

**Fifth Semester (Third Year) Scheme and
Syllabus of BCA Programme
under the aegis of University School of
Information, Communication and Technology
offered at Affiliated Institutions of the
University
Applicable to Batch Admitted in Academic
Session 2024-25**

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External	Max Marks	
Core Course Theory (CCT)									
BCA 301T	Computer Networks	CCT	4	--	4	40	60	100	
BCA 303T	Artificial Intelligence	CCT	4	--	4	40	60	100	
Core Course Practical (CCP)									
BCA 301P	Computer Networks Lab	CCP	-	2	1	40	60	100	
BCA 303P	Artificial Intelligence Lab	CCP	-	4	2	40	60	100	
Choose Any One Theory and Respective Practical (Programme Core Electives (PCE))									
BCA 305	BCA 305T	Natural Language Processing	PCE	4	-	4	40	60	100
	BCA 305P	Natural Language Processing Lab	PCE	-	4	2	40	60	100
BCA 307	BCA 307T	Network Security	PCE	4	-	4	40	60	100
	BCA 307P	Network Security Lab	PCE	-	4	2	40	60	100
BCA 309	BCA 309T	Full Stack Development using Java	PCE	4	-	4	40	60	100
	BCA 309P	Full Stack Development using Java Lab	PCE	-	4	2	40	60	100
Summer Internship (SI)*									
BCA 311*	Summer Training*	SI	0	0	4	40	60	100	

Applicable from Batch Admitted in Academic Session 2024-25 onwards

Multidisciplinary (Generic Compulsory) (Choose Any One)								
BCA 313T	Introduction to Management & Entrepreneurship Development	GE-3	3	0	3	40	60	100
BCA 315T**	MOOC Course**	GE-3	3	0	3	40	60	100
	Total				24			800

* Summer Training (Conducted at the end of the 4th Semester and evaluation to be carried in 5th Semester) Report and Viva – Voce: Students will undergo summer training/industry visit/In-house training/In-house project during the summer break after the completion of 4th semester. Report of the same is required to be submitted to the College/ Institution. Viva-voce examination will be conducted based on the report submitted by the student. A panel of examiner will be appointed by the HOD/ Director of the Institution for internal evaluation out of 40 marks. External evaluation of 60 marks will be conduct by the examination division of the university.

**The students can learn these courses / technologies through self-paced MOOC courses or through regular courses offered by the institute during the summer break on a fast-track mode. The broad guidelines for undertaking MOOC courses are as follows:

1. MOOC Course should be done from SWAYAM/NPTEL as per the guidelines of UGC.
2. For securing the credits, the student is required to complete the assessment of the course and to provide the certificate of the course done from SWAYAM/NPTEL.
3. The fees (if any) for the registration and/or assessment of the MOOC course must be borne by the student only.
4. If the student secures more than 4 credits for the MOOC Course even then 3 credits shall be considered for this subject and the grade/marks provided by assessing authority shall be transferred to the university by the institution where the student is studying. The University's Examination Division shall take the result of the MOOC course on record and the final result must accommodate the results received from such MOOC courses. The student must submit the result of such papers to their respective institution. All the results for the MOOC courses may be submitted before the completion of other requirements including credits requirement.

Course Code: BCA 301T

L T C

Course Name: Computer Networks

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INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To study different types of media, multiplexing, switched networks, the Internet, TCP/IP suite, fiber-optic communications and the state-of-art networking applications.
2. To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.
3. Identify and discuss the underlying concepts of IPv4 & IPv6 protocols, along with their characteristics and functionality.
4. Details of IP operations in the Internet and associated routing principles.
5. Analyzing various layering protocols in computer networks

PRE-REQUISITES:

1. Fundamentals of Computers and IT

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Utilize the fundamentals of data communication and networking to identify the topologies and connecting devices of networks module
CO2	Understand and describe the layered protocol model (OSI and TCP/IP model)
CO3	Analyze the elements and protocols for peer – peer and communication between layers.
CO4	Evaluate and implement routing algorithms and Router basic configuration.
CO5	Evaluate the protocols and Principles in computer networking

Course Outcomes	Program Outcomes (Scale: 1 – Very Low, 2 – Low, 3 – Medium, 4 – High)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	4	2	4	4	1	4	1	1	1	4
CO2	4	2	4	2	1	4	1	1	1	4

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CO3	4	2	4	4	1	4	1	1	1	4
CO4	4	2	4	4	1	4	3	2	1	4
CO5	4	2	4	4	1	4	4	2	1	4

UNIT – I

No. of Hours: 12 **Chapter/Book Reference: TB1, TB2**

Basic Concepts: Components of data communication, distributed processing, Line configuration, topology, transmission mode, and categories of networks. OSI and TCP/IP **Models:** Layers and their functions, comparison of models. Transmission Media: Guided and unguided, Attenuation, distortion, noise, throughput, propagation speed and time, wavelength, Shannon Capacity.

