FACULTY OF COMPUTER SCIENCE & IT

SYLLABUS

of

Bachelor of Computer Applications

(Semester I-VI)

(Under Continuous Evaluation System)
(12+3 System of Education)
Session: 2021-22

The Heritage Institution

KANYA MAHA VIDYALAYA JALANDHAR
(Autonomous)

PROGRAMME SPECIFIC OUTCOMES

Bachelor of Computer Applications
(Session 2021-22)

Program Specific Outcomes

PSO1: Apply skills for development of software and websites for providing efficient solution to IT based problems

PSO2: Comprehend development process in IT industry through ethical, defined and innovative techniques.

PS03: Achieve leadership role and team player role to be able to work in multidisciplinary areas at various job roles.

PSO4: Identify and demonstrate the implementation of various tools and technologies involved in the field of Information Technology.

PSO5: Demonstrate proficiency in the field of Programming, Web development and IT enabled services.

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Computer Applications
Session 2021-22

Bachelor of Computer Applications Semester- I							
Course Code	**Course Name**	**Course Type**	**Marks**				**Examination Time (in Hours)**
			Total	**Ext.**		**CA**	
				L	**P**		
BCAL-1421 / BCAL-1031/ BCAL-1431	Punjabi (Compulsory) / [1] Basic Punjabi/ [2]Punjab History and Culture	C	50	40	-	10	3
BCAL-1102	Communication Skills in English	C	50	40	-	10	3
BCAL-1333	Applied and Discrete Mathematics	C	100	80	-	20	3
BCAM-1114	Introduction to Programming – C	C	100	50	30	20	3+3
BCAM-1115	Introduction to Computers and Information Technology	C	100	50	30	20	3+3
AECD-1161	*Drug Abuse: Problem, Management and Prevention (Compulsory)	AC	50	40	-	10	3
SECF-1492	*Foundation Course	AC	25	20	-	05	1
	Total		400				

Note:

C - Compulsory

AC - Audit Course

[1] Special course in lieu of Punjabi (Compulsory)

[2] Special course in lieu of Punjabi (Compulsory) for those students who are not domicile of Punjab.

*Marks of these courses will not be added in total marks and only grades will be provided.

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Computer Applications
Session 2021-22

<table>
<tr><th colspan="9">Bachelor of Computer Applications Semester- II</th></tr>
<tr><th rowspan="3">Course Code</th><th rowspan="3">Course Name</th><th rowspan="3">Course Type</th><th colspan="4">Marks</th><th rowspan="3">Examination Time (in Hours)</th></tr>
<tr><th rowspan="2">Total</th><th colspan="2">Ext.</th><th rowspan="2">CA</th></tr>
<tr><th>L</th><th>P</th></tr>
<tr><td>BCAL-2421 / BCAL-2031/ BCAL-2431</td><td>Punjabi (Compulsory)
[1]Basic Punjabi
[2] Punjab History and Culture</td><td>C</td><td>50</td><td>40</td><td>-</td><td>10</td><td>3</td></tr>
<tr><td>BCAM-2102</td><td>Communication Skills in English</td><td>C</td><td>50</td><td>25</td><td>15</td><td>10</td><td>3 + 3</td></tr>
<tr><td>BCAL-2113</td><td>Principles of Digital Electronics</td><td>C</td><td>100</td><td>80</td><td>-</td><td>20</td><td>3</td></tr>
<tr><td>BCAL-2114</td><td>Numerical Methods and Statistical Techniques</td><td>C</td><td>100</td><td>80</td><td>-</td><td>20</td><td>3</td></tr>
<tr><td>BCAM-2115</td><td>Introduction to Object Oriented Programming-I</td><td>C</td><td>100</td><td>50</td><td>30</td><td>20</td><td>3+3</td></tr>
<tr><td>AECD-2161</td><td>*Drug Abuse: Problem, Management and Prevention (Compulsory)</td><td>AC</td><td>50</td><td>40</td><td>-</td><td>10</td><td>3</td></tr>
<tr><td>SECM-2502</td><td>*Moral Education</td><td>AC</td><td>25</td><td>20</td><td>-</td><td>05</td><td>1</td></tr>
<tr><td></td><td>Total</td><td></td><td>400</td><td></td><td></td><td></td><td></td></tr>
</table>

Note:

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Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Computer Applications
Session 2021-22

Bachelor of Computer Applications Semester- III							
Course Code	**Course Name**	**Course Type**	**Marks**				**Examination Time (in Hours)**
			Total	**Ext.**		**CA**	
				L	**P**		
BCAL-3111	Computer Architecture	C	75	60	-	15	3
BCAL-3112	Database Management System	C	75	60	-	15	3
BCAL-3113	Computational Problem Solving	C	75	60	-	15	3
BCAP-3114	Lab on Computational Problem Solving	C	50	-	40	10	3
BCAP-3115	Lab on Database Management System	C	25	-	20	5	3
AECE - 3221	* Environmental Studies (Compulsory)	AC	100	60	20	20	3
SECP - 3512	* Personality Development	AC	25	20	-	05	1
	Total		300				

Note:

C - Compulsory

AC - Audit Course

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SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Computer Applications
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Course Code	Course Name	Course Type	Marks				Examination Time (in Hours)
			Total	**Ext.**		**CA**	
				L	**P**		
BCAL-4111	Data Structures	C	75	60	-	15	3
BCAL-4112	Information Systems	C	75	60	-	15	3
BCAL-4113	Internet Applications	C	75	60	-	15	3
BCAL-4114	Foundation of Data Science	C	75	60	-	15	3
BCAP-4115	Lab on Data Structures	C	50	-	40	10	3
BCAP-4116	Lab on Internet and Web Designing	C	50	-	40	10	3
SECS - 4522	* Social Outreach	AC	25	-	20	05	1
	Total		400				

Note:

C - Compulsory

AC - Audit Course

* Marks of these courses will not be added in total marks and only grades will be provided.

