

Chaudhary Bansi Lal University, Bhiwani, Haryana

Scheme of Examination for Under-Graduate Programmes

Bachelor of Computer Applications (BCA)



According to
Curriculum Framework for Under-Graduate Programmes

As per NEP-2020

(Multiple Entry-Exit, Internships and Choice Based Credit System)

Ch. Bansi Lal University, Bhiwani, Haryana

Ch. Bansi Lal University, Haryana

Poojesh
Chairperson
Department of ICT
CBLU, Bhiwani

Ch. Bansil Lal University, Bhiwani

Scheme of Examination for the Computer Science Subject in Under Graduate Programmes
as per NEP2020 Curriculum and Credit Framework for Undergraduate Programmes

(Multiple Entry-Exit, Internships and Choice Based Credit System LOCF) with effect from the session 2024-25 (in a phased manner)

Semester-I

Course Type	Course Code	Nomenclature of the Course	Credits			Contact hours L: Lecture P: Practical T: Tutorial			Internal Assessment Marks		End term Examination Marks		Total Marks	Examination hours	
			Total	Theory (T)	Practical (P)	L	P	Total	T	P	T	P		T	P
CC-A1	24UN-BCA-101	Problem Solving through C	4	3	1	3	2	5	20	10	50	20	100	3	3
CC-B1	24UN-BCA-102	Foundations of Computer Science	4	3	1	3	2	5	20	10	50	20	100	3	3
CC-C1	24UN-BCA-103	Logical Organization of Computer	4	3	1	3	2	5	20	10	50	20	100	3	3
CC-M1	24UN-BCA-104	Mathematical Foundations for Computer Science-I	2	1	1	1	2	3	10	5	20	15	50	3	3
MDC1	To be taken from other department														
AEC-1	To be taken from AEC Pool														
SEC-1	To be taken from SEC Pool														
VAC-1	To be taken from VAC Pool														

Ch. Bansil Lal University, Haryana

Pooja Singh
Chairperson
Department of ICT
Ch. Bansil Lal University, Bhiwani

Semester-2

Course Type	Course Code	Nomenclature of the Course	Credits		Contact hours		Internal Assessment Marks		End term Examination Marks		Total Marks	Examination hours		
			Theory (T)	Practical (P)	L	P	Total	T	P	T			P	
CC-A2	24UN-BCA-201	Object Oriented Programming using C++	4	3	1	3	2	5	20	10	50	20	3	3
CC-B2	24UN-BCA-202	Introduction to Web Technologies	4	3	1	3	2	5	20	10	50	20	3	3
CC-C2	24UN-BCA-203	Concepts of Operating Systems	4	3	1	3	2	4	20	10	50	20	3	3
CC-M2	24UN-BCA-204	Mathematical Foundations for Computer Science-II	2	1	1	1	2	3	10	5	20	15	3	3
MDC-2			To be taken from other department											
SEC-2			To be taken from SEC Pool											
VAC-2			To be taken from VAC Pool											
AEC-2			To be taken from AEC Pool											
Internship	24UN-BCA-205		Internship of 4 credits of 4-6 weeks duration after 2nd semester											

Ch. Bansi Lal University, Haryana


Chairperson
 Department of ICT
 C.U.U. Bhiwani

Semester-3

Course Type	Course Code	Nomenclature of the Course	Credits				Contact hours L: P: Total			Internal Assessment Marks		End term Examination Marks		Total Marks	Examination hours	
			Total	Theory (T)	Practical (P)		L	P	Total	T	P	T	P		T	P
CC-A3	24UN-BCA-301	Java OOP Foundations	4	3	1		3	2	5	20	10	50	20	100	3	3
CC-B3	24UN-BCA-302	Linux and Shell programming	4	3	1		3	2	5	20	10	50	20	100	3	3
CC-C3	24UN-BCA-303	Data Base Technologies	4	3	1		3	2	5	20	10	50	20	100	3	3
CC-M3			To be taken from other department													
MDC-3			To be taken from other department													
SEC-3			To be taken from SEC pool													
AEC-3			To be taken from AEC Pool													

Semester-4

Course Type	Course Code	Nomenclature of the Course	Credits	Contact hours			Internal Assessment Marks	End term Examination Marks	Total Marks	Examination hours
				L	P	Total				
				Practical (P)						

