Annexure D-3

FACULTY OF COMPUTER SCIENCE & IT

SYLLABUS

of

Bachelor of Computer Applications

(Semester V-VI)

(Under Continuous Evaluation System)

(12+3 System of Education)

Batch: 2022-25
Session: 2024-25

The Heritage Institution

KANYA MAHA VIDYALAYA JALANDHAR (Autonomous)

PROGRAMME SPECIFIC OUTCOMES

Bachelor of Computer Applications
(Session 2024-25)

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 2024-25

Bachelor of Computer Applications Semester - V							
Course Code	**Course Name**	**Course Type**	**Marks**				**Examination Time (in Hours)**
			Total	**Ext.**		**CA**	
				L	**P**		
BCAL-5111	Computer Networks	C	75	60	-	15	3
BCAL-5112	Web Technologies (Full Stack Development)	C	75	60	-	15	3
BCAL-5113	Operating System	C	75	60	-	15	3
BCAL-5114	Object Oriented Programming -II	C	75	60	-	15	3
BCAP-5115	Lab on Object Oriented Programming- II	C	50	-	40	10	3
BCAP-5116	Lab on Full Stack Development	C	50	-	40	10	3
SECJ-5551	* Job Readiness Course	AC	25	20	-	5	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**

**** An Internship/MOOCs of not less than 30 hours (either online or offline mode) in either of Semester V or Semester VI.**

The students will have to submit the Certificate of Completion to the department (No marks or credits – only completion required).

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAMME

Bachelor of Computer Applications

Session 2024-25

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

**** An Internship/MOOCs of not less than 30 hours (either online or offline mode) in either of Semester V or Semester VI**

The students will have to submit the Certificate of Completion to the Department (No marks or credits – only completion required).

Bachelor of Computer Applications Semester – V
(Session 2024-25)
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: Identify various network devices and the layers on which it operates.

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

CO4: Comprehend the functioning of Transport layer and Application layer protocols.

Bachelor of Computer Applications Semester – V
(Session 2024-25)
COURSE CODE: BCAL-5111
COMPUTER NETWORKS

Examination Time: 3 Hours

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.

Models: 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: Introduction to Analog and Digital Signals, Modems, Types of modems, pulse code modulation. Multiplexing and its types, Circuit Switching, Packet Switching, Message Switching.

Data Link Layer Design Issues: Error Control, Flow Control, Error Detection & Correction

UNIT - III

Media Access Protocols: CSMA, CSMA/CD, CSMA/CA.

IEEE standards 802: Token Ring, FDDI.

Design Issues of Network Layer: Routing Algorithm- Distance Vector Routing, Link state Routing and The Dijkstra Algorithm, IPv4: Notation, Classful addressing, Header Format, IPv6 addressing.

UNIT – IV

Design issues of Transport Layer: Introduction to TCP, TCP Services, features, TCP segment format, Introduction to UDP, User Datagram Format, UDP Operation
Network Security and Privacy: Introduction to Cryptography, types of Key.

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.

Bachelor of Computer Applications Semester – V
(Session 2024-25)
COURSE CODE: BCAL-5112
WEB TECHNOLOGIES (FULL STACK DEVELOPMENT)

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

CO1: Apply JavaScript code for interaction with content of webpage.

CO2: Develop user interface of single page website through React.

CO3: Implement Node.js code for back-end support and database connectivity with MongoDB.

CO4: Implement Express code for managing HTTP responses, sessions, forms and database connectivity.

Bachelor of Computer Applications Semester – V
(Session 2024-25)
COURSE CODE: BCAL-5112
WEB TECHNOLOGIES (FULL STACK DEVELOPMENT)

Examination Time: 3 Hours

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

JavaScript: Introduction to JavaScript, Features, Data types (Number, Strings, Boolean, Objects), Operators (Arithmetic, Assignment, Comparison, Logical), Functions, Looping Statement (For loop, While loop), Conditional Statement, Arrays, JavaScript objects, Host objects.

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

BOM: Window, Screen, History, Navigation.

ES6: Variables, Arrow functions, Class.

UNIT-II

React: Introduction, Features, Render HTML, JSX.

React Components: Class, Function, Constructor, Nested Component, Lifecycle of React Components

Data Handling: Props, Form and Event Handling in React, Fetching Data through API.

UNIT-III

Node: Introduction to Node, Modules -NPM, HTTP and URL Module.

Node File System, User Authentication, Event Handling, File Upload, Email Handling. Using MongoDB with Node.

UNIT-IV

Express: Introduction, Working with HTTP methods (GET and POST), Routing, URL Building, and Templating.

Express Middleware: Application-level, Router-level, Error-Handling, Built-in, Third Party. Managing Cookies and Sessions, Connecting with MongoDB.

References / Textbooks:

1. Jeffery C Jackson, "Web Technology- A Computer Science perspective", Pearson Education, 1st Edition, 2007.
2. Chris Bates, "Web Programming- Building Internet Applications", Wiley India, 1st Edition, 2006.
3. Achyut S Godbole and Atul Kahate, "Web technologies", Tata McGraw Hill, 1st Edition, 2008.
4. Web Technologies, Uttam K Roy, Oxford University Press, 1st Edition, 2010.
5. Kirupa Chinnathambi, Learning React, Addison-Wesley Professional, 1st Edition, 2019.