UNIT – II

No. of Hours: 12 **Chapter/Book Reference: TB1, TB2**

Telephony: Multiplexing, WDM, TDM, FDM, circuit switching, packet switching and message switching. Data Link

Layer: Types of errors, Framing (character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- NARQ, Selective repeat ARQ.

UNIT – III

No. of Hours: 12 **Chapter/Book Reference: TB1, TB2**

Network Layer: Internetworking & Devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway, Modems; Addressing: IPv4 and IPv6 addressing, IPv4 subnetting; Routing: Unicast Routing Protocols: RIP, OSPF, BGP; Routing: Routing Methods- Static and Dynamic Routing, Routing basic commands, Distance vector protocol, Link state protocol

UNIT – IV

No. of Hours: 10 **Chapter/Book Reference: TB1, TB2**

Transport and upper layers in OSI Model: Transport layer functions and Protocols, connection management, functions of session layers, Presentation layer, and Application layer.

TEXT BOOKS:

TB1. A. S. Tanenbaum, Nick Feamster, and David J. Wetherall, “Computer Networks”; Pearson Education, 6th Ed., 2021.

TB2. Behrouz A. Forouzan, “Data Communications and Networking”, 5th Edition, McGraw-Hill Education, 2013.

REFERENCE BOOKS:

RB1. D. E. Comer, “Internetworking with TCP/IP, Volume 1: Principles, Protocols, and Architecture”; Pearson Education, 6th Ed., 2014.

RB2. William Stallings, “Data and Computer Communications”; Pearson Education, 11th Ed., 2023.

RB3. Leinwand, A., & Pinsky, B., “Cisco Router Configuration Handbook”, 2nd Edition, Cisco Press, 2001.

Course Code: BCA 303T

L T C

Course Name: Artificial Intelligence

4 0 4

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

1. To learn the basics of designing intelligent agents that can solve general purpose problems.
2. To represent and process knowledge, plan and act, reason under uncertainty and can learn from experiences.

PRE-REQUISITES:

1. Basic Programming Skills

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	To understand elements constituting problems and learn to solve it by various uninformed and informed (heuristics based)
CO2	To understand formal methods for representing the knowledge and the process of inference to derive new representations of the knowledge
CO3	Analyze and apply the notion of uncertainty and some of probabilistic reasoning methods to deduce inferences under uncertainty.
CO4	Apply some mechanisms to create and improve AI system.

Course Outcomes	Program Outcomes (Scale: 1 – Very Low, 2 – Low, 3 – Medium, 4 – High)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	4	2	4	4	1	4	1	2	1	4
CO2	4	2	4	4	1	4	1	2	1	4
CO3	4	2	4	4	1	4	1	2	1	4
CO4	4	2	4	4	1	4	3	2	1	4

UNIT-I

No. of Hours: 12 **Chapter/Book Reference: TB1; TB2**

Overview of AI: Introduction to AI, Importance of AI, AI and its related field, AI techniques,

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Criteria for success.

Problems, problem space and search: Defining the problem as a state space search, Production Systems and its characteristics, Issues in the design of the search programs.

Heuristic search techniques: Generate and test, hill climbing, best first search technique, problem reduction, constraint satisfaction.

UNIT-II

No. of Hours: 12 **Chapter/Book Reference: TB1; TB2; RB1**

Knowledge Representation: Definition and importance of knowledge, Knowledge representation, various approaches used in knowledge representation, Issues in knowledge representation.

Logical Reasoning: Logical agents, propositional logic, inferences, Syntax and semantics of First Order Logic, Inference in First Order Logic Knowledge Base, forward chaining, backward chaining, unification, resolution, Expert system: Case study of Expert system in PROLOG

UNIT-III

No. of Hours: 10 **Chapter/Book Reference: TB1; TB2**

Handling Uncertainty: Non-Monotonic Reasoning, Probabilistic reasoning, Bayes 'Theorem, Certainty factors and Rule-based Systems, Bayesian Networks, Dempster-Shafer Theory, Introduction to Fuzzy logic. Fuzzy set definition & types. Membership functions. Designing a fuzzy set for a given application

Natural Language Processing: Introduction, Syntactic Processing, Semantic Processing, Pragmatic Processing.

UNIT-IV

No. of Hours: 10 **Chapter/Book Reference: TB1; TB2**

Learning: Introduction to Learning, Rote Learning, learning by taking advice, learning in problem solving, learning from examples: Induction, Explanation-based Learning, Discovery, Analogy, Neural