To be taken from VOC Pool

To be taken from AEC Pool

To be taken from VAC Pool

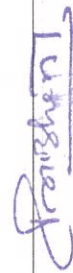
Internship of 4 credits of 4-6 weeks duration after 4th semester



Chairperson
Department of ICT
CBLU, Bhiwani

Semester-5

Course Type	Course Code	Nomenclature of the Course	Credits				Contact hours			Internal Assessment Marks		End term Examination Marks		Total Marks	Examination hours	
			Total	Theory (T)	Practical (P)	L	P	Total	T	P	T	P	T		P	
CC-A5	24UN-BCA-501	Software Engineering	4	3	1	3	2	5		10	20	50	20	100	3	3
CC-B5	24UN-BCA-502	Back-end Development	4	3	1	3	2	5		10	20	50	20	100	3	3
CC-C5	24UN-BCA-503	Network Infrastructure and Data Communication Technologies	4	3	1	3	2	5		10	20	50	20	100	3	3
CC-M5(V)			To be taken from VOC Pool													
SEC-4			Internship @ 4 Credits													



Chairperson
Department of ICT
CBLU, Bhiwani

Semester-6

Course Type	Course Code	Nomenclature of the Course	Credits	Contact hours	Internal Assessment Marks	End term Examination Marks	Total Marks	Examination hours							
				L:Lecture P:Practical T: Tutorial											
					T	P	T	P							
CC-A6	24UN-BCA-601	Programming using Python	4	3	1	3	2	5	20	10	50	20	100	3	3
CC-B6	24UN-BCA-602	Advanced Web Development	4	3	1	3	2	5	20	10	50	20	100	3	3
CC-C6	24UN-BCA-603	Artificial Intelligence	4	3	1	3	2	5	20	10	50	20	100	3	3
CC-M6															
				To be taken from other department											
CC-M7(V)				To be taken from VOC Pool											

To be taken from other department

To be taken from VOC Pool

Pargash

Chairperson
Department of ICT
CBLU, Bhiwan

Semester-7

Course Type	Course Code	Nomenclature of the Course	Credits			Contact hours		Internal Assessment Marks	End term Examination Marks	Total Marks	Examination hours			
			Theory (T)	Tutorial/Practical (P)	L	T	Total							
CC-H1	24UN-BCA-701	Principles & Paradigms of Programming Languages.	4	4	0	4	0	4	30	-	70	100	3	-
CC-H2	24UN-BCA-702	Software Testing	4	4	0	4	0	4	30	-	70	100	3	-
CC-H3	24UN-BCA-703	Data Mining and Warehousing	4	4	0	4	0	4	30	-	70	100	3	-
DSE-H1	24UN-BCA-704	NoSQL Databases	4	4	0	4	0	4	30	-	70	100	3	-
Or														
PC-H1	24UN-BCA-705	Cyber Security	4	4	0	4	0	4	30	-	70	100	3	-
CC-HM1	24UN-BCA-706	Practical	4	0	4	0	8	8	-	30	70	100	-	6
CC-HM1		Cloud Computing	4	0	4	4	4	30	--	70	100	3	-	

Ch. Bansi Lal University, Haryana

Forbert

Chairperson
Department of ICT
CBLU, Bhiwan'

Semester-8 (Honours without research)

Course Type	Course Code	Nomenclature of the Course	Credits			Contact hours L: Lecture P: Practical T: Tutorial		Internal Assessment Marks		End term Examination Marks		Total Marks	Examination hours
			Total	Theory (T)	Tutorial/Practical	L	T	T	P	T	P		
CC-H4	24UN-BCA-801	Design & Analysis of Algorithms	4	4	0	4	0	4	0	30	70	100	3
CC-H5	24UN-BCA-802	Software Project Management	4	4	0	4	0	4	0	30	70	100	3
CC-H6	24UN-BCA-803	Emerging Trends in Information Security	4	4	0	4	0	4	0	30	70	100	3
DSE-H2	24UN-BCA-804	Big Data	4	4	0	4	0	4	0	30	70	100	3
	OR												
	24UN-BCA-805	Machine Learning	4	4	0	4	0	4	0	30	70	100	3
PC-H2	24UN-BCA-806	Practical	4	0	4	0	8	-	30	-	70	100	6
CC-HM2	24UN-BCA-807	Internet of Things (IoT)	4	4	0	4	0	4	0	30	70	100	3