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Computer Applications
Session 2021-22

<table>
<tr><td colspan="9" align="center">Bachelor of Computer Applications Semester - V</td></tr>
<tr>
<td rowspan="3">Course Code</td>
<td rowspan="3">Course Name</td>
<td rowspan="3">Course Type</td>
<td colspan="4" align="center">Marks</td>
<td rowspan="3">Examination Time (in Hours)</td>
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<tr>
<td rowspan="2">Total</td>
<td colspan="2" align="center">Ext.</td>
<td rowspan="2">CA</td>
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<tr>
<td>L</td>
<td>P</td>
</tr>
<tr>
<td>BCAL-5111</td>
<td>Computer Networks</td>
<td>C</td>
<td>75</td>
<td>60</td>
<td>-</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>BCAL-5112</td>
<td>Web Technologies</td>
<td>C</td>
<td>75</td>
<td>60</td>
<td>-</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>BCAL-5113</td>
<td>Operating System</td>
<td>C</td>
<td>75</td>
<td>60</td>
<td>-</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>BCAL-5114</td>
<td>Object Oriented Programming -II</td>
<td>C</td>
<td>75</td>
<td>60</td>
<td>-</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>BCAP-5115</td>
<td>Lab on Object Oriented Programming- II</td>
<td>C</td>
<td>50</td>
<td>-</td>
<td>40</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>BCAP-5116</td>
<td>Lab on Web Technologies</td>
<td>C</td>
<td>50</td>
<td>-</td>
<td>40</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>SECJ-5551</td>
<td>* Job Readiness Course</td>
<td>AC</td>
<td>25</td>
<td>20</td>
<td>-</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td colspan="3" align="center">Total</td>
<td>400</td>
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Note:

C-Compulsory

AC - Audit Course

* Marks of these courses will not be added in total marks and only grades will be provided

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Computer Applications
Session 2021-22

	Bachelor of Computer Applications Semester - VI						
Course Code	**Course Name**	**Course Type**	**Marks**				**Examination Time (in Hours)**
			Total	**Ext.**		**CA**	
				L	**P**		
BCAL-6111	Computer Graphics	C	75	60	-	15	3
BCAL-6112	Software Engineering	C	75	60	-	15	3
BCAP-6113	Lab on Computer Graphics	C	50	-	40	10	3
BCAD-6114	Project	C	300	-	240	60	3
	Total		500				

Note:
C-Compulsory

Course Outcome:

Student will be able to:

CO1: Have knowledge of matrices, sets, relations, propositional logic and Boolean algebra.

CO 2: represents world knowledge in symbolic notation through propositional calculus.

CO 3: Apply discrete mathematical concepts to obtain analytical and numerical solutions.

Bachelor of Computer Applications Semester – I
(Session 2021-22)
COURSE CODE: BCAL–1333
APPLIED AND DISCRETE MATHEMATICS

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs

Instructions for Paper Setter -

Eight questions of equal marks (16 Marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT-I
Sets and Relations: Definition of sets, subsets, complement of a set, universal set, intersection and union of sets, De-Morgan's laws, Cartesian products, Equivalent sets, Countable and uncountable sets, minset, Partitions of sets, Relations: Basic definitions, graphs of relations, properties of relations

UNIT-II
Logic and Propositional Calculus: Proposition and Compound Propositions, basic Logical Operations, Propositions and Truth Tables, Tautologies and Contradictions, Logical Equivalence, Duality law, Algebra of propositions, Conditional and Bi conditional Statements, Arguments, Logical Implication, Propositional Functions, Predicates and Quantifiers, Negation of Quantified Statements, Inference theory of the predicates calculus.

UNIT-III
Boolean Algebra: Boolean algebra and its duality, Duality, Boolean Algebra as Lattices, Boolean identities, sub-algebra, Representation Theorem, Sum-of-Products Form for Sets, Sum -of-Products Form for Boolean Algebra, Minimal Boolean Expressions, Prime Implicants, Boolean Functions, Karnaugh Maps.

UNIT IV
Matrices: Introduction of a Matrix, its different kinds, matrix addition and scalar multiplication, multiplication of matrices, transpose etc. Square matrices, inverse and rank of a square matrix, Matrix Inversion method.

References/Textbooks:

1. Seymour Lipschutz, Marc Lars Lipson, Discrete Mathematics (Schaum's outlines Series), McGraw-Hill, 1997.
2. Bernard Kolman, Robert C. Busby, Discrete Mathematical structures for Computer Science, Prentice-Hall, 1984.
3. Alan Doerr, Kenneth Levasseur, Applied Discrete Structures for Computer Science, Galgotia Publications, 1989.
4. J.P.Tremblay. and R Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill, 1997.

Note: The latest editions of the books should be followed.

Course Outcome:

After passing course the student will be able to:

CO1: Understand formulation of algorithms and flowcharts for problem solution and different programming constructs.

CO2: Have knowledge of execution flow of a C program for programming and maintenance.

CO3: Apply programming concepts to provide solution in different problem domains.

Max. Marks: 100
Theory: 50
Practical: 30
CA: 20

Examination Time: 3+3 Hrs

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Instructions for Paper Setter -

Eight questions of equal marks (10 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts(not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT I
Fundamentals: Character set, Identifiers and Key Words, Data types, Constants, Variables,Expressions, Statements, Symbolic Constants.

Operations and Expressions: Arithmetic operators, Unary operators, Relational Operators, Logical Operators, Assignment and Conditional Operators, Library functions. Data Input and Output statements

UNIT II
Control Statements: Preliminaries, While, Do–while and For statements, Nested loops, If–else, Switch, Break – Continue statements.

Program Structure Storage Class: Storage Classes- Auto, extern, register and static about library functions.

UNIT III
Functions: Brief overview, defining, accessing functions, passing arguments to function, specifying argument data types, function prototypes, recursion.

Arrays: Defining, processing an array, passing arrays to a function, multi–dimensional arrays.

Strings: String declaration, string functions and string manipulation

UNIT IV

Structures & Unions: Defining and processing a structure, user defined data types, structures and pointers, passing structures to functions, self referenced structure, unions.

Pointers: Fundamentals, pointer declaration, passing pointer to a function, pointer and one dimensional arrays, operation on pointers, pointers & multi–dimensional arrays of pointers, passing functions, other functions, more about pointer declarations.

References/Textbooks:

1. E Balagurusamy, Programming in ANSI C, Tata McGraw-Hill, 2002.
2. Byron Gottfried, Schaum's Outline Programming with C, McGraw Hill, 1996.
3. Brian W. Kernighan, Dennis M. Ritchie, The C Programming language, Prentice Hall, 1988.
4. Stephen G. Kochan, Programming in C, Pearson Education, 2015.

Note: The latest editions of the books should be followed.

Course Outcome:

After passing course the student will be able to:

CO1: Have knowledge of Computer fundamentals, operating system concepts and office automation software.

CO2: Analyze, design and implement solutions to various problems using algorithms, flowcharts, decision tables and pseudo codes.

CO3: Apply office automation software to create professional and academic documents and presentations.

Max. Marks: 100
Theory: 50
Practical: 30
CA: 20

Examination Time: 3+3Hrs

Instructions for Paper Setter -

Eight questions of equal marks (10 Marks each) are to be set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT I

Fundamentals of Computer: Introduction to computer, Applications of computer, Components of computers (Input unit, Output Unit, Memory Unit & CPU).

Software: Application Software, Service software, System software -operating system (Types & Function of OS), Translators (compiler, interpreter, assembler), Booting a System.

UNIT II

Input Devices: Keyboards, Mouse, Joystick, Track Ball, Light Pen and Data Scanning devices (scanner, OCR, OMR, MICR, Bar Code Reader, Card Reader)

Output Devices: Monitor, Printers (laser printer, dot matrix printer, ink jet printer)

Memories: Primary Memory -RAM (Working and Its types), ROM (Types of ROM). Secondary Memory - Hard Disk (Structure of a hard disk, working, concept of tracks, sectors, clusters, cylinders), CD, DVD.