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

Bachelor of Computer Applications Semester – V
(Session 2024-25)
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 synchronization policies and CPU scheduling.

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

CO4: Comprehend about the application of virtual memory and disk scheduling.

Bachelor of Computer Applications Semester – V
(Session 2024-25)
COURSE CODE: BCAL-5113
OPEARTING SYSTEM

Examination Time: 3 Hours

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 2024-25)
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: Identify the use of inheritance, interfaces and packages in Java.

CO3: Identify the utilization of multithreading and Exception handling.

CO4: Connect Java application with an existing database and access it through JDBC.

Bachelor of Computer Applications Semester – V
(Session 2024-25)
COURSE CODE: BCAL-5114
OBJECT ORIENTED PROGRAMMING-II

Max. Marks: 75
Examination Time: 3 Hours **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

JAVA BASICS: Introduction to Java, Features of Java, Structure of a Java Program, primitive data types, keywords, Identifiers, literals, operators and comments.

OOPS: Object oriented concepts Advantage of OOPs, Objects and Classes,

Strings: Declaring a string, Immutable string, string comparison, concatenation, substring, string tokenizer.

UNIT - II

Inheritance: what is inheritance, types of inheritance, static import, Method overloading, method overriding, Runtime polymorphism, super keyword, final keyword

Interfaces: Abstract classes, declaring an interface, relationship between classes and interface, interface inheritance, implementing multiple inheritance using interface

Packages: what are packages, advantages of using packages, accessing package from another package, subpackaging, running packages by setting path and classpath.

UNIT - III

Exception Handling: what is exception handling, checked and unchecked exceptions, try-catch, try-multiple catch, try – finally, throw and throws

Multithreading: What is a thread, life cycle of a thread, creating a thread, sleeping a thread, joining a thread, thread priority

UNIT - IV

Input/Output: File input stream, File output stream, Buffered output stream, Buffered input stream.

Database connectivity: JDBC, JDBC drivers, steps to connect to the database, connectivity with MYSQL.

References/Textbooks:

1. HurbertSchildt, Java The Complete Reference, Tata McGraw 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 2024-25)
COURSE CODE: BCAP-5115
LAB ON OBJECT ORIENTED PROGRAMMING-II

Examination Time: 3 Hours

Max. Marks: 50
Practical: 40
CA: 10

Lab Based on Object Oriented Programming - II

Bachelor of Computer Applications Semester – V
(Session 2024-25)
COURSE CODE: BCAP-5116
LAB ON FULL STACK DEVELOPMENT

Examination Time: 3 Hours

Max. Marks: 50
Practical: 40
CA: 10

Lab Based on Web Technologies.

Bachelor of Computer Applications Semester – VI
(Session 2024-25)
COURSE CODE: BCAL - 6111
COMPUTER GRAPHICS

COMPUTER GRAPHICS

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 and techniques to clip and transform various objects and viewports.

CO4: Identify the importance of viewing and projections.

Bachelor of Computer Applications Semester – VI
(Session 2024-25)
COURSE CODE: BCAL - 6111
COMPUTER GRAPHICS

Examination Time: 3 Hours **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, Raster Scan, LED & LCD Monitors, Virtual Reality and Workstation.

UNIT – II

Elementary Drawing: Points and various line drawing Algorithms and their comparisons and Circle & Ellipse Generating Algorithms.

UNIT – III

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

Windowing and Clipping: Windowing Concepts, Clipping and its Algorithms and 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. Pardeep K. Bhatia, Computer Graphics, Dreamtech Press (2019)
6. Andries Van Dam, Foley, Steven, John, Computer Graphics Principles and Practice, Pearson Education India (2002), 2nd Edition

Bachelor of Computer Applications Semester – VI
(Session 2024-25)
COURSE CODE: BCAL - 6112
SOFTWARE ENGINEERING

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 and formulate design from this requirement specifications..

CO3: Comprehend activities involved in software project management.

CO4: Apply testing techniques on basic building blocks and control structure of a software.

Bachelor of Computer Applications Semester – VI
(Session 2024-25)
COURSE CODE: BCAL - 6112
SOFTWARE ENGINEERING

ExaminationTime: 3 Hours **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, and 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 2024-25)
COURSE CODE: BCAP - 6113
LAB ON COMPUTER GRAPHICS

Max. Marks: 50
Practical: 40
CA: 10

Examination Time: 3 Hours

Lab Based on Applications of Computer Graphics in C / C++.

Bachelor of Computer Applications Semester – VI
(Session 2024-25)
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 2024-25)
COURSE CODE: BCAD - 6114
PROJECT

Examination Time: 3 Hours **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. Candidates have to submit one hard copy and two CDs/DVDs of documentation which shall be kept with the HoD in the college only. Further, supervisor/guide shall forward one copy of DVD/CD containing all the documentation files of the students (file name to be saved as Rollno_of_the_ student.pdf) to the COE Office. The Covering letter (duly signed by the guide and Head of the department) should contain the following information: Candidate name, Candidate Roll no, Project Title of the student and .pdf file name of her project documentation.
3. The software module / website maybe developed in groups, consisting of at most two students in a group.
4. The 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 and 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 under semester system.