Ch. Bansi Lal Univeristy, Bhiwani, Haryana


 Chairperson
 Department of ICT
 CBLU, Bhiwani

OR

Semester-8 (Honours with research)

CC-H4	24UN-BCA-801	Design & Analysis of Algorithms	4	4	4	0	0	4	0	4	30	-	70	-	100	3	-
CC-H5	24UN-BCA-802	Software Project Management	4	4	4	0	0	4	0	4	30	-	70	-	100	3	-
CC-HM2	24UN-BCA-807	Internet of Things (IoT)	4	4	4	0	0	4	0	4	30	-	70	-	100	3	-
Research	24UN-BCA-808	Project/ Dissertation	12												300		

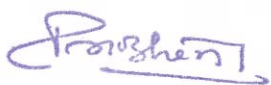
For Bhanu

Chairperson
Department of ICT
CBLU, Bhiwani

Ch. Bansi Lal Univeristy, Bhiwani, Haryana

Semester: 5

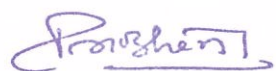
Session: 2024-25			
Part A - Introduction			
Subject	BCA		
Semester	V		
Name of the Course	Software Engineering		
Course Code	24UN-BCA-501		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC		
Level of the course (As per Annexure-I	300-399		
Pre-requisite for the course (if any)	Knowledge of any Programming language		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: • Learn the various models for software development. • Understand how to analyze software. • Plan a software design and the risks associated with software. • Test and validate software. • Implement the various tools and techniques used in software engineering.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Instructions for Paper-Setter			
Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. The candidate must attempt five questions in all, selecting one question from each unit. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.			


 Chairperson
 Department of ICT
 CBLU, Bhiwan

Part B- Contents of the Course		
Unit	Topics	Contact Hours
I	Introduction: Program vs. Software, Software Engineering, Programming paradigms, Software Crisis – problem and causes, Phases in Software development: Requirement Analysis, Software Design, Coding, Testing, Maintenance, Software Development Process Models: Waterfall, Prototype, Evolutionary and Spiral models, Role of Metrics.	12
II	Feasibility Study, Software Requirement Analysis and Specifications: SRS, Need for SRS, Characteristics of an SRS, Components of an SRS, Problem Analysis, Information gathering tools, Requirement specification, validation and metrics. <i>Structured Analysis and Tools:</i> Data Flow Diagram, Data Dictionary, Decision table, Decision trees, Structured English, Entity-Relationship diagrams.	12
III	Software Project Planning: Cost estimation: COCOMO model, Project scheduling, Staffing, and personnel planning, team structure, Software configuration management, Quality assurance plans, Project monitoring plans, Risk Management. <i>Software Design:</i> Design fundamentals, problem partitioning, and abstraction, design methodology, Cohesion & Coupling.	11
IV	Software testing strategies: unit testing, integration testing, Validation testing, System testing, Alpha and Beta testing. <i>Software Maintenance:</i> Type of maintenance, Management of Maintenance, Maintenance Process, maintenance characteristics.	12
V*	The following activities be carried out/ discussed in the lab during the semester. Programming Lab: • Development of 0-level • Development of 1-level, • Development of 2-level, • Data dictionary creation • E-R diagram for Student-Teacher Relationship & • E-R diagram for Library Management • Draw an ER Diagram for Hospital Management System • ER diagram for ANY 5: • Student Result Management System, • Library management system, • Inventory control system, Accounting system, • Fast food billing system, • Bank loan system, • Blood bank system, • Railway reservation system, • Automatic teller machine, • Video library management system,	30

Suggested Evaluation Methods	
Internal Assessment: > Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 > Practicum Class Participation: NA Seminar/Demonstration/Viva-voce/Lab records etc.: 10 Mid-Term Exam: NA	End Term Examination: A three-hour exam for both theory and practicum. End Term Exam; Marks: 70(50(T)+20(P))
Part C-Learning Resources	
Recommended Books/e-resources/LMS: • Pressman R. S., <i>Software Engineering – A Practitioner's Approach</i>, Tata McGraw Hill. • Jalote P., <i>An Integrated Approach to Software Engineering</i>, Narosa. • Sommerville, <i>Software Engineering</i>, Addison Wesley. • Fairley R., <i>Software Engineering Concepts</i>, Tata McGraw Hill. • James Peter, W Pedrycz, <i>Software Engineering</i>, John Wiley & Sons.	

