 2008.
4. J. P. Tremblay and P. G. Sorenson, "Introduction to Data Structures with Applications", TMH, 2007.
5. Seymour Lipschutz, "Theory and Problems of Data Structures", Sehaum's Outline, Tata McGraw-Hill, 2006.
6. A. M. Tannenbaum, M. J. Augenstein and Y. Langsam, "Data Structures with C", PHI, 2006.

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A
Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B
Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C
It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-SECOND SEMESTER

Total Marks = 100	Int. Assessment = 20 marks
No. of Credits = 4	Semester Exam. = 80 marks
Time allotted for Major Test = 2 ½ Hrs	
Examination to be held: May 2021, 2022, 2023	

COURSE NO. : UBCATC-202
COURSE TITLE : *FUNDAMENTALS OF DIGITAL ELECTRONICS*

UNIT-I
Overview of Computers, Data Representation, Integer Representation, Floating Point Representation using IEEE Format, Rules of Floating Point Arithmetic, Error Detection, Parity, Checksum, Cyclic Redundancy Check, Error Detection and Correction Methods using Hamming Technique.

UNIT-II
Logic Gates: Basic Gates – AND, OR, NOT; Combination of Basic Gates: NAND, XOR, NOR, XNOR Gates; Logic Gates Truth Tables, Logic Symbols and Design. Universal Property of NAND and NOR Gates, Tri-state Logic. Representation of Computer Codes: ASCII Code, BCD Code, Excess-3 Code, Gray Code, Cyclic Code and their Arithmetic Operations.

UNIT-III
Boolean Algebra: Boolean Variables, Boolean Operators, Boolean Expressions, Laws of Boolean Algebra, De–Morgan Laws, Principle of Duality, Implementation of Boolean Expressions in Gates, Canonical Forms: SOP, POS; Simplification of SOP and POS Forms of Boolean Expressions, Minimization of Gates using K-Map Techniques. Combinational Circuits: Half Adder and Subractor, Full Adder and Subtractor, Parallel Adders and Subtractors, Multiplexer, De - Multiplexer, Encoder, Decoder.

UNIT-IV
Sequential Circuits: Concept of Clock – Level, Edge, Pulse Trigging; Flip Flops – RS, D, JK, T, Master-Slave Configuration, Cache Memory and its Working; Registers and its Types, Data Register, Shift Registers, Bi-Directional Register; Binary Counters – Ripple and Synchronous; RAM – Cell, Read, Write, Decoding, Organization; ROM – Cell, Internal Logic;

UNIT-V
Assembly Language: Characteristics of Assembly Language, Syntax and Basic Programming, Assembler and its Types: TASM and MASM, Assembler Directives and its Types, Procedures and Macros.
Instruction Set of 8085: Data Transfer, Arithmetic, Branch, Machine Control, Loop Instructions with Examples.

SUGGESTED READINGS:

1. Thomas L. Floyd, "Digital Fundamentals", Pearson Education India, 10th Edition, 2010.
2. Donald P. Leach, Albert Paul, Gautam Saha, "Digital Principles and Applications", McGraw-Hill publication, 8th Edition, 2014.
3. Atul P. Godse, Dr. Deepali A. Godse, "Digital Electronics (A Conceptual Approach)", Dhanpat Rai publications, 3rd Revised Edition, 2008.

BCA-SECOND SEMESTER

Contd.

Total Marks	= 100	Int. Assessment	= 20 marks
No. of Credits	= 4	Semester Exam.	= 80 marks

Time allotted for Major Test = 2 ½ Hrs
Examination to be held: May 2021, 2022, 2023

COURSE NO. : UBCATC-202
COURSE TITLE : *FUNDAMENTALS OF DIGITAL ELECTRONICS*

4. R. K. Gaur, "Digital Electronics and Microcomputers", Dhanpat Rai Publication, 4th Edition, 2012.

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A
Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B
Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C
It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-SECOND SEMESTER

TITLE: Practical (Based on UBCATC-201)

Course No. : **UBCAPC-260**		
No. of Credits = 2	**Duration of Examination** : 3 Hrs	
Examination to be held: May 2021, 2022, 2023	**Total Marks** = 50	

In this course the students shall be exposed to various practical problems based on the above topic and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct one internal evaluation test for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on written test, viva-voce, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:

External Examination = 25 marks

- Written Test = 20 marks
- Viva Voce = 5 marks

Internal Examination= 25 marks

- Written Test = 10 marks
- Viva Voce = 5 marks
- Practical File = 5 marks
- Attendance = 5 marks

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BCA-SECOND SEMESTER

TITLE: Practical (Based on UBCATC-202)

Course No.	: **UBCAPC-261**	Duration of Examination	: 3 Hrs
No. of Credits	= 2	Total Marks	= 50
Examination to be held: May 2021, 2022, 2023			

In this course the students shall be exposed to various practical problems based on the above topic and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct one internal evaluation test for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on written test, viva-voce, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:

External Examination = 25 marks

- Written Test   =   20 marks

- Viva Voce   =   5 marks

Internal Examination= 25 marks

- Written Test   =   10 marks

- Viva Voce   =   5 marks

- Practical File   =   5 marks

- Attendance   =   5 marks

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BCA-THIRD SEMESTER

Total Marks	= 100	Int. Assessment	= 20 marks
No. of Credits	= 4	Semester Exam.	= 80 marks
Time allotted for Major Test = 2 ½ Hrs			
Examination to be held: December 2021, 2022, 2023			

COURSE NO.   : **UBCATC-301**
COURSE TITLE   : **FUNDAMENTALS OF OPERATING SYSTEM**

UNIT-I

Introduction to Operating System: Definition, Evolution of Operating Systems, Types of Operating Systems: Batch Systems, Concepts of Multiprogramming and Time Sharing, Parallel, Distributed and Real Time Systems.

Operating System Structures, Components & Services, System Calls, System Programs, Virtual Machines.

UNIT-II

File System and Management: File Concepts, Access Methods, Directory Structure, Protection and Consistency, File System Structure, Allocation Methods: Continuous Allocation, Chained Allocation and Indexed Allocation.

Disk Structure & Scheduling Methods, Disk Management, Free Space Management.

UNIT-III

Process Management: Process Concepts, Process States and Process Control Block.

CPU Scheduling: Scheduling Criteria, Levels of Scheduling, Scheduling Algorithms: FCFS, SJF, Priority, Round Robin.

Deadlocks: Deadlock Characterization, Deadlock Prevention and Avoidance, Deadlock Detection and Recovery, Practical Considerations.

UNIT-IV

Memory Management: Logical and Physical Address Space, Swapping, Contiguous and Non-Contiguous Allocation, Paging, Segmentation, Demand Paging and its Performance.

Page Replacement Algorithms, FIFO, Optimal, LRU, Counting Based Page Replacement.

Allocation of Frames, Thrashing, Page Size and Other Considerations.