UNIT III

Word Processing: Introduction to Office, word processing & its features, Parts of window of word (Title bar, menu bar, status bar, and ruler), understanding the Ribbon, Use of Office Button and Quick Access Toolbar, Creation of new documents, opening document, insert a document into another document. Page setup, margins, gutters, font properties, Alignment, page breaks, header & footer, deleting, moving, replace, editing text in document, saving a document, spell checker, printing a document. Creating a table, entering and editing, Text in tables. Changing format of table, height, width of row/column. Editing, deleting Rows,

columns in table. Adding picture, page colors and Watermarks, Borders, shading, Templates, wizards, drawing objects.

Presentation: Introduction to PowerPoint, Exploring menus, starting a new slide, saving presentation, moving/rearranging slides, printing slides. Applying theme to presentation, Views (slide View, slide sorter, notes view, outline view), Formatting & enhancing text formatting. Displaying slide show, adding multimedia. Slide transitions, applying Animation, Timing slide display, adding movies & sounds.

UNIT IV

Spreadsheet: Introduction to Worksheet/Spreadsheet, Features of excel, Describe the excel Window, Creating a new workbook, different functions on different data in excel, creation of graphs, editing it and formatting, creation of worksheet, adding, deleting, moving the text in worksheet, sorting the data, querying the data, filtering the data (auto and advance filters), To open an already existing workbook, Saving workbook, printing a worksheet, Closing the workbook & exiting.

References/Textbooks:

1. Joyce Cox, Joan Lambert and Curtis Frye, Microsoft office Professional 2010 Step by Step, Microsoft Press, 2010.
2. V. Rajaraman, NeeharikaAdabala, Fundamentals of Computers, PHI Learning, 2015.
3. P.K. Sinha, Computer Fundamentals, BPB Publications, 2004.
4. Anshuman Sharma,A book of Fundamentals of Information Technology, Lakhanpal Publishers, 5th Edition.
5. Peter Norton, Peter Norton's Computing Fundamentals, McGraw-Hill Technology Education, 2006.

Note: The latest editions of the books should be followed.

Bachelor of Computer Applications Semester – II
(Session 2021-22)
COURSE CODE: BCAL–2113
PRINCIPLES OF DIGITAL ELECTRONICS

Course Outcomes:

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

CO1: Comprehend and apply the number systems and Boolean Algebra.

CO2: Design advanced and complex electronic circuits.

CO3: Reduce Boolean Expressions and implement them with Logic Gates.

CO4: Demonstrate the internal structure of semiconductor memory

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT-I
Number System: Introduction, number conversion system , binary arithmetic, representation of signed binary numbers, 1's and 2's complement, Codes: straight binary code, BCD Code Excess3 Code, Grey Code ASCII, Integer and floating point representation

UNIT- II
Logic Gates and Boolean Algebra: Logic gates, Universal Gates, Boolean algebra and Minimization techniques, canonical forms of Boolean expressions, K-Map

UNIT-III
Combinational Circuits: Adder, Subtracter, Multiplexer, Demultiplexer, Decoder, Encoder
Sequential Circuits: Flip-flops, clocks and timers, registers, counter

UNIT-IV
Semiconductor memories: Introduction, Static and dynamic devices, read only & random access memory chips, PROMS and EPROMS Address selection logic. Read and write control timing diagrams for ICs

References / Textbooks:
   1. M. Morris Mao, Digital Design, Pearson Publication (2018), 6th Edition.
   2. Ronald J. Tocci, Digital Systems, Pearson (2009), 10th Edition.
   3. Morris Mano, Digital Logic and Computer Design, Pearson Education (2004), 1st Edition.
   4. V.K. Jain, Arti Agarwal, Digital Electronics, Genius Publications Pvt. Ltd. (2018), 1st Edition

5. K. Meena, Principles of Digital Electronics, Prentice Hall India Learning Private Limited (2009), 1st Edition
6. William H. Gothmann, Digital Electronics: An introduction to Theory and Practice, Prentice Hall India Learning Private Limited (1982), 2nd Edition

Course Outcomes:

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

CO1: Comprehend mechanics of elementary methods and statistical inference techniques for numerical analysis.

CO2: Demonstrate the application of numerical methods on different platform with the use of programming language.

CO3: Apply learned techniques to solve linear and non-linear equations related to real world problems.

Bachelor of Computer Applications Semester – II
(Session 2021-22)
COURSE CODE: BCAL–2114
NUMERICAL METHODS AND STATISTICAL TECHNIQUES

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT-I
Introduction: Numerical Methods, Numerical methods versus numerical analysis, Errors and Measures of Errors.
Non–linear Equations: Bisection Method, False Position method and Newton Raphson's Method
Linear Equations: Direct Method - Gauss Elimination Method, Gauss Jordan Method, Iterative method – Gauss Seidal Method.

UNIT-II
Interpolation: Lagrange's method, Newton's Methods: Forward Difference Method, Backward Difference Method Divided Difference Method.
Numerical Integration: Trapezoidal Rule, Simpson's 1/3 method and Simpson's 3/8 Method

UNIT-III
Statistical Techniques:
Measure of Central Tendency: Arithmetic mean, Geometric Mean, Harmonic Mean, Median, Mode.
Measures of dispersion: Range, Quartile Deviation, Mean deviation, Standard deviation, Co–efficient of variation.
UNIT –IV

Correlation: Introduction, Karl Pearson's Coefficient of Correlation, Rank Correlation
Regression: Regression line and regression equations, Regression Coefficient

Non Linear Curve Fitting: Fit a polynomial equation, Fit an exponential curve, Geometric Curve, Logarithmic curve

References / Textbooks:

1. Amrinder Pal Sngh, Jaspal Singh, Anshuman Sharma, Fundamentals Of Numerical Methods And Statistical Techniques, Lakhanpal Publishers, 4th edition.
2. Kandasamy P.& et AI., Numerical Methods, S. Chand & Company (2006), Reprint Edn. 2006 Edition.
3. B.S. Grewal, Numerical Methods in Engineering & Science, Khanna Publishers (2013), 11th Edition.
4. E. Balagurusamy, Numerical Methods, Tata McGraw Hill Education (2017)
5. H.S.G. Rao, Numerical Methods, IK International Publishing House (2011)
6. S.S. Sastry, Introductory methods of Numerical Analysis, PHI (2012), 5th Edition

Course Outcomes:

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

CO1: Comprehend the concepts of Object Oriented Programming Paradigm

CO2: Write, compile and debug programs in C++, use different data types, operators and I/O function in a computer program

CO3: Apply OOPs concepts to model real world problems for its simplified implementation.