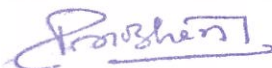
*Applicable for courses having practical components.



Chairperson
Department of ICT
CBLU, Bhiwan

Session: 2024-25			
Part A - Introduction			
Subject	BCA		
Semester	V		
Name of the Course	Back-end Development		
Course Code	24UN-BCA-502		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC		
Level of the course (As per Annexure-I	300-399		
Pre-requisite for the course (if any)	Knowledge of any Programming language		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: • Understand the principles of back-end development. • Gain proficiency in back-end programming languages and frameworks. • Learn to design and manage databases. • Develop skills to create and use back-end applications. • Equip with the knowledge of back-end programming		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Instructions for Paper-Setter			
Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. The candidate must attempt five questions in all, selecting one question from each unit. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.			

Part B- Contents of the Course		
Unit	Topics	Contact Hours
I	Introduction to back-end Development: Overview of backend, Client-server architecture, Introduction to web servers and database. Programming Languages and Tools: Introduction to server-side languages (e.g., Node.js), Syntax and semantics of chosen server-side language	11
II	Programming Languages: Version control with Git, Introduction to IDEs of chosen language, Writing and executing basic server-side scripts. Performance Optimization and Security: Caching strategies, Query optimization.	11
III	<i>Database Management:</i> Introduction to databases and DBMS (SQL and NoSQL), Designing a database schema, CRUD operations (Create, Read, Update, Delete), Connecting applications to a database.	11
IV	Server-Side Frameworks: Overview of popular server-side frameworks (e.g., Express.js), Building a simple application using a framework. API Development: RESTful API concepts, Designing and documenting APIs, Authentication and authorization basics. Web security best practices: SQL injection, XSS, CSRF.	12
V*	The following activities be carried out/ discussed in the lab during the semester. Programming Lab: Introduction to Backend Technologies: • Setup Development environment (IDE, Git) • Create a simple "Hello Word" backend application in Node.JS Working with Databases (SQL): Learn Basic SQL operations and Database interactions • Setup MySQL/PostgreSQL • Perform CRUD operations using SQL Queries Working with NoSQL Databases: • Setup MongoDB database • Implement CRUD operations using NoSQL Database Building RESTful APIs: • Create endpoints for CRUD operations • Implement basic authentication/authorization. Web Frameworks (Node.js/Express.js): • Setup Node.js/Express.js project • Implement a simple web application. Integrating Frontend & Backend:	30


 Chairperson
 Department of ICT
 CBLU, Bhiwani

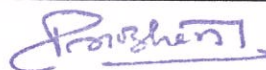
	• Create API endpoints to serve JSON data • Develop frontend (HTML/CSS/Javascript) to consume backend API. Data Validation & Error Handling: • Implement input validation middleware Express.js/Node.js forms • Handle errors gracefully.	
Suggested Evaluation Methods		
Internal Assessment: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum Class Participation: NA Seminar/Demonstration/Viva-voce/Lab records etc.: 10 Mid-Term Exam: NA	End Term Examination: A three-hour exam for both theory and practicum. End Term Exam; Marks: 70(50(T)+20(P))	
Part C-Learning Resources		
Recommended Books/e-resources/LMS: • Mario Casciaro & Luciano Mammino, <i>"Node.js Design Patterns"</i>. • Robin Nixon, <i>"Learning PHP, MySQL & JavaScript"</i>. • Robert C. Martin, <i>"Clean Code: A Handbook of Agile Software Craftsmanship"</i>. • Martin Kleppmann, <i>"Designing Data-Intensive Applications"</i>. • Anthony Molinaro, <i>"SQL Cookbook"</i>. • Ilya Grigorik, <i>"High-Performance Browser Networking"</i>.		