UNIT-V

Introduction to LINUX/UNIX: Various Parts of Operating System, Kernel, Important Parts of Kernel; Files and Directories: Pathname; Directory Tree; Current Working Directory; Relative Pathname; Referring to Home Directories; Device Files; File Permissions; Pipes; Tees; Mount, Init, Files, Directories, Processes.

Commands: pwd, mkdir, rmdir, ls, cat, more, mv, cp, rm, diff, wc, pwd, who write, who am i, passwd, ps, kill, date, cal, man, gzip, df, chmod, mkdir, cd. Filters: pr, head, tail, cut, paste, sort, uniq, nl, tr.

Regular Expression: grep; egrep; fgrep.

BCA-THIRD SEMESTER

Contd.	
Total Marks = 100	Int. Assessment = 20 marks
No. of Credits = 4	Semester Exam. = 80 marks
Time allotted for Major Test = 2 ½ Hrs	
Examination to be held: December 2021, 2022, 2023	
COURSE NO. : *UBCATC-301*	
COURSE TITLE : *FUNDAMENTALS OF OPERATING SYSTEM*	

SUGGESTED READINGS:

1. Abraham Silberschartz, Peter Baer Galvin and Greg Gagne, "Operating system Principles", WSE wiley, 2006.
2. Andrew. S. Tanenbaum and Herbert Bos, "Modern operating systems", Pearson Prentice Hall, 2015.
3. Harvey M. Deitel, "An Introduction to operating system", Addison-Wesley publications, 1984.
4. William Stallings, "Systems Internals and Design Principles", Pearson Education, 5th Edition, 2005.
5. Charles Crowley, "Operating System-A design oriented approach", Pearson Education, 2009.

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A

Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B

Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C

It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-THIRD SEMESTER

Total Marks	= 100	Int. Assessment	= 20 marks
No. of Credits	= 4	Semester Exam.	= 80 marks
Time allotted for Major Test = 2 ½ Hrs			
Examination to be held: December 2021, 2022, 2023			
COURSE NO.	: UBCATC-303		
COURSE TITLE	: *OBJECT ORIENTED PROGRAMMING USING C++*		

UNIT-I

Need of Object Oriented Programming, Evolution of Object Oriented Methodology and C++, Comparison of Object Oriented and Procedure Oriented Approaches.

Basic Concepts of Object Oriented Approach: Objects, Classes, Encapsulation, Abstraction, Inheritance, Reusability, Polymorphism and Overloading.

Basic Program Construction, Data Types, Keywords, Constants, Storage Classes, Comments, Escape Sequence, Type Conversion, Operators in C++, Scope Resolution Operators, Member Dereferencing Operators, New and Delete Operator, Control Statements, Operator Precedence.

UNIT-II

Structures and Classes, Classes and Objects, Passing and Returning Objects from Functions, Scope of the Members of Class, Arrays of Objects, Inline Functions, Static Members, Friendly Functions, this Pointer.

Constructors and its Types, Overloaded Constructors, Copy Constructors, Destructor.

Arrays and Strings, Accessing Elements in Arrays and Strings.

UNIT-III

Polymorphism, Operator Overloading, Overloading Unary and Binary Operators.

Inheritance: Base Class and Derived Class, Constructors in Inheritance, Types of Inheritance: Single Level, Multiple, Multilevel, Hierarchical, Hybrid Inheritance, Making a Private Member Inheritable, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Function Overriding, Virtual Functions.

UNIT-IV

Exceptions, Basics of Exception Handling, Exception Handling Mechanism, Throwing Mechanism, Catching Mechanism, Re-Throwing an Exception, Specifying User Defined Exceptions.

Templates Function, Template Classes.

UNIT-V

Working with Files: Introduction, Classes for File Stream Operations, Opening and Closing a File, Detecting End-of-File, Streams: Stream Classes, Stream Errors, Disk File I/O with Streams, File Pointers and their Manipulations, File Handling in Text and Binary Modes.

SUGGESTED READINGS:

1. E. Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill, 4th Edition, 2008.
2. Herbert Schildt, "C++ The Complete Reference", McGraw-Hill, 4th Edition, 2002.
3. Robert Lafore, "Object Oriented Programming in C++", Galgotia Publications, 3rd Edition, 2003.
4. Harvey M. Deitel and Paul J. Deitel, "C++: How to Program", Prentice Hall, 2006.

BCA-THIRD SEMESTER

Contd.
Total Marks   = 100
No. of Credits = 4
Time allotted for Major Test = 2 ½ Hrs
Examination to be held: December 2021, 2022, 2023

Int. Assessment   = 20 marks
Semester Exam.   = 80 marks

COURSE NO.   : UBCATC-303
COURSE TITLE : *OBJECT ORIENTED PROGRAMMING USING C++*

5. Bjarne Stroustrup, "The C++ Programming Language", Addison Wesley, 2000.

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

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Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

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Section B
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(5 x 7 = 35 marks)

Section C
It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-THIRD SEMESTER

SKILL ENHANCEMENT COURSE

Total Marks	= 100	Int. Assessment	= 20 marks
No. of Credits	= 4	Semester Exam.	= 80 marks

Time allotted for Major Test = 2 ½ Hrs
Examination to be held: December 2021, 2022, 2023

COURSE NO. : **UBCAPS-351**
COURSE TITLE : **PC ASSEMBLY AND INSTALLATION**

UNIT-I

Input and Output Devices, Cables, Connectors, jumpers, Computer Ports, different types of motherboard, SMPS, UPS (Online/Offline), Controller Cards: Display Cards, Sound Card, AGP Cards, TV Tuner Cards, LAN Cards, Ethernet Cards, Different types of RAM used in PC's, Replacement of components.

UNIT-II

Performing installation, configuration, and upgrading of microcomputer/ computer: Hardware and Software requirement, Assembling the system, POST (Power on Self Test), BIOS setting, BIOS Password break, Formatting/Partitioning of Hard Disk, Installation of Operating System, Multi-Booting, Creating bootable media.

UNIT-III

Maintenance: Windows file repairing, Use of system tools like Disk defragmentation, Disk clean up, Scan disk etc, use of open source data recovery tools, CD/ Pen Drive booting. Approaches to solve a PC problem, troubleshooting a failed boot, different approaches to installing and supporting I/O device, managing faulty components.

UNIT-IV

Different types of Application Software, Application Software Installation, Antivirus Software Installation, Installation of Printers: local printers, Network Printers, Scanners, Web Camera, working with different control panel option of windows, using system restore features, backup and restore.

UNIT-V

Basic LAN concepts, IP Address, ping, ipconfig, network cabling, network cable connectors, cabling tools, network troubleshooting, modems: Installation and configuration of different type of Modems, setting up broad band connection, administrative modem settings: creating different Wi-Fi network, securing modem using wifi key, admin password, MAC/IP filter, Sharing Internet Connection.