Max. Marks: 100
Theory: 50
Practical: 30
CA: 20

Examination Time: 3+3 Hrs

Instructions for Paper Setter -

Eight questions of equal marks (10 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT -I

Programming Paradigms: Introduction to the object oriented approach towards programming by discussing Traditional, Structured Programming methodology.
Objects & Classes: Object Definition, Instance, Encapsulation, Data Hiding, Abstraction, Inheritance, Messages, Method, Polymorphism, Classes, Candidate& Abstract Classes to be examples of the Design process.

UNIT -II

Object Oriented Programming using C++: Characteristics of OOP, Overview of C++, I/O using cout and cin, Objects and Classes, Member functions and data, private & public, constructor & destructor, Constructor Overloading, Types of Constructors.

UNIT -III

Function Overloading: Function Overloading, Default Arguments, Ambiguity in Function Overloading.
Operator Overloading: Overloading unary and binary operators, Type Conversion using Operator Overloading

UNIT-IV

Inheritance: Concept of inheritance, Base & derived classes, Access Specifiers, Class Hierarchies, Types of Inheritance with examples.
Virtual Functions and Polymorphism: Virtual functions, friend functions, static function, this pointer, polymorphism, Types of Polymorphism with examples, templates, class templates.

References / Textbooks:

1. HerberttSchildt, C++: The Complete Reference, Tata McGraw-Hill Education India, 4th Edition.
2. Bjarne Stroustrup, The C++ Programming Language, Addison – Wesley Professional (2013), 4th Edition
3. Bjarne Stroustrup, A Tour of C++ (C++ In-Depth Series), Addison – Wesley Professional (2018), 2nd Edition
4. G.S. Baluja, C++ Program Design (w/CD), Khanna Book Publishing Company (2015), 2nd edition.
5. Stanley Lippman, JoseeLajoie, Barbara Moo, C++ Primer, Addison-Wesley Professional (2012), 5th edition.
6. Richard Johnsonbaugh and Martin Kalin, Object Oriented Programming in C++, Pearson Education (1999), 2nd Edition

Course Outcomes:

After passing course the student will be able to:

CO1: Understand register and its micro-operations, computer instructions and basic design of computer.

CO2: Gain knowledge of various instruction formats and addressing modes.

CO3: Have understanding of memory organization and design.

CO4: Have understanding of I/O organization, Pipeline and vector processing.

Max. Marks: 75
Theory: 60
CA: 15

Examination Time: 3 Hrs

Instructions for Paper Setter -

Eight questions of equal marks(12 Marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Information Representation: Register Transfer, Various Registers, Implementing Common Bus Using Multiplexers: Logical; Arithmetic & Shift Micro-operations.

Basic Computer Design Instruction Codes, Interfacing various Registers, Computer Instructions, Timing Signals, Instruction Cycle, Design of a Basic Computer.

UNIT-II

CPU Design Stack Organized CPU, Instruction Formats, Addressing Modes, Program Control, Hardwired & Microprogrammed (Wilhe's Design) Control Unit.

UNIT-III

Memory Organization Memory Hierarchy, Designs & Concepts of Main Memory, Auxiliary Memory, Associative Memory, Cache and Virtual Memory.

UNIT-IV

I/O Organization I/O Interface, Modes of Transfer, Program Interrupt, DMA & I/O Processor.

Pipeline & Vector Processing Parallel Processing Pipelining, Parallel & Distributed Computers, SISD,SIMD& MISD, MIMD Machines, Vector Processing.

References/Textbooks:

1. Morris M. Mano, Computer System Architectue, Prentice Hall, 1992.
2. J.P. Hayes, Computer Architecture and Organization, McGraw Hill, 1998.
3. J.L. Hennessy D.A Patterson, and D. Goldberg, Computer Architecture A Quantitative Approach, Pearson Education Asia, 2006.

Note: The latest editions of the books should be followed.

Course Outcomes:
After passing course the student will be able to:

CO1: Understand data, database and database models.

CO2: Gain knowledge of normalization and transaction control.

CO3: Gain knowledge of core database language-SQL.

CO4: Have a basic understanding of Big-data and NoSQL.

Bachelor of Computer Applications Semester – III
(Session 2021-22)
COURSE CODE:BCAL–3112
DATABASE MANAGEMENT SYSTEM

Max. Marks: 75
Theory: 60
CA: 15

Examination Time: 3 Hrs

Instructions for Paper Setter -

Eight questions of equal marks(12 Marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction: Introduction to Data, Field, Record, File, Database, Database management system. Structure of database system, Advantages and Disadvantages, levels of database system, Relational model, Hierarchical model, Network model, comparison of models, E-R diagram, different keys used in a relational system, DBA, responsibilities of DBA.

UNIT-II

Codd's Rules, Relational Algebra, Relational Calculus - Domain and Tuple relational calculus, Query Processing and Optimization.

UNIT-III

Introduction to normalization – need and advantages of normalization, INF, 2NF, 3NF, BCNF, 4NF and 5NF, Introduction to transaction management – ACID Properties, concurrency control and its management, protection, security, recovery of database.

UNIT-IV

SQL: Introduction to SQL–DDL, DML, DCL, Join methods & sub query, Union Intersection, Minus, Built in Functions, Views, Security amongst users, sequences, Indexing,
Introduction to PL/SQL: Cursors – Implicit and Explicit, Procedures, Functions, Packages, Database Triggers.
Big Data: Introduction to Big Data and Analytics, Introduction to NoSQL.

References/Textbooks:

1. C.J. Date, AnIntroduction to Database Systems, Pearson Education 2000.
2. H. F. Korth&Silverschatz, A., Database System Concepts, Tata McGraw Hill, 2010.
3. Elmasri&Navathe, Fundamentals of Database Systems, Addison-Wesley, 2011.
4. Hoffer, Prescott, Mcfadden, Modern Database Management, Paperback International, 2012.
5. Martin Gruber, Understanding SQL, BPB Publication, 1994.
6. Shashank Tiwari, Professional NOSQL, Wiley, 2015.

Note: The latest editions of the books should be followed.

Course Outcomes:

After passing course the student will be able to:

CO1: Understand formulation of algorithms and programs for problem solving.

CO2: Gain understanding of various programming constructs like data types, operators, string processing and control structures.

CO3: Have knowledge of object oriented programming paradigm.

CO4: Have understanding of file handling, exception handling and SQLite database connectivity in python.

Max. Marks: 75
Theory: 60
CA: 15

Examination Time: 3 Hrs

Instructions for Paper Setter -

Eight questions of equal marks(12 Marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT-I

Introduction to Python: Process of Computational Problem Solving, Python Programming Language

Data and Expressions: Literals, Variables and Identifiers, Operators, Expressions, Statements and Data Types

Control Structures: Boolean Expressions (Conditions), Logical Operators, Selection Control, Nested conditions, Debugging

UNIT-II
Lists: List Structures, Lists (Sequences) in Python, Iterating Over Lists (Sequences) in Python
Dictionaries: Dictionaries and Files, Looping and dictionaries, Advanced text parsing
Iteration: While statement, Definite loops using For, Loop Patterns, Recursive Functions, Recursive Problem Solving, Iteration vs. Recursion

UNIT-III
Functions: Fundamental Concepts, Program Routines, Flow of Execution, Parameters & Arguments
Files: Opening Files, Using Text Files, String Processing, Exception Handling

UNIT-IV
Objects and Their Use: Introduction to Object Oriented Programming
Modular Design: Modules, Top-Down Design, Python Modules
Using Databases and SQL: Database Concepts, SQLite Manager Firefox Add-on, SQL basics summary, basic Data Modeling, Programming with multiple tables.