*Applicable for courses having practical components.


 Chairperson
 Department of ICT
 CBLU, Bhiwani

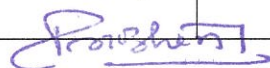
Session: 2024-25			
Part A - Introduction			
Subject	BCA		
Semester	V		
Name of the Course	Network Infrastructure and Data Communication Technologies		
Course Code	24UN-BCA-503		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	CC		
Level of the course (As per Annexure-I)	300-399		
Pre-requisite for the course (if any)	Basic knowledge of computer		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: • Understand the basic concepts and principles of computer networks. • Describe analog and digital communication concepts. • Evaluate different data link layer designs and LAN technologies. • Analyze various routing algorithms and know about the application layer. • Use networking infrastructure and its applications.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
<u>Instructions for Paper-Setter</u> Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. The candidate must attempt five questions in all, selecting one question from each unit. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.			

Part B- Contents of the Course



Chairperson
Department of ICT
CBLU, Bhiwani

Unit	Topics	Contact Hours
I	Introduction to Data Communication and Computer Networks; Uses of Computer Networks; Types of Computer Networks and Topologies; Network Hardware Components: Connectors, Transceivers, Repeaters, Hubs, Network Interface Cards and PC Cards, Bridges, Switches, Routers, Gateways; Network Software: Network Design issues and Protocols; Connection-Oriented and Connectionless Services; OSI Reference Model; TCP/IP Model.	11
II	Analog and Digital Communications Concepts: Analog and Digital data and signals; Bandwidth and Data Rate, Capacity, Baud Rate; Guided and Wireless Transmission Media; Communication Satellites; Switching and Multiplexing; Modems and modulation techniques.	11
III	Data Link Layer Design issues; Error Detection and Correction methods; Sliding Window Protocols: One-bit, Go Back N, and Selective Repeat; Media Access Control: ALOHA, Slotted ALOHA, CSMA, Collision free protocols; Introduction to LAN technologies: Ethernet, Switched Ethernet, Fast Ethernet, Gigabit Ethernet; Token Ring; Introduction to Wireless LANs and Bluetooth.	11
IV	Routing Algorithms: Flooding, Shortest Path Routing, Distance Vector Routing; Link State Routing, Hierarchical Routing; Congestion Control; Traffic shaping; Choke packets; Load shedding; Application Layer: Introduction to DNS, E-Mail, and WWW services; Network Security Issues: Security attacks; Encryption methods; Firewalls; Digital Signatures.	12
V*	The following activities be carried out/ discussed in the lab during the semester. Programming Lab: • Experiment Study of different types of Network cables and Practically implement cross-wired and straight-through cable using a clamping tool. • Study of Network Devices in Detail. • Study of network IP. • Connect the computers to the Local Area Network. • Performing an Initial Switch & Router Configuration. • Study about components and specifications of Laptops and Desktop. • Familiarization with networking components and devices (LAN adapter, Hub, Switches, Routers, etc.).	30


 Chairperson
 Department of ICT
 CBLU, Bhiwani

• Familiarization with Transmission media and tools (Co-axial cable, UTP cable, Crimping tool, Connectors, etc.). • Introduction to various interior and exterior routing protocols. • Study of various LAN topologies and their creation using network devices, cables, and Computer. • Configuration of TCP/IP protocols in Windows/LINUX.	
Suggested Evaluation Methods	
Internal Assessment: > Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 > Practicum Class Participation: NA Seminar/Demonstration/Viva-voce/Lab records etc.: 10 Mid-Term Exam: NA	End Term Examination: A three-hour exam for both theory and practicum. End Term Exam; Marks: 70(50(T)+20(P))
Part C-Learning Resources	
Recommended Books/e-resources/LMS: • Andrew S. Tanenbaum, "<i>Computer Networks</i>", Pearson Education. • Michael A. Gallo, William M. Hancock, "<i>Computer Communications and Networking Technologies</i>", CENGAGE Learning. • Behrouz A Forouzan, "<i>Data Communications and Networking</i>", McGraw Hill.	

*Applicable for courses having practical components.