SUGGESTED READINGS:

1. Pradeep K. Sinha, and Priti Sinha, "Computer fundamentals", BPB publications, 2010.
2. R. K. Taxali, "PC Software for Windows", Tata McGraw-Hill Publishers Pvt. Ltd.
3. Wikibooks contributors, "How to Assemble a Desktop PC", Platypus Global Media, 2011.
4. Jacob Beckerman, "How to build a computer, A step by step guide", JIBB Publishing.
5. Mark L. Chambers, "Build your own PC Do-It-yourself for dummies", Wiley Publishing, 2009.
6. N. S. Reddy, "PC Hardware - Theory and Practical, In Depth step by step", Neo Publishing house.

BCA-THIRD SEMESTER

Contd.

SKILL ENHANCEMENT COURSE

Total Marks	= 100	Int. Assessment	= 20 marks
No. of Credits	= 4	Semester Exam.	= 80 marks

Time allotted for Major Test = 2 ½ Hrs
Examination to be held: December 2021, 2022, 2023

COURSE NO. : UBCAPS-351
COURSE TITLE : PC ASSEMBLY AND INSTALLATION

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A

Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B

Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C

It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-THIRD SEMESTER

TITLE: Practical (Based on UBCATC-301)

Course No.	: UBCAPC-360	Duration of Examination	: 3 Hrs
No. of Credits	= 2	Total Marks	= 50
Examination to be held: December 2021, 2022, 2023			

In this course the students shall be exposed to various practical problems based on the above topic and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct one internal evaluation test for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on written test, viva-voce, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:

External Examination = 25 marks

- Written Test   =   20 marks
- Viva Voce   =   5 marks

Internal Examination = 25 marks

- Written Test   =   10 marks
- Viva Voce   =   5 marks
- Practical File   =   5 marks
- Attendance   =   5 marks

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BCA-THIRD SEMESTER

TITLE: Practical (Based on UBCATC-303)

Course No.	: UBCAPC-361	Duration of Examination	: 3 Hrs
No. of Credits	= 2	Total Marks	= 50
Examination to be held: December 2021, 2022, 2023			

In this course the students shall be exposed to various practical problems based on the above topic and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct one internal evaluation test for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on written test, viva-voce, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:

External Examination = 25 marks

- Written Test = 20 marks
- Viva Voce = 5 marks

Internal Examination= 25 marks

- Written Test = 10 marks
- Viva Voce = 5 marks
- Practical File = 5 marks
- Attendance = 5 marks

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BCA-FOURTH SEMESTER

Total Marks	= 100	Int. Assessment	= 20 marks
No. of Credits	= 4	Semester Exam.	= 80 marks
Time allotted for Major Test = 2 ½ Hrs			
Examination to be held: May 2022, 2023, 2024			

COURSE NO. : **UBCATC-403**
COURSE TITLE : **DATABASE MANAGEMENT SYSTEM & SQL**

UNIT-I
Introduction to Data, Field, Record, File, Database, Traditional File Approach, File Based System, Advantages and Disadvantages of Traditional File Approach, Database Management System: Concepts, Need of Database Management System, Components of DBMS, Data Independence, Three Level Architectural of Database, Centralized and Client Server Architecture for DBMS, Introduction to Hierarchical and Network Data Models, Conventional File Organizations, Inverted Files, Schema, Instance, Database Users, DBA and its Responsibilities.

UNIT–II
Relational Data Model: Introduction to Relational Data Model, Entity Relationship Model, Conversion of ER Diagrams to Relational Database Design, Joins, Relational Algebra and Relational Calculus Concepts, Queries using Relational Algebra and Calculus.
Normalization: Concept of Keys, Functional Dependencies, Inference Rules, Covers, Closure, Equivalence of Functional Dependencies, Multivalued Dependencies, Theory of Normalization, Normal Forms.

UNIT–III
Concurrency Control: Database Anomalies, ACID Rules, Transaction Processing, Deadlocks, Concurrency Control, Major Goals of Concurrency, Methods of Concurrency Control and its Types, Locking Techniques, Timestamp Ordering, Recovery Management, Recovery Techniques, Distributed Database Concepts.

UNIT–IV
SQL: Query Processing, Table Creation and Management, Data Types, Logical Operators, Expressions, Drop Database, Drop Table, Inserting Values, WHERE Clause, AND-OR Clause, UPDATE, DELETE, CREATE Query, LIKE and TOP Clause, ORDER and GROUP-BY Clause, DISTINCT Keyword, Data Integrity Constraints, HAVING Clause, WILDCARD, DATE Functions and Other Inbuilt Functions, Views, Joins, Operators, Privileges, ALTER Table, Roles and Security Policies.

UNIT-V
PLSQL: Transaction Management in PLSQL, Storage and Indexing, Query Processing and Optimization, Conditions and Loops, Strings, Exceptions, Creating Procedures and Functions, Triggers, Cursors.

SUGGESTED READINGS:

1. Bayross, Ivan, "SQL, PL/SQL: The programming language of Oracle", BPB publications, 2009.
2. Bipin Desai, "An Introduction to Database Systems", Galgotia Publications Pvt. Ltd.
3. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concept", McGraw-Hill, 7th Edition, 2020.

BCA-FOURTH SEMESTER

Contd.

Total Marks	= 100	Int. Assessment = 20 marks
No. of Credits	= 4	Semester Exam. = 80 marks

Time allotted for Major Test = 2 ½ Hrs
Examination to be held: May 2022, 2023, 2024

COURSE NO. : **UBCATC-403**
COURSE TITLE : **DATABASE MANAGEMENT SYSTEM & SQL**

4. Ramon Mata-Toledo and Pauline Cushman, "Schaum's Outline of Fundamentals of Relational Databases (Schaum's Outline Series) Toledo", McGraw-Hill Education, 2000.
5. Scott Urman, Ron Hardman and Michael McLaughlin, "Oracle Database 10g PL/SQL Programming", Tata McGraw-Hill, 8th Edition, 2008.

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A

Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B

Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C

It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-FOURTH SEMESTER

Total Marks	= 100	Int. Assessment	= 20 marks
No. of Credits	= 4	Semester Exam.	= 80 marks
Time allotted for Major Test = 2 ½ Hrs			
Examination to be held: May 2022, 2023, 2024			

COURSE NO. : *UBCATC-404*
COURSE TITLE : *JAVA PROGRAMMING*

UNIT-I

Introduction to Java, Java Runtime Environment, Java Virtual Machine, Features of Java Programming, Java Buzzwords, Garbage Collection, Java Keywords, Data Type and Variables, Java Identifiers, Java Operators, Expressions, Control Statements, Loops and Arrays.

UNIT-II

Class and Objects, Object Oriented Concepts, Application of Object Oriented Programming Constructors, Method Overloading, Static Methods, Inheritance, Access Modifiers, Method Overriding, Abstract Classes, Polymorphism, Packages, Interfaces.