References/Textbooks:

1. Charles Severance, Python for Informatics, Version 0.0.7.
2. Charles Dierbach, Introduction to Computer Science Using Python: A Computational Problem-SolvingFocus, Wiley Publications, 2012.
3. Guttag John V, Introduction To Computation And Programming Using Python, PHI, 2014.
4. Jeeva Jose and Sojan P. Lal, Introduction to Computating& Problem Solving Through Python, Khanna Publishers, 2015.
5. Mark J. Guzdial, Introduction to Computing and Programming in Python, PearsonEducation, 2015.
6. Kenneth Lambert, Fundamentals of Python, Course Technology, Cengage Learning, 2015
7. Mark Lutz, Learning Python, O'Reilly Media, 2013

Note: The latest editions of the books should be followed.

Max. Marks: 50
Practical: 40
CA: 10

Examination Time: 3 Hrs

Lab based on computational problem solving**.**

Bachelor of Computer Applications Semester – III
(Session 2021-22)
COURSE CODE: BCAP–3115
LABON DATABASE MANAGEMENT SYSTEM

Max. Marks: 25
Practical: 20
CA: 5

Examination Time: 3 Hrs

Lab based on Database Management System .

Bachelor of Computer Applications Semester – IV
(Session 2021-22)
COURSE CODE: BCAL–4111
DATA STRUCTURES

Course Outcomes:

After passing course the student will be able to:

CO1: Comprehend various sorting and searching algorithms.

CO2: Implement the basic data structures and solve problems using fundamental algorithms.

CO3: Analyze complexity of algorithms to determine their efficiency.

CO4: Evaluate and choose adequate data structures to solve real world problems.

Bachelor of Computer Applications Semester – IV
(Session 2021-22)
COURSE CODE: BCAL–4111
DATA STRUCTURES

Examination Time: 3 Hrs   **Max. Marks: 75**
                                                                     Theory: 60
                                                                     CA: 15

Instructions for Paper Setter -

Eight questions of equal marks (12 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT-I

Basic Data Structure: Introduction to elementary Data Organization, Common Operation on Data Structures, Algorithm Complexity, Big O Notation, Time – Space tradeoff between Algorithms.

Arrays: Array Defined, Representing Arrays in Memory, Various Operations on Linear Arrays, Multidimensional Arrays.

UNIT-II

Sorting and Searching: Sorting Algorithms, Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Searching Algorithms, Linear Search and Binary Search.

Hashing: Hash Functions, Division Method, Mid-Square Method, Folding Method.

Linked Lists: Types of Linked Lists, Representing Linked Lists in Memory, Advantages of using Linked Lists over Arrays, Various Operations on Linked Lists.

UNIT-III

Stacks: Description of STACK structure, Implementation of Stack using Arrays and Linked Lists, Applications of Stacks – Converting Arithmetic expression from infix notation to polish and their subsequent evaluation, Quicksort Technique to sort an array.

Queues: Description of queue structure, Implementation of queue using arrays and linked lists, Description of priorities of queues, Dequeues.

UNIT-IV

Trees: Description of Tree Structure and its Terminology, Binary Trees and Binary Search Trees and their representation in Memory, Heapsort.

Graphs: Description of Graph Structure, Implement Graphs in Memory using Adjacency

Matrix, PathMatrix, graph traversal techniques - DFS, BFS.

References / Textbooks:

1. Seymour Lipschutz, Data Structures with C (Schaum's Outline Series), McGraw Hill Education (2017), 1st Edition
2. ReemaThareja, Data Structures Using C, Oxford Publication (2014), 2nd Edition
3. Sahni Horowitz, Fundamentals of Data Strucetures in C (2008), 2nd Edition
4. NarasimhaKarumanchi, Data Structures and Algorithms made easy, Careermonk Publications (2016), 5th Edition
5. S.K. Srivastava and Deepali Srivastava, Data Structures through C, BPB Publications (2004)
6. YedidyahLangsam, Augestein and Tanenbaum, Data Structures using C and C++, Pearson Education India (2015), 2nd Edition

Bachelor of Computer Applications Semester – IV
(Session 2021-22)
COURSE CODE: BCAL–4112
INFORMATION SYSTEMS

Course Outcomes:

After passing course the student will be able to:

CO1: Identify the impact of information in decision making of an organization.

CO2: Comprehend various methods for capturing and accessing information including online access.

CO3: Comprehend various types of Information Systems - TPS, MIS, OAS and DSS.

CO4: Identify the role of Information System in organizations: Accounting Information systems, Inventory control systems and Marketing systems.

Bachelor of Computer Applications Semester – IV
(Session 2021-22)
COURSE CODE: BCAL–4112
INFORMATION SYSTEMS

Examination Time: 3 Hrs   **Max. Marks: 75**
                                                              Theory: 60
                                                              CA: 15

Instructions for Paper Setter -

Eight questions of equal marks (12 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT - I

Basic Terminology: Systems, Data, Information, Knowledge, Database and Database Management System.

Capturing of Information, sources of information, online access and capture.

UNIT - II

Types of systems, Introduction to Information system and its types.

Technologies for Information System: Latest trends in Hardware and Software.

Development life cycle of Information system.

UNIT - III

Types of Decisions: Structured, Unstructured and Semi Structured, Decision Support System (DSS), Transaction processing systems (TPS), office Automation systems (OAS).

UNIT - IV

Management Information System (MIS) and Expert System.

Case studies of the Information System: Accounting Information systems, Inventory control systems & Marketing systems.

References / Textbooks:

1. Mohammad Azam, Management Information Systems, Tata McGraw Hill Education (2012).
2. Nagpal D.P., Textbook on Management Information System, S.Chand& Company (2011).
3. R. Kelly, Rainer and Casey G. Cegielski, Introduction to Information Systems, Wiley (2015), 4th Edition
4. C. Laudon Kenneth and P. Laudon Jane, Management Information System, Pearson Education (2018), 15th Edition.
5. Brien, Marakas and Behl, Management Information Systems, McGraw Hill Education (2017), 10th Edition
6. Suman Mann SeemaShokeen, Pooja Singh, Information Systems, Dreamtech Press (2020)

Course Outcomes:

After passing course the student will be able to:

CO1: Comprehend basics of internet and its working.

CO2: Apply the concepts for better e-mail management.

CO3: Comprehend different Internet protocols and search engines.

CO4: Apply basic web designing technologies to design webpage.