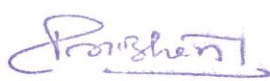

 Chairperson
 Department of ICT
 CBLU, Bhiwani

Semester: 6

Syllabus: 2024-25			
Part A - Introduction			
Subject	BCA		
Semester	VI		
Name of the Course	Programming using Python		
Course Code	24UN-BCA-601		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC		
Level of the course (As per Annexure-I)	300-399		
Pre-requisite for the course (if any)	Knowledge of any Computer Programming Language		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. understand the basic concepts of Python programming 2. learn various data structures used in Python programming. 3. develop the simple programs of Python using arrays and functions. 4. illustrate the process of data file manipulations using python 5* develop the programs using Python.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u> The examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory. Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.			
Unit	Topics		Contact Hours


Chairperson
Department of ICT
CBLU, Bhiwani

I	Introduction to Python: Python Interpreter, Python as calculator, Python shell, Indentation, identifier and keywords, literals, strings, Operators: Arithmetic, Relational, Logical, comparison, Bitwise, Assignment, Identity operator and Membership operator; Input & output statements; Control statements: Branching, looping, Conditional statement, Exit function	11
II	String Manipulations: Subscript operator, indexing, slicing a string, other functions on strings, string module. Strings and number system: Format functions, converting strings to numbers & Vice Versa. List, Tuples, Sets, Dictionaries: Basic list operators, replacing, inserting, removing an element, searching, Sorting lists, dictionary literals, adding & removing keys, accessing & replacing values, traversing dictionaries.	11
III	Array in Python, Design with Functions: hiding redundancy, complexity, arguments & return values; Formal/Actual arguments, named arguments, program structure and design, Recursive functions, scope & Global statements, Importing modules, Math modules & Random modules.	11
IV	Exception Handling: Exceptions, except clause, try and finally clause, user-defined exceptions. File Handling: Manipulating files & directories, OS & SYS modules, Reading, writing text & numbers from/to file. Graphics: "Turtle" module, drawing colors, shapes, digital images, image file formats.	12
V*	Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: • WAP to find the roots of a quadratic equation. • WAP to accept a number 'n' and (a). Check if 'n' is prime (b). Generate all prime numbers till 'n' (c). Generate first 'n' prime numbers (d). This program may be done using functions. • WAP that accepts a character and performs the following: (a). print whether the character is a letter, numeric digit, or special character (b). if the character is a letter, print whether the letter is uppercase or lowercase (c). if the character is a numeric digit, print its name in the text (e.g., if the input is 9, the output is NINE) • WAP to perform the following operations on a string (a). Find the frequency of a character in a string. (b). Replace a character by another character in a string. (c). Remove the first occurrence of a character from a string. (d). Remove all occurrences of a character from a string. • WAP to swap the first n characters of two strings. • Write a function that accepts two strings and returns the indices of all the occurrences of the second string in the first string as a list. If the second string is not present in the first string, then it should return -1. • WAP to create a list of the cubes of only the even integers appearing in the input list (may have elements of other types also) using the following: (a). 'for' loop (b). list comprehension	30