UNIT-III

Fundamentals of Exceptions Handling, Types of Exceptions, Try-Throw-Catch Construct, Nested Try Block, Throw, Finally Keywords, Writing Exception Subclasses, Multithreading, using isAlive() and Join(), Priorities of Threads, Stopping of Threads.

UNIT-IV

I/O in Java, Byte Stream Classes, Character Stream Classes, Reading and Writing Files, Serialization, Transient and Volatile Modifiers, The String and String Buffer Class, String Methods, String Processing, Escape Characters.

UNIT-V

Applet Fundamentals, Applet Architecture, Applet Life Cycle, Event Handling: Mouse &Keyboard Events, Applet Tags, Graphics and User Interfaces, Basics of AWT, Building User Interface with AWT, Layouts, Layout Manager, Action Listener Interface, Panels, Using Buttons, Checkbox, Choice Lists, Lists, Scroll Bar, Text Fields, Text Area.

SUGGESTED READINGS:

1. Herbert Schildt, "Java2 The Complete Reference", Tata McGraw-Hill, 2000.
2. E. Balagurusamy, "Programming with JAVA", Tata McGraw-Hill, 3rd Edition, 2006.
3. Steven Holzner, "Java2 Black Book", Dreamtech Press, 2006.
4. Dietel & Dietel, "Java How to Program", Pearson Education, 10th Edition, 2015.
5. Grant Palmer, "Java Programmer's Reference", Wrox Press, 2000.
6. Shubhnandan S. Jamwal, "Java 9 for students", Shroff Publications, 1stEdition, 2018.
7. Daniel Liang, "Intro to Java Programming", Pearson, 10th Edition, 2015.

BCA-FOURTH SEMESTER

Contd.

Total Marks	= 100		Int. Assessment	= 20 marks
No. of Credits	= 4		Semester Exam.	= 80 marks

Time allotted for Major Test = 2 ½ Hrs
Examination to be held: May 2022, 2023, 2024

COURSE NO. : **UBCATC-404**
COURSE TITLE : **JAVA PROGRAMMING**

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A

Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B

Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C

It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-FOURTH SEMESTER

SKILL ENHANCEMENT COURSE

Total Marks = 100	Int. Assessment	= 20 marks
No. of Credits = 4	Semester Exam.	= 80 marks
Time allotted for Major Test = 2 ½ Hrs		
Examination to be held: May 2022, 2023, 2024		

COURSE NO.   : UBCAPS-452
COURSE TITLE   : INFORMATION SECURITY

UNIT-I

Need for security, principles of security – confidentiality, integrity and authentication, Computer Security Concepts (CIA), Security Threats/Attacks, Vulnerabilities and protections, Types of Threats-DoS, DDoS, Spoofing, virus, worms, Trojans, Backdoor, Phishing, and Spam, Information Security, Methods of Protection.

UNIT-II

Introduction to cryptography, Encryption and Decryption, Characteristics of Good Encryption Technique, Plain text and Cipher text, substitution techniques–Caesar Cipher, Mono alphabetic Cipher, Polygram Substitution and Play Fair, Transposition Techniques – Rail Fence Technique, Simple Columnar Transposition and Vernam Cipher, Types of Encryption Systems, Cryptanalysis, Symmetric and Asymmetric Cryptography, Authentication, Password-Based, Address-Based and Certificate-Based Authentication, Hashing.

UNIT-III

Diffie-Hellman key-exchange algorithm with examples, problems with the algorithm: Man –in-the-Middle Attack, secret key, Characteristics of Public Key System, Asymmetric key encryption and decryption, RSA Algorithm, security of RSA,

Symmetric Key Encryption: Data Encryption Standard (DES) algorithm, Basic principles and working of the algorithm, Security of the DES, Blowfish algorithm.

UNIT-IV

Introduction TCP/IP, Network security issues, Sniffing, E-Mail security- IMAP and Pop3, Internet security protocol- SSL and TLS, Intruders, Firewalls-need and features of firewall, network address translation, Types of firewall, demilitarized zone (DMZ), Intrusion Detection Systems, Virtual Private Networks, Message digest, Digital signatures.

UNIT-V

Cyber Crime and cyber security, Tools and Methods Used in Cybercrime, Short notes on Computer Forensics, Digital Forensics, OS fingerprinting, TCP/IP stack masking, Ethical hacking and Social Engineering.

BCA-FOURTH SEMESTER

Contd.

SKILL ENHANCEMENT COURSE

Total Marks	= 100	Int. Assessment	= 20 marks
No. of Credits	= 4	Semester Exam.	= 80 marks

Time allotted for Major Test = 2 ½ Hrs
Examination to be held: May 2022, 2023, 2024

COURSE NO. : **UBCAPS-452**
COURSE TITLE : **INFORMATION SECURITY**

SUGGESTED READINGS:

1. Principles of Information Security – M. E. Whitman and H. J. Mattord, Cengage Learning.
2. Network Security Essentials: Applications and Standards - William Stallings, Pearson.
3. Cryptography and Network Security – Atul Kahate, McGraw Hill Professional Publication.
4. Information Security: The complete reference – Mark Rhodes-Ousley, McGraw Hill Professional Publication.
5. Information Security: Principles and Practices – Mark S. Merkow and Jim Breithaupt, Pearson.
6. Network Security: Private communication in a Private world – C. Kaufman, R. Perlman, M. Speciner, Pearson.

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A

Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B

Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C

It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-FOURTH SEMESTER

TITLE: Practical (Based on UBCATC-403)

Course No.	: **UBCAPC-460**	Duration of Examination	: 3 Hrs
No. of Credits	= 2	Total Marks	= 50
Examination to be held: May 2022, 2023, 2024			

In this course the students shall be exposed to various practical problems based on the above topic and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct one internal evaluation test for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on written test, viva-voce, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:

External Examination = 25 marks

- Written Test = 20 marks
- Viva Voce = 5 marks

Internal Examination = 25 marks

- Written Test = 10 marks
- Viva Voce = 5 marks
- Practical File = 5 marks
- Attendance = 5 marks

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BCA-FOURTH SEMESTER

TITLE: Practical (Based on UBCATC-404)

Course No.	: **UBCAPC-461**	Duration of Examination	: 3 Hrs
No. of Credits	= 2	Total Marks	= 50
Examination to be held: May 2022, 2023, 2024			

In this course the students shall be exposed to various practical problems based on the above topic and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct one internal evaluation test for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on written test, viva-voce, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:

External Examination = 25 marks

- Written Test = 20 marks
- Viva Voce = 5 marks

Internal Examination = 25 marks

- Written Test = 10 marks
- Viva Voce = 5 marks
- Practical File = 5 marks
- Attendance = 5 marks

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BCA-FIFTH SEMESTER

DISCIPLINE SPECIFIC ELECTIVE

Total Marks	= 100	Int. Assessment	= 20 marks
No. of Credits	= 4	Semester Exam.	= 80 marks

Time allotted for Major Test = 2 ½ Hrs
Examination to be held: December 2022, 2023, 2024

COURSE NO. : UBCATE-501
COURSE TITLE : VB.NET

UNIT–I

Introduction to .NET, .NET Framework Features &Architecture, Introduction to Visual Studio, The VB.NET Language, Data Types, Variables, Forcing Variables Declarations, Scope & Lifetime of a Variable, Type Conversion, Constants, Operators and Expressions.