Bachelor of Computer Applications Semester – IV
(Session 2021-22)
COURSE CODE: BCAL-4113
INTERNET APPLICATIONS

Examination Time: 3 Hrs

Max. Marks: 75
Theory: 60
CA: 15

Instructions for Paper Setter -

Eight questions of equal marks (12 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT-I

Introduction: About Internet and its working, Business use of Internet, services offered by Internet, evaluation of internet, internet service provider (ISP), windows environment for dial up networking (connecting to internet), audio on Internet, Internet addressing (DNS) and IP addresses).

E–Mail Basics: Introduction,Advantage and disadvantage, structure of an e–mail message, working of e–mail (sending and receiving messages), managing e–mail (creating new folder, deleting messages, forwarding messages, filtering messages).

UNIT-II

Internet Protocol: Introduction, file transfer protocol (FTP), Gopher, Telnet, other protocols like HTTP and TCP/IP.

WWW: Introduction, working of WWW, Web browsing (opening, viewing, saving and printing a web page and bookmark).

UNIT-III

Web Designing: HTML – Elements, Attributes, Formatting, Paragraphs, Links, Lists, Tables, Images, Frames, Forms.

CSS – Types, Syntax, Colors, Background, Box model, Fonts, Alignment, CSS Links.

JavaScript – Syntax, Operators, Data-Types, Function, Array.

Search Engine: About search engine, component of search engine, working of search engine, difference between search engine and web directory.

Intranet and Extranet: Introduction, application of intranet, business value of intranet, working of intranet, role of extranet, working of extranet, difference between intranet and extranet.

References / Textbooks:

1. Anshuman Sharma, Fundamentals of Internaet Applications, Lakhanpal Publications (2016)

2. Ikvinderpal Singh, Internet Applications, Khanna Book Publishing Company (2011), 1st Edition

3. P. Rizwan Ahmed, Internet & its Applications, Margham Publications (2013)

4. Douglas E. Corner, Computer Networks and Internet with Internet Applications, Pearson (2008), 4th Edition

5. Satish Jain/Vineeta Pillai, Wireless Communication & Networking made Simple, BPB Publishers (2007)

6. Laura Lerney, Rafe Colburn, Jennifer Kyrnin, Mastering HTML, CSS &Javascript Web Publishing, BPB Publishers (2016), 1st Edition

Bachelor of Computer Applications Semester – IV
(Session 2021-22)
COURSE CODE: BCAL-4114
FOUNDATION OF DATA SCIENCE

Course Outcomes:

After passing course the student will be able to:

CO1: Comprehend basic concepts of Data Science along with its components and process.

CO2: Analyze different application areas and challenges of data science.

CO3: Interpret various data collection tools.

CO4: Comprehend various types of data analytics.

Examination Time: 3 Hrs   **Max. Marks: 75**
                                                          Theory: 60
                                                          CA: 15

Instructions for Paper Setter -

Eight questions of equal marks (12 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT-I

Introduction: Meaning, Evolution of Data science, Need of Data Science, Components of Data Science, Data Science process. Difference between data science and business intelligence.

UNIT- II

Application Areas and Challenges in DataScience. Job Roles in Data Science.

Domain Data Analysis: Exploratory and Confirmatory data analysis.

UNIT-III

Data Collection and Data Analytics.

Data Collection sources, Data collection methods – Primary data collection methods and Secondary data collection methods.

UNIT-IV

Data Collection Tools – online and offline.

Understanding Data Analytics: Need, Characteristics.

Types: Descriptive. Predictive, Diagnostic, Prescriptive

References / Textbooks:

1. Qurban A Memon, Shakeel Ahmed, Data Science: Theory, Analysis and Applications, CRC Press (2019), 1st edition.
2. Ulrika Jagare, Data Science for Dummies, Wiley (2019)
3. Joel Grus, Data Science from Scratch, O'Reilly (2015), 1st Edition
4. Pulkit Bansal, Data Science Uncovering the Reality, Notion Press (2020), 1st Edition
5. Davy Cielen, Arno D.B.Meysman, Mohamed Ali, Introducing Data Science: Big Data, Machine Learning, Dreamtech Press (2016)
6. Roger Peng, Elizabeth Matsui, The Art of Data Science, Lulu.com (2016)
7. Ramesh Sharda, DursunDelen and Efraim Turban, Business Intelligence, Analytics and Data Science: A Managerial Perspective, Pearson Education (2019), 4th Edition

Examination Time: 3 Hrs   **Max. Marks: 50**
                                           Practical: 40
                                           CA: 10

Lab based on Data Structures .

Examination Time: 3 Hrs   **Max. Marks: 50**
                                                           Practical: 40
                                                           CA: 10

Lab Based on Use of Internet and Web Designing.

Bachelor of Computer Applications Semester – V
(Session 2021-22)
COURSE CODE: BCAL-5111
COMPUTER NETWORKS

Course Outcomes:

After passing course the student will be able to:

CO1: Describe the functions of each layer in OSI and TCP/IP model.

CO2: Understand the types of transmission media with real time applications

CO3: Describe the Data Link layer and Network layer design issues.

CO4: Explain the functions of Transport layer and Application layer protocols.

CO5: Have a basic knowledge of the use of cryptography and network security.

Bachelor of Computer Applications Semester – V
(Session 2021-22)
COURSE CODE: BCAL-5111
COMPUTER NETWORKS

Examination Time: 3 Hrs   **Max. Marks: 75**
                                                            Theory: 60
                                                            CA: 15

Instructions for Paper Setter -

Eight questions of equal marks(12 Marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT – I

Introduction: Basic concepts of Computer Networks, Basic Components of a Network, Network types and topologies. OSI Reference Model, TCP/IP Model, Comparison between TCP/IP and OSI model,

Transmission Media: Coaxial cable, Twisted pair cable, Fiber optics & Satellites.

UNIT – II

Network Devices - Hub, Switch, Repeaters, Bridges, Routers, Gateways.

Introduction to Analog and Digital Transmission: Telephone system, Modems, Types of modems, pulse code modulation. Multiplexing and its types, Circuit Switching, Packet Switching, Message Switching, ISDN service transmission.

UNIT - III

Data Link Layer Design Issues: Framing, Error Control, Flow Control, Error Detection & Correction, Media Access Protocols: ALOHA, CSMA, CSMA/CD, CSMA/CA. IEEE standards 802: Token Bus, Token Ring, FDDI.

Design Issues of Network Layer: Routing, IPv4: Notation, Classful addressing, Header Format, IPv6 addressing.

UNIT – IV

Design issues of Transport Layer: TCP, UDP

Network Security and Privacy: Brief Introduction to Cryptography.

Network Services: File transfer, Access & Management, Electronic Mail, Remote login

References/Textbooks:

1. Tanenbaum , A.S., Computer Networks, Prentice Hall, 2010.
2. Stallings, W., Local Networks: An Introduction: Macmillan Publishing Co, 1990.
3. Stallings W., Data and Computer Communications, Prentice Hall, 2011.
4. Forouzan B., Data Communications and networking, McGraw Hill, 2007.