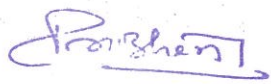


Chairperson

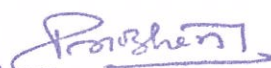
Department of IT

CBLU, Bangalore

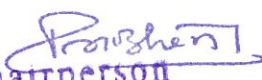
- WAP to read a file and (a). Print the total number of characters, words, and lines in the file. (b). Calculate the frequency of each character in the file. Use a variable of dictionary type to maintain the count. (c). Print the words in reverse order. (d). Copy even lines of the file to a file named 'File1' and odd lines to another file named 'File2'. - Write a function that prints a dictionary where the keys are numbers between 1 and 5 and the values are cubes of the keys. - Consider a tuple t1= (1, 2, 5, 7, 9, 2, 4, 6, 8, 10). WAP to perform the following operations: (a). Print half the values of the tuple in one line and the other half in the next line. (b). Print another tuple whose values are even numbers in the given tuple. (c). Concatenate a tuple t2= (11,13,15) with t1. (d). Return maximum and minimum values from this tuple - WAP to accept a name from a user. Raise and handle the appropriate exception(s) if the text entered by the user contains digits and/or special characters.	
Suggested Evaluation Methods	
Internal Assessment: ➤ Theory - Class Participation: 5 - Seminar/presentation/assignment/quiz/class test etc.: 5 - Mid-Term Exam: 10 ➤ Practicum - Class Participation: NA - Seminar/Demonstration/Viva-voce/Lab records etc.: 10 - Mid-Term Exam: NA	End-Term Examination:A three-hour exam for both theory and practicum. End Term Exam Marks: 70(50(T)+20(P))
Part C-Learning Resources	
Recommended Books/e-resources/LMS: - Sheetal Taneja, Naveen Kumar, Python Programming: A Modular approach, 5th Impression, Pearson. - Reema Thareja, Python Programming Using Problem Solving Approach, Oxford University Press. - Mark Lutz, Learning Python (available online at pdf derive). - Gutttag John V, Introduction to Computation and Programming Using Python with Application to Understanding Data, PHI. - Charles Diorbach, Introduction to Computer Science using Python, Wiley. - Balaguruswamy E., Introduction to Computing and Problem Solving using Python, 2nd edition, McGraw Hill Education, 2018. - Brown, Martin C., Python: The Complete Reference, 2nd edition, McGraw Hill Education, 2018.	
* Applicable for courses having practical components.	


Chairperson
Department of ICT
CBLU, Bhiwani

Syllabus: 2024-25			
Part A - Introduction			
Subject	BCA		
Semester	VI		
Name of the Course	Advanced Web Development		
Course Code	24UN-BCA-602		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC		
Level of the course (As per Annexure-I	300-399		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. gain proficiency in advanced web development frameworks and tools. 2. understand the principles of responsive design and progressive web apps. 3. learn best practices for database management and full-stack development. 4. know about optimization and devops. 5* To work on real-world projects and develop a comprehensive web application.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Part B- Contents of the Course			
Instructions for Paper- Setter			
Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. Examination will be of three-hour duration. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus.			
Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.			
Practicum will be evaluated by an external and an internal examiner. The examination will be of three-hour duration.			

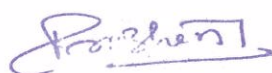

Chairperson
Department of ICT
CBLU, Bhiwan

Unit	Topics	Contact Hours
I	Advanced Front-End Development: Advanced HTML5 & CSS3: Semantic HTML, CSS Grid and Flexbox, CSS Preprocessors (Sass/LESS) JavaScript ES6+: Advanced JavaScript concepts (Promises, Async/Await), ES6+ features (Arrow functions, Template literals, Destructuring)	11
II	Front-End Frameworks: Introduction to React, Angular, Component-based architecture, State management with Redux Advanced Back-End Development: Server-Side Programming: Express.js, GraphQL, Middleware, and Authentication (JWT, OAuth)	11
III	Database Management: Advanced SQL concepts, NoSQL databases (Firebase), ORMs (Sequelize) Full-Stack Development: Integrating Front-End and Back-End: Building a full-stack application, Handling asynchronous operations, Real-time applications with WebSockets	11
IV	Performance Optimization: Code splitting and lazy loading, Caching strategies, Optimizing images and assets Deployment and DevOps: Deployment Strategies: CI/CD pipelines, Containerization with Docker, Deployment platforms (Heroku, AWS, Netlify) DevOps and Monitoring: Infrastructure as code (Terraform, Ansible), Monitoring and logging (Prometheus, Grafana)	12
V*	Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: • Front-End Projects: Develop a responsive web application using React/Angular. • Back-End Projects: Build and deploy a RESTful API using Node.js and Express.js. • Full-Stack Projects: Create a full-stack application integrating front-end and back-end. • Optimization Projects: Implement performance optimization techniques on existing projects. • Deployment Projects: Set up a CI/CD pipeline and deploy a web application to a cloud platform.	30
Suggested Evaluation Methods		
Internal Assessment: > Theory • Class Participation: 5		End Term Examination: A three-hour


Chairperson
Department of ICT
CBLU, Bhiwani

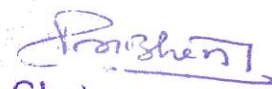
• Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA	exam for both theory and practicum.
Part C-Learning Resources	
Recommended Books/e-resources/LMS: • "JavaScript: The Good Parts" by Douglas Crockford • "You Don't Know JS" by Kyle Simpson • "Learning React" by Alex Banks and Eve Porcello	

*Applicable for courses having practical components.