UNIT–II

Conditional Statements, Choose and Switch Functions, Loop Statements, Arrays, Types of Array, Structures, Collections and its Types, Procedures: Subroutines and Functions, Passing Arguments, Optional Argument, Structures.

UNIT-III

Concepts of Classes and Objects, Properties, Events, Access Modifiers, Constructors and Destructors, Garbage Collection, RegEx Class, Inheritance, Overloading and Overriding, Interfaces, Polymorphism, Exception Handling, Multithreading.

UNIT-IV

Working with Window Forms: Loading, Showing and Hiding Forms, Events and Working of Basic Controls, Designing Menus: Context Menu, Access &Shortcut Keys, Basic Controls -Textbox, Label, Message Box, Link Label, Button, List Box, Combo Box, Checkbox, Picture Box, Radio Button, Panel, Scroll Bar, Timer, List View, Tree View, Openfile Dialog, Savefile Dialog, Font Dialog, Color Dialog, Print Dialog.

UNIT-V

File Handlings: Opening and Closing Files, Reading and Writing into Files. Overview of Ado.NET, Connection Object, Command Object, Data Adapter, Dataset, Data Reader, Connection to Database, Data Binding, Data Form Wizard, Data Validation, Data Grid View.

SUGGESTED READINGS:

1. Steven Holzner, "VB.NET Programming Black Book", Dreamtech Publications, 2002.
2. Evangelos Petroutsos, "Mastering Visual Basic .NET", BPB Publications, 2002.
3. Peter G. Aitken, "Visual Basic.NET Programming, with Peter Aitken", Dreamtech Publications, 2002.
4. Steven Holzner, "Visual Basic Programing", Dreamtech Press, 2002.
5. David Vitter, "Designing VB.NET Application - A Developer's Indispensable Guide To VB.NET", Dreamtech Press, 2002.
6. Francesco Balena, "Programming Microsoft Visual Basic.NET", Microsoft Press, 2002.

BCA-FIFTH SEMESTER

Contd.

DISCIPLINE SPECIFIC ELECTIVE

Total Marks = 100	Int. Assessment	= 20 marks
No. of Credits = 4	Semester Exam.	= 80 marks

Time allotted for Major Test = 2 ½ Hrs
Examination to be held: December 2022, 2023, 2024

COURSE NO. : UBCATE-501
COURSE TITLE : VB.NET

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A
Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B
Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C
It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-FIFTH SEMESTER

DISCIPLINE SPECIFIC ELECTIVE

Total Marks	= 100	Int. Assessment	= 20 marks
No. of Credits	= 4	Semester Exam.	= 80 marks

Time allotted for Major Test = 2 ½ Hrs
Examination to be held: December 2022, 2023, 2024

COURSE NO. : UBCATE-502
COURSE TITLE : PHP

UNIT-I
Introduction: History, Features, Installing PHP, Basic PHP Development, Working of PHP Scripts, Data Types, Variables, Statements, Flow Control Statements, Expressions and Operators, Loops, Types of Errors, Namespaces.

UNIT-II
Arrays: Types of Arrays, Operations on Arrays.
Strings: Introduction to Strings, Comparing Strings, Manipulating and Searching Strings Functions: Calling a Function, Defining a Function.

UNIT-III
Form Handling: Working with Forms, Super Global Variables, Super Global Array, Importing User Input, Accessing User Input, Combine HTML and PHP Code, Using Hidden Fields, Redirecting the User.
Form Validation, GET Variable and POST Variable, REQUEST Variable, Creating The Upload Script, Using Your File System: File Paths and Permissions, Displaying Directory Contents, Working with fopen() and fclose().

UNIT-IV
Working with File and Directories: Understanding File and Directory, Opening and Closing a File, Copying, Renaming and Deleting a File, Working with Directories, Building a Text Editor, File Uploading and Downloading.
Generating Images with PHP: Basics Computer Graphics, Creating Image, Manipulating Image, Using Text in Image, Cookies: Setting and Using Cookie Variables, Session: Managing User Preferences with Sessions.

UNIT-V
PHP with MySQL: Installing and Configuring MySQL, Performing Basic DML Database Operations: Insert, Delete, Update, Select, Setting Query Parameter, Executing Query, Joins (Cross Joins, Inner Joins, Outer Joins, Self Joins).

SUGGESTED READINGS:

1. Tim Converse, Joyce Park and Clark Morgan, "PHP 5 and MySQL", Wiley India Reprint, 2008.
2. Robert Sheldon and Geoff Moes, "Beginning MySQL", Wrox, 2005.
3. Alexis Leon and Mathews Leon, "Database Management Systems", Vikas, 2008.
4. Kevin Tatroe, "Programming PHP", O'Reilly Media, 3rd Edition, 2013.
5. Steven Holzner, "PHP: The Complete Reference". McGraw-Hill books, 2007.
6. Pratiyush Guleria, "PHP: Beginners Practical Guide", BPB Publications, 2018.
7. Robin Nixon, "Learning PHP, MySQL & JavaScript", O'REILLY, 2015.

BCA-FIFTH SEMESTER

Contd.

DISCIPLINE SPECIFIC ELECTIVE

Total Marks	= 100	Int. Assessment	= 20 marks
No. of Credits	= 4	Semester Exam.	= 80 marks
Time allotted for Major Test = 2 ½ Hrs			
Examination to be held: December 2022, 2023, 2024			

COURSE NO. : UBCATE-502
COURSE TITLE : PHP

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A
Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B
Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C
It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-FIFTH SEMESTER

DISCIPLINE SPECIFIC ELECTIVE		
Total Marks = 100	Int. Assessment	= 20 marks
No. of Credits = 4	Semester Exam.	= 80 marks
Time allotted for Major Test = 2 ½ Hrs		
Examination to be held: December 2022, 2023, 2024		

COURSE NO. : **UBCATE-503**
COURSE TITLE : **COMPUTER NETWORK AND INTERNET**

UNIT-I
Networking Definition, Network Hardware and Software, Types of Networks- Based on Transmission Technology; Circuit switched vs Packet Switched Networks, Based on their Scale LAN, WAN, MAN Advantages of Networking, Topologies, Transmission Medium, Baseband, Broadband, Wired and Wireless Network, Transmission Modes Simplex, Half Duplex and Full Duplex, Components Hub, Connector, Switch, Router, Gateway, Bridge.

UNIT-II
Protocol, Client and Server, Internet Protocol, IP Addresses, Classful and Classless Addressing Classes of IP Addresses, Intranet and Internet Advantages and Disadvantages, OSI Reference Model, TCP/IP Reference Model, Peer to Peer Network, Comparison of OSI and TCP/IP Reference Models, Design Issues for the Layers, Merits and De-Merits of Layered Architecture, Network Standardization.