Note: The latest editions of the books should be followed.

Course Outcomes:

After passing course the student will be able to:

CO1: Understand the basics of websites and use of different markup languages.

CO2: Gain knowledge of different client side technologies.

CO3: Develop single page application through React.

Bachelor of Computer Applications Semester – V
(Session 2021-22)
COURSE CODE: BCAL-5112
WEB TECHNOLOGIES

Examination Time: 3 Hrs
Max. Marks: 75
Theory: 60
CA: 15

Instructions for Paper Setter -

Eight questions of equal marks (12 Marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT I

Web Essentials – Client/Server Architecture, Web Server, Webpage, Website, Internet, Protocol, OSI model, IP Addresses, Port, HTTP Method, HTTP Response/Request, HTTPS, URL, Browser Architecture, E-mail Protocols, World Wide Web, DNS.

HTML – Basics, Program Structure, Headings, Paragraph, Styling, Formatting, Hyperlink, Image, Table, List, Frame, Block, Entities, Form, Form Elements, Introduction To XHTML.

CSS – Types, Selector, Colors, Background, Box Model, Text, Font, Display, Position, Float, Clear, Rounded Corners.

UNIT - II

JavaScript – Basics, Features, Advantages, Limitations, Types, Basics, Functions, Control Statement, Arrays, JavaScript Objects, Host Objects.

DOM – Introduction, Methods, Accessing HTML and CSS, Events, Event Listener, Nodes and Collection.

BOM – Window, Screen, History, Navigation.

UNIT – III

ES6 – Variables, Arrow functions, Class and Inheritance.

Introduction to React - Render HTML, JSX.

React Components – Web component, Class, Function, Constructor, nested Component.

UNIT IV

Data Handling – Props, Props Validation, State, Fetching Data through API.

Lifecycle of React Components, Form Handling in React, Event Handling in React, React Sass.

References/Textbooks:

1. Jeffery C Jackson, Web Technology- A Computer Science perspective, Pearson Education, 2007.
2. Chris Bates, Web Programming- Building Internet Applications, Wiley India, 2006.
3. Achyut S Godbole and AtulKahate, Web technologies, Tata McGraw Hill, 2002.
4. Uttam K Roy, Web Technologies, Oxford University Press, 2010.
5. KirupaChinnathambi, Learning React, Addison-Wesley Professional, 2019.
6. Alex Banks, Eve Porcello, Learning React: Functional Web Development with React and Redux, O'Reilly Media, 2017.

Note: The latest editions of the books should be followed.

Bachelor of Computer Applications Semester – V
(Session 2021-22)
COURSE CODE: BCAL - 5113
OPERATING SYSTEM

Course Outcomes:

After passing course the student will be able to:

CO1: Describe, contrast and compare different types of Operating System.

CO2: Understand the process management policies and CPU scheduling.

CO3: Describe and analyze the memory management and its allocation policies.

CO4: Gain knowledge of operating system concepts that includes virtual memory, mutual exclusion algorithms and deadlock handling.

Examination Time: 3 Hrs   **Max. Marks: 75**
                                                                              Theory: 60
                                                                              CA: 15

Instructions for Paper Setter -

Eight questions of equal marks(12 Marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT – I

Introduction: Definition, Batch Processing, Multi programming, Time Sharing Systems, Multitasking, multiprocessing, Parallel Systems, Distributed Systems, Real–time Systems.

Processes: Process Concepts, Process Scheduling, Threads, System Calls.

UNIT - II

CPU–Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Algorithm Evaluation: Response Time, Turnaround Time, Waiting Time, Throughput.

Process Synchronization: Critical-section problem, semaphores and its Types (Binary and Counting), Classical problems of synchronization and their solutions.

UNIT – III

Deadlocks: System Model, Deadlock characterization, Methods for handing deadlocks, Deadlocks Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Approach to Deadlock handling.

Memory Management: Background, Logical v/s Physical Address Space, Swapping, Continuous Allocation, Paging, Segmentation.

UNIT – IV

Virtual Memory: Background, Page Fault, Demand Paging, Page Replacement, Page Replacement Algorithms, Thrashing.

Secondary Storage Structures: Disk structures, Disk scheduling.

References/Textbooks:

1. AviSilberschatz, Peter Baer Galvin, Greg Gagne, Operating System Concepts, Wiley, 2013.

2. Charles Crowley, Operating Systems: A Design-Oriented Approach, Tata McGraw Hill, 2001.

3. Deitel, An Introduction to Operating Systems, Second Edition, Addison Wesley, 1990.

4. William Stallings, Operating Systems: Internals and Design Principles, Pearson Education Limited, 2014.

Note: The latest editions of the books should be followed.

Bachelor of Computer Applications Semester – V
(Session 2021-22)
COURSE CODE: BCAL-5114
OBJECT ORIENTED PROGRAMMING-II

Course Outcomes:

After passing this course the student will be able to:

CO1: Understand the basic fundamentals of Object Oriented Programming using Java .

CO2: Gain knowledge of object oriented concepts to model real world problems.

CO3: Have knowledge of packages, multithreading and Exception handling.

CO4: Demonstrate the concept of file handling and Applets.

Bachelor of Computer Applications Semester – V
(Session 2021-22)
COURSE CODE: BCAL-5114
OBJECT ORIENTED PROGRAMMING-II

Max. Marks: 75

Examination Time: 3 Hrs
Theory: 60
CA: 15

Instructions for Paper Setter -

Eight questions of equal marks (12 Marks each)are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction to Object Oriented Programming using Java: Features, Object Orientation Concepts, Java Virtual Machine, Data Types, Operators, Control Structures.

UNIT-II

Introduction to OOPS: Classes & Methods, Constructors, Inheritance& Polymorphism

UNIT-III

Packages & Interfaces, Multithreading in Java, Exception Handling.

UNIT-IV

I/O Stream Classes & File Handling.

Applets: Applet basics, Applet Life Cycle, Applet Display, Repaint, Parameter Passing.

References/Textbooks:

1. HurbertSchildt, Java The Complete Reference, Tata MacGraw Hill, 2014.
2. Y. Daniel Liang, Introduction to Java Programming, Pearsons Publications, 2015.
3. Jon Duckett, Beginning Web Programming with HTML, XHTML, and CSS, John Wiley & Sons, 2004.
4. Thomas A. Powell, HTML & CSS: The Complete Reference, McGraw-Hill, 2010.

Note: The latest editions of the books should be followed.

Bachelor of Computer Applications Semester – V
(Session 2021-22)
COURSE CODE: BCAP-5115
LAB ON OBJECT ORIENTED PROGRAMMING-II

Examination Time: 3 Hrs

Max. Marks: 50
Practical: 40
CA: 10

Lab Based on Object Oriented Programming .