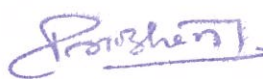


Chairperson
Department of ICT
CBLU, Bhiwani

Syllabus: 2024-25			
Part A - Introduction			
Subject	BCA		
Semester	VI		
Name of the Course	Artificial Intelligence		
Course Code	24UN-BCA-603		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC		
Level of the course (As per Annexure-I	300-399		
Pre-requisite for the course (if any)	Basic understanding of computer systems and programming.		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. learn the basic Artificial Intelligence (AI) concept and its application areas. 2. acquire the knowledge of heuristic search and approaches for knowledge representations. 3. understand the idea of natural language processing and predicate logic 4. gain the knowledge of learning technologies & build expert systems. 5*. Understand the practical aspects of artificial intelligence.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Part B- Contents of the Course			
<u>Instructions for Paper-Setter</u> The examiner will set a total of nine questions. Out of which the first question will be compulsory. The remaining eight questions will be set from four units selecting two questions from each unit. The examination will be of three-hour duration. All questions will carry equal marks. The first question will comprise short answer-type questions covering the entire syllabus. The candidate will have to attempt five questions in all, selecting one question from each unit. The first question will be compulsory.			

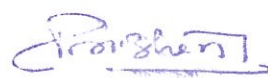

 Chairperson
 Department of ICT
 CBLU, Bhiwani

The practicum will be evaluated by an external and an internal examiner. The examination will be of three-hour duration.		
Unit	Topics	Contact Hours
I	Introduction to Artificial Intelligence (AI), Importance of AI, AI and its Related Field, AI Techniques, Criteria for success. Problem Space and Search: Problem as a State Space Search, Production System and its Characteristics, Issues in the Design of the Search Problem.	11
II	Heuristic search techniques: Generate and test, hill climbing, best first search technique, problem reduction, constraint satisfaction. Knowledge Representation: Definition and Importance of Knowledge, Knowledge Representation, Various Approaches Used in Knowledge Representation, Issues in Knowledge Representation.	11
III	Using Predicate Logic: Representing Simple Facts in Logic, Representing Instances and is-a Relationship, Computable Function and Predicate, Natural Language Processing: Introduction, Syntactic Processing, Semantic Processing, Discourse and Pragmatic Processing.	11
IV	Learning: Introduction to Learning, Rote Learning, Learning by Taking Advice, Learning in Problem-Solving, Learning from Example-Induction, Explanation-Based Learning. Expert System: Introduction, Representing Using Domain-Specific Knowledge, Expert System Shells.	12
V*	Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: Problem Solving and Search Algorithms - Implementing uninformed search algorithms (Breadth-First Search, Depth-First Search) - Implementing informed search algorithms (A*, Greedy Best-First Search) Knowledge Representation and Reasoning - Implementing basic logic representation (Propositional and Predicate Logic) - Building simple inference engines - Developing rule-based systems for decision-making Introduction to Expert Systems - Understanding the components of expert systems - Designing knowledge bases using rule-based systems Expert Systems Applications - Developing expert systems for specific domains (e.g., medical diagnosis, financial advisory) - Case studies of successful expert systems	30
Suggested Evaluation Methods		
Internal Assessment: > Theory - Class Participation: 5 - Seminar/presentation/assignment/quiz/class test etc.: 5		End-Term Examination: A three-hour exam for both


 Chairperson
 Department of ICT
 CBLU, Bhiwadi

• Mid-Term Exam: 10 ➤ Practicum • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA	theory and practicum. End Term Exam Marks: 70(50(T)+20(P)
Part C-Learning Resources	
Recommended Books/e-resources/LMS: • E. Rich and K. Knight, Artificial Intelligence, TMH. • D.W. Patterson, Introduction to AI and Expert Systems, PHI. • Nils J Nilsson, Artificial Intelligence -A new Synthesis, Harcourt Asia Ltd.	

*Applicable for courses having practical components


Chairperson
 Department of ICT
 CBLU, Bhiwani