UNIT-III
World Wide Web, Web Browser, Web Portal, Web Server, Web Site, Web Page, Web Portal, HTTP, Internet, Applications of Internet. Services of Internet, Email, FTP, Remote Login,Domain Name System, Uniform Resource Locator, Internet Service Provider. Web Security, Cookies, Firewalls, Web Applications, Search Engine.

UNIT-IV
Introduction to HTML, Structure of HTML Program, Formatting Tags, Image Tags, Linking of Documents, Lists, Tables, Frames, Iframes,HTML Forms, Introduction to Cascading Style Sheet, Defining Style, Inline Styles, Internal and External Style Sheet.

UNIT-V
Introduction to Javascript, Data Types Variables, Conditional and Loops Control Statement, Functions, Arrays, Events, Strings and Mathematical Functions, Windowsand Document Object and their basic properties, methods andevents, JS Forms.

SUGGESTED READINGS:

1. Andrew. S. Tannenbaum,"Computer Network", Pearson, 1996.
2. Williams Stallings,"Data and Computer Communication", Pearson, 1988.
3. Behrouz A. Forouzan,"Data Communication and Networking", McGraw-Hill Professional Publication, 5th Edition, 2013.
4. Douglas E. Comer,"The Internet Book", Prentice Hall, 4th Edition, 2007.
5. Eric Roberts, "Introduction to JavaScript Programming The 'Nothing but a Browser' Approach", Pearson, 2020.
6. Phil Ballard, "JavaScript in 24 Hours, Sams Teach Yourself", Pearson, 7thEdition, 2019.

BCA-FIFTH SEMESTER

Contd.

DISCIPLINE SPECIFIC ELECTIVE

Total Marks   = 100   Int. Assessment = 20 marks
No. of Credits   = 4   Semester Exam. = 80 marks
Time allotted for Major Test = 2 ½ Hrs
Examination to be held: December 2022, 2023, 2024

COURSE NO.   : UBCATE-503
COURSE TITLE : COMPUTER NETWORK AND INTERNET

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7. Felke-Morris and Felke-Morris, "Basics of Web Design: HTML5 & CSS", Pearson 5th Edition, 2020.
8. Julie C. Meloni and Jennifer Kyrnin, "HTML, CSS, and JavaScript All in One, Sams Teach Yourself", Pearson, 3rd Edition, 2019.

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A
Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

<div align="right">(5 x 3 = 15 marks)</div>

Section B
Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

<div align="right">(5 x 7 = 35 marks)</div>

Section C
It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

<div align="right">(2 x 15 = 30 marks)</div>

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-FIFTH SEMESTER

SKILL ENHANCEMENT COURSE

Total Marks	= 100	Int. Assessment	= 20 marks
No. of Credits	= 4	Semester Exam.	= 80 marks

Time allotted for Major Test = 2 ½ Hrs
Examination to be held: December 2022, 2023, 2024

COURSE NO.   : UBCAPS-552
COURSE TITLE : MULTIMEDIA COMPUTING

UNIT-I

Introduction to Multimedia, Multimedia Definition and Concepts, Need of Multimedia, Areas of use, Development platforms for multimedia, Identifying Multimedia elements-Text, Images, sound, Animation and video, Multimedia Hardware and Software requirement, Making simple Multimedia with Power Point text as a component of Multimedia.

UNIT-II

Sound in multimedia, Importance of sound in multimedia, sound and its attributes- tone, intensity, frequency, wavelength, pitch. Mono v/s stereo sound, Analog vs. Digital sounds, Concept of MIDI: Musical Instrument Digital Interface.

UNIT-III

Graphics in Multimedia, Importance of graphics in Multimedia, Various attributes of Images- Size, color, Bit Depth, Resolution, Various Image file formats BMP, DIB, EPS, PIC and TIF format their features and limitations.

UNIT-IV

Video and animation in multimedia, impact of video in multimedia, Basics of video, analog and digital video, Brief note on various video standards PAL, NTSC, Basics of animations, types of animation and use of animation.

UNIT-V

Application of Multimedia and its feature, Application of multimedia in Education, Entertainment, Journalism etc. Future of Multimedia, career in Multimedia Production, Virtual reality as new technology in Multimedia, Application of Virtual Reality.

SUGGESTED READINGS:

1. Tay Vaughan, "Multimedia: Making it Work", Tata McGraw-Hill, 8th Edition, 2008.
2. James E Shuman, "Multimedia in action", Vikas Publishing House.
3. Multimedia Basics Volume/ Technology, Andreas.
4. Hoi Zinger, "Firewall Media", Laxmi Publication Pvt. Ltd., New Delhi.
5. IAN Sinclair, "Multimedia on PC", BPB Publisher, 2008.

BCA-FIFTH SEMESTER

Contd.

SKILL ENHANCEMENT COURSE

Total Marks = 100	Int. Assessment = 20 marks
No. of Credits = 4	Semester Exam. = 80 marks
Time allotted for Major Test = 2 ½ Hrs	
Examination to be held: December 2022, 2023, 2024	

COURSE NO. : UBCAPS-552
COURSE TITLE : MULTIMEDIA COMPUTING

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A

Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B

Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C

It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-FIFTH SEMESTER

TITLE: Practical (Based on UBCATE-501)

Course No.	: UBCAPE-560	Duration of Examination	: 3 Hrs
No. of Credits	= 2	Total Marks	= 50
Examination to be held: December 2022, 2023, 2024			

In this course the students shall be exposed to various practical problems based on the above topic and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct one internal evaluation test for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on written test, viva-voce, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:

External Examination = 25 marks

- Written Test = 20 marks
- Viva Voce = 5 marks

Internal Examination = 25 marks

- Written Test = 10 marks
- Viva Voce = 5 marks
- Practical File = 5 marks
- Attendance = 5 marks

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BCA-FIFTH SEMESTER

TITLE: Practical (Based on UBCATE-502)

Course No. : **UBCAPE-561**

No. of Credits = 2

Examination to be held: December 2022, 2023, 2024

Duration of Examination : 3 Hrs

Total Marks = 50

In this course the students shall be exposed to various practical problems based on the above topic and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct one internal evaluation test for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on written test, viva-voce, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:

External Examination = 25 marks

- Written Test = 20 marks

- Viva Voce = 5 marks

Internal Examination= 25 marks

- Written Test = 10 marks

- Viva Voce = 5 marks

- Practical File = 5 marks

- Attendance = 5 marks

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BCA-FIFTH SEMESTER

TITLE: Practical (Based on UBCATE-503)

Course No.	: UBCAPE-562	Duration of Examination	: 3 Hrs
No. of Credits = 2		Total Marks	= 50
Examination to be held: December 2022, 2023, 2024			