Bachelor of Computer Applications Semester – V
(Session 2021-22)
COURSE CODE: BCAP-5116
LAB ON WEB TECHNOLOGIES

Examination Time: 3 Hrs

Max. Marks: 50
Practical: 40
CA: 10

Lab Based on Web Technologies.

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend the background mechanism involved in display devices like CRT, LCD, LED, etc.

CO2: Comprehend basic concepts involved in drawing basic shapes.

CO3: Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping, etc.

CO4: Identify the importance of viewing and projections.

Bachelor of Computer Applications Semester – VI
(Session 2021-22)
COURSE CODE: BCAL - 6111
COMPUTER GRAPHICS

ExaminationTime: 3 Hrs   **Max. Marks: 75**
                                                              Theory: 60
                                                              CA: 15

Instructions for Paper Setter -

Eight questions of equal marks (12 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT – I

Overview of Graphics System: Computer Graphics and their applications.

Display Devices: CRT Monitors (Random Scan and Raster Scan, DVST, Plasma – Panel Display, LED and LCD Monitors, Virtual Reality and Workstation.

UNIT – II

Elementary Drawing: Points and various line drawing Algorithms and their comparisons. Circle Generating Algorithms, Algorithms for Ellipse, Arc and Sector.

UNIT – III

Two Dimensional Transformations: Basic Transformations - Translation, Rotation, Scaling, Reflection and Shearing. Matrix representation of Basic Transformations and Homogenous Coordinates.

Composite Transformations: Windowing and Clipping. Windowing Concepts, Clipping and its Algorithms, Window–to–View Port Transformations.

UNIT - IV

Three Dimensional concepts: 3D Coordinate Systems, 3D Transformations - Translation, Rotation, Scaling, Reflection and Shearing,

Projection: Parallel Projections, Perspective Projection, Vanishing Point, View Confusion and Topological Distortion.

References / Textbooks:

1. Hearn D, Baker P, Computer Graphics, PHI Easter Economy (2002), 2nd Edition.
2. Zhigang Xiang, Plastock R, Kalley G, Computer Graphics, McGraw Hill Education (2006), 2nd Edition.
3. Rajesh K. Maurya, Computer Graphics with Virtual Reality System, Wiley (2018), 3rd Edition
4. Udit Aggarwal, Computer Graphics, SK Katria and Sons (2013), Reprint 2013 Edition
5. Padeep K. Bhatia, Computer Graphics, Dreamtech Press (2019)
6. Andries Van Dam, Foley, Steven, John, Computer Graphics Principles and Practice, Peson Education India (2002), 2nd Edition

Course Outcomes:

After passing course the student will be able to:

CO1: identify and evaluate various process model used for development of software.

CO2: Analyze gathered data to form requirement specifications.

CO3: Design modular and structured design of a system.

CO4: Identify various documentation involved in different phases of system development.

CO5: Apply testing techniques on basic building blocks and control structure.

CO6: Comprehend activities involved in software project management.

Bachelor of Computer Applications Semester – VI
(Session 2021-22)
COURSE CODE: BCAL - 6112
SOFTWARE ENGINEERING

ExaminationTime: 3 Hrs   **Max. Marks: 75**
                                                              Theory: 60
                                                              CA: 15

Instructions for Paper Setter -

Eight questions of equal marks (12 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT – I

Introduction to Software: Definition, Software characteristics, Software Components, Software Applications.

Introduction to Software Engineering: Definition, Software Engineering Paradigms, Waterfall Model, Prototyping Model, Incremental Model, Spiral Model.

UNIT – II

Requirement, Analysis and Specifications – Problem Analysis, Requirement Gathering Tools (Questionnaire, Interview, Group Discussion, Observation), SRS Document and its Characteristics, Structured Analysis: Data Flow Diagram, Data Dictionaries.

Software Design – Characteristics, Structure Chart, Coupling, Cohesion, Functional Independence.

UNIT – III

Project Management – SPMP Document, Size Estimation (LOC, Function Point), COCOMO (Basic, Intermediate and Complete COCOMO), Effort Estimation, Development Time Estimation, Project Scheduling (Work Breakdown Structure, Activity Network, Critical Path Method, Gantt Chart, PERT Chart), Staffing.

Risk management and Control, software Maintenance and its types, Software Reuse, Software Reliability.

UNIT – IV

Coding– Coding Standards and Guidelines, Code Walkthrough, Code Inspection.

Testing - Test Case Design, Unit Testing, Black Box Testing (Equivalence Class Partitioning, Boundary Value Analysis), White Box Testing (Statement, Branch, Condition, Path Coverage), Cyclomatic Complexity, Integration Testing, System Testing (Alpha, Beta, Acceptance), Validation And Verification, Performance Testing.

References / Textbooks:

1. Roger S. Pressman, Software Engineering, McGraw-Hill series (2014) , 8th Edition.
2. Pankaj Jalote, A concise introduction to Software Engineering, Wiley (2008).
3. Rajib Mall, Fundamentals of Software Engineering, PHI Learning (2018), 5th Revised Edition
4. Kogent Learning Solutions Inc., Software Engineering, Dreamtech Press (2012)
5. Bruce R.Maxim, Roger S. Pressman, Software Engineering: A Practioner's Approach, McGraw Hill Education (2019), Eighth edition
6. David A. Gustafson, Schaum's Outline of Software Engineering, McGraw Hill (2020), 1st Edition

Bachelor of Computer Applications Semester – VI
(Session 2021-22)
COURSE CODE: BCAP - 6113
LAB ON COMPUTER GRAPHICS

Max. Marks: 50
Practical: 40
CA: 10

ExaminationTime: 3 Hrs

Lab Based on Applications of Computer Graphics .

Bachelor of Computer Applications Semester – VI
(Session 2021-22)
COURSE CODE: BCAD - 6114
PROJECT

Course Outcomes:

After passing this course the student will be able to:

CO1: Apply software engineering paradigms like Process Model, Analysis, Design, Testing, etc.

CO2: Work within defined time and resource constraints while developing real world application.

CO3: Address the Real World Problems and find the required solution.

CO4: Demonstrate an ability to work in teams and manage the conduct of the research study.

CO5: Formulate and propose a plan for creating a solution.

Bachelor of Computer Applications Semester – VI
(Session 2021-22)
COURSE CODE: BCAD - 6114
PROJECT

Examination Time: 3 Hrs   **Max. Marks: 300**
                                                               Practical: 240
                                                               CA: 60

General Instructions:

1. A software module based on the work done in the entire course is to be developed.
2. The soft copy of the module shall be submitted to the College/Institute till April 5 of the respective semester.
3. The software module shall be developed in groups, consisting of at most two students in a group.
4. The respective college shall depute guide(s)/supervisor(s) under whose supervision the software module shall be developed. The guide/supervisor shall clarify that the work done is original & authenticated. The certificate found to be incorrect at any stage shall attract the proceedings against all the stakeholders, as per rules.
5. The evaluation of the module shall be done as per the common ordinance of UG/PG w.e.f. 2012–2013 under semester system.