In this course the students shall be exposed to various practical problems based on the above topic and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct one internal evaluation test for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on written test, viva-voce, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:

External Examination = 25 marks

- Written Test   =   20 marks

- Viva Voce   =   5 marks

Internal Examination= 25 marks

- Written Test   =   10 marks

- Viva Voce   =   5 marks

- Practical File =   5 marks

- Attendance   =   5 marks

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BCA-SIXTH SEMESTER

TITLE: Project

Course No. : **UBCAPE-650**

No. of Credits = 6

Examination to be held: May 2023, 2024, 2025

Total Marks = 100

In Sixth semester, project work will be assigned to the individual student or group of students in case of bigger project with prior permission of the Head of the Department. The project work would be carried out in the department as an industrial or research application under the guidance of a faculty member. The student is required to submit the certification of successful completion of project from the guide mentioning the total number of hours worked per week and conduct during the project period. A formal project report has to be submitted by each student to the respective guide in prescribed format. Internal evaluation would be carried out by the constituted committee comprising Head of Department, guide and other faculty members of the department. Student has to appear before committee for midterm presentation. Committee will conduct the viva-voce evaluate presentation and monitor progress. External evaluation would be carried out by the external examiner appointed by the University and the internal examiner appointed by the college. Examiners will conduct the viva-voce; examine the presentation, project report and demonstration of the project.

The distribution of marks is given below as:

External Examination = 50 marks

Internal Examination = 50 marks

Project Guidelines

1. The students have to strictly follow the guidelines for the project work
2. The student has to select the project with the approval of the guide.
3. Synopsis of the project would be submitted to the guide depicting the title of the project, DFDs, brief description of project etc.
4. The project report must be submitted in accordance with the prescribed format to the Department before prescribed date.
5. Two copies of the project report and the software CD must be submitted to the external examiner. One copy of the project shall be returned to the student with the signature of external examiner and the other one shall be retained in the library.
6. Students whose project work would found unsatisfactory shall be given another chance under same or another guide.

DETAILED PROFORMA FOR THE PROJECT REPORT

1. Title of the Project
2. Objectives
3. System Analysis and Design
4. Input to the Project
5. Output generated
6. Details of Hardware Platform used
7. Details of Software Tools used
8. Implementation Issues (Clearly defining the area of Application).
9. Miscellaneous
10. Signature of the Candidate.

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BCA-SIXTH SEMESTER

DISCIPLINE SPECIFIC ELECTIVE

Total Marks = 100	Int. Assessment = 20 marks
No. of Credits = 4	Semester Exam. = 80 marks
Time allotted for Major Test = 2 ½ Hrs	
Examination to be held: May 2023, 2024, 2025	

COURSE NO. : UBCATE-603
COURSE TITLE : ANDROID PROGRAMMING

UNIT-I

Android Overview, Android Versions, Environmental Setup, JDK, SDK, Architecture, Features, Libraries, Emulator, Creating First Android Application.

UNIT-II

Introduction to Activities, Activity Lifecycle, Introduction to Intents, Linking Activities Using Intents, Calling Built-In Applications Using Intents, Introduction to Fragments, Adding Fragments Dynamically, Lifecycle of Fragment, Interaction Between Fragments.

UNIT-III

UI Controls, Views and Viewgroups, Textview, Edittext, Autocomplete Textview, Buttons, Image Button, Toggle Button, Radio Button, and Radio Group, Checkbox, Action Bar, Progress Bar, Time Picker, Data Picker, List, UI Layout (Absolute Layout, Table Layout, Frame Layout, Scroll Layout, Relative Layout), Notifications.

UNIT-IV

Basic Graphics, Input Handling, Image View, Image Switcher, Playing Audio, Playing Video.

UNIT-V

Introduction to SQLite, SQLite Openhelper, SQLite Database, Creating, Opening and Closing Database, Working with Cursors, Insert, Update, Delete, Building and Executing Queries.

SUGGESTED READINGS:

1. Greg Nudelman, "Android Design Patterns: Interaction Design Solutions for Developers", Wiley, 2013.
2. Dave Smith and Jeff Friesen, "Android Recipes: A Problem-Solution Approach", A Press, 2011.
3. Ian G. Clifton, "Android User Interface Design: Turning Ideas and Sketches into Beautifully Designed Apps", Pearson, 2013.
4. Bill Philips & Brian Hardy, "Android Programming: The Big Nerd Ranch Guide (Big Nerd Ranch Guides)", 2nd Edition, 2015.
5. Ed Burnette, "Hello, Android: Introducing Google's Mobile Development Platform (Pragmatic Programmers)", 4th Edition, 2015.
6. Dawn Griffiths and David Griffiths, "Best for Visual Learners: Head First Android Development: A Brain-Friendly Guide".
7. Ian F. Darwin "Android Cookbook: Problems and Solutions for Android Developers", O'Reilly, 2012.
8. Erik Hellman, "Android Programming: Pushing the Limits", Wiley, 2013.

BCA-SIXTH SEMESTER

Contd.

DISCIPLINE SPECIFIC ELECTIVE

Total Marks = 100	Int. Assessment = 20 marks
No. of Credits = 4	Semester Exam. = 80 marks
Time allotted for Major Test = 2 ½ Hrs	
Examination to be held: May 2023, 2024, 2025	

COURSE NO. : UBCATE-603
COURSE TITLE : ANDROID PROGRAMMING

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A
Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B
Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C
It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-SIXTH SEMESTER

DISCIPLINE SPECIFIC ELECTIVE

Total Marks = 100	Int. Assessment	= 20 marks
No. of Credits = 4	Semester Exam.	= 80 marks
Time allotted for Major Test = 2 ½ Hrs		
Examination to be held: May 2023, 2024, 2025		

COURSE NO. : **UBCATE-604**
COURSE TITLE : **PYTHON**

UNIT-I

Overview of Programming: Structure of a Python Program, Python Interpreter, Using Python as calculator, Python shell, Indentation. Installation of Python in Windows and LINUX, PIP installation and installation of other modules like Matplotlib, Pandas, Numpy, Scikit etc.

UNIT-II

Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric Data Types: int, float etc. Python Complex data types: String and String Operations, List, Tuple and Dictionary.

UNIT-III

Programming using Python Conditional and Loop Blocks: if, else and else if, for and while loops, for loop using Ranges, String, List and Dictionaries, Loop Manipulation using pass, continue, break and else.

UNIT-IV

Functions, Advantages of Functions, Built-in Functions, User Defined Functions, Anonymous Functions, Pass by Value vs. Pass by Reference, Recursion, Scope and Lifetime of Variables.

UNIT-V

Exception Handling: Exceptions, Built-in exceptions, Exception handling, User defined exceptions in Python.
File Management in Python: Operations on files (opening, modes, attributes, encoding, closing), read() & write() methods, tell() & seek() methods, Renaming and Deleting Files in Python, Directories in Python.

SUGGESTED READINGS:

1. Reema Thareja, "Python Programming", Oxford University Press, 3e, 2017
2. Mark Summerfield, "Programming in python 3: A Complete Introduction to Python Programming".
3. Mark Lutz, "Learning Python", O Reily, 4th Edition, 2009.
4. Brian K. Jones, "Python Cookbook".
5. Alex Martelli, "Python in a nutshell".
6. Tim Hall and J-P Stacey, "Python 3 for Absolute Beginners", 2009.
7. Python online documentation: www.python.org/doc.

BCA-SIXTH SEMESTER

Contd.

DISCIPLINE SPECIFIC ELECTIVE

Total Marks = 100		Int. Assessment = 20 marks
No. of Credits = 4		Semester Exam. = 80 marks

Time allotted for Major Test = 2 ½ Hrs
Examination to be held: May 2023, 2024, 2025

COURSE NO. : UBCATE-604
COURSE TITLE : PYTHON

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A

Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B

Total of 5 medium answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 300 words. Each question shall be of 7 marks.

(5 x 7 = 35 marks)

Section C

It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-SIXTH SEMESTER

SKILL ENHANCEMENT COURSE

Total Marks	= 100	Int. Assessment	= 20 marks
No. of Credits	= 4	Semester Exam.	= 80 marks
Time allotted for Major Test = 2 ½ Hrs			
Examination to be held: May 2023, 2024, 2025			

COURSE NO. : UBCAPS-651
COURSE TITLE : SOFTWARE ENGINEERING

UNIT-I

Software Systems Analysis and Design Life Cycle: Requirement Determination, Feasibility Analysis, Final Specifications, Software System Design, Software System Implementation, Software System Evaluation, Software System Modification, Role of Software System Analyst, Tools Used in Software System Analysis, Introduction to Software Engineering, Software Engineering Paradigms, Software Prototyping and Specifications.

UNIT-II

Information Gathering and Feasibility Analysis: Software System Requirements Specification, Strategies, Methods, Case Study, Classification of Requirements as Strategic, Tactical, Operational and Statutory, Deciding Project Goals, Examining Alternative Solutions, Technical and Economical Feasibility, Cost Benefit Analysis.
Tools for System Analysts: Data Flow Diagrams, Case Study for Use of DFD, Data Dictionaries, Process Organization and Interaction, Leveling of DFDs, Software Tools to Create DFDs.

UNIT-III

Structured Software System Analysis and Design: Procedure Specifications in Structured English, Examples and Cases, Decision Table for Complex Logical Specifications, Specification Oriented Design vs. Procedure Oriented.
Data Oriented Software Systems Design: Entity Relationship Model, ER Diagram, Relationships, Cardinality and Participation, Data Base Design, Architectural Design, Effective Modular Design, Procedural Design, Interface Design, HCI Design

UNIT-IV

Software Cost Estimation Techniques: Different Types of Project Metrics, Models for Cost Estimation (COCOMO, Putnam's Function Point), Project Schedules, Project and Activities, Scheduling Activities, Schedule Development Methods Critical Path Method, Critical Chain Scheduling, PERT.

UNIT-V

Data Input Methods and Software Testing: Coding Techniques, Requirements of Coding Schemes, Error Detection of Codes, Validating Input Data, Input Data Controls, Interactive Data Input Designing Outputs: Output Devices, Designing Output Reports, Screen Design, Graphical User Interfaces, Interactive I/O on Terminals.
Software Testing: Testing Issues, Testing Object-Oriented Systems, Testing Techniques: White-Box Testing, Black-Box Testing, Testing Strategies: Unit Testing, Integration and Validation Testing, System Testing.

BCA-SIXTH SEMESTER

Contd.

SKILL ENHANCEMENT COURSE

Total Marks	= 100		Int. Assessment	= 20 marks
No. of Credits	= 4		Semester Exam.	= 80 marks

Time allotted for Major Test = 2 ½ Hrs
Examination to be held: May 2023, 2024, 2025

COURSE NO. : **UBCAPS-651**
COURSE TITLE : **SOFTWARE ENGINEERING**

SUGGESTED READINGS:

1. Roger S. Pressman, "Software Engineering", Tata McGraw-Hill, 7th Edition, 2010.
2. Bob Hughes and Mike Cotterell, "Software Project Management", Tata McGraw-Hill, 2011.
3. Shashikant A. Kelkar, "Software Project Management: A Concise Study", PHI Learning Pvt. Ltd., 2012.
4. Kathey and Schwalbe, "Information Technology Project Management", Thomson Learning, 2015.
5. Pankaj Jalote, "An Integrated Approach to software Engineering", PHI, 2012.

Instructions for paper setter

The question paper will be divided into the following three sections. No question shall be repeated in the question paper.

Section A
Total of 5 short answer questions (one from each Unit) shall be set and the candidates are required to answer all questions. Answer to a question should not exceed 80 words. Each question shall be of 3 marks.

(5 x 3 = 15 marks)

Section B
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(5 x 7 = 35 marks)

Section C
It will contain five long answer questions (one from each Unit). The candidates will be required to answer any two questions. Answer to each question should not exceed 600 words. Each question shall be of 15 marks.

(2 x 15 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

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BCA-SIXTH SEMESTER

TITLE: Practical (Based on UBCATE-603)

Course No. : **UBCAPE-660**	Duration of Examination : 3 Hrs
No. of Credits = 2	Total Marks = 50
Examination to be held: May 2023, 2024, 2025	

In this course the students shall be exposed to various practical problems based on the above topic and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct one internal evaluation test for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on written test, viva-voce, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:

External Examination = 25 marks

- Written Test = 20 marks
- Viva Voce = 5 marks

Internal Examination = 25 marks

- Written Test = 10 marks
- Viva Voce = 5 marks
- Practical File = 5 marks
- Attendance = 5 marks

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BCA-SIXTH SEMESTER

TITLE: Practical (Based on UBCATE-604)

Course No. : **UBCAPE-661**	Duration of Examination	: 3 Hrs
No. of Credits = 2	Total Marks	= 50
Examination to be held: May 2023, 2024, 2025		

In this course the students shall be exposed to various practical problems based on the above topic and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory. The 50% of the total marks in this paper shall be reserved for internal assessment. The Teacher-in-Charge shall conduct one internal evaluation test for awarding the students for internal assessment. The students shall also be required to maintain proper record of their practicals in a Practical File which shall be regularly checked by the concerned teacher-in-charge. The internal assessment shall be based on written test, viva-voce, practical file and attendance in the laboratory. For the rest of 50% of the total marks there shall be an external examination which shall be conducted jointly by an internal examiner and an external examiner to be appointed by the University. The distribution of marks to various components is given below as:

External Examination = 25 marks

- Written Test   =   20 marks
- Viva Voce   =   5 marks

Internal Examination= 25 marks

- Written Test   =   10 marks
- Viva Voce   =   5 marks
- Practical File   =   5 marks
- Attendance   =   5 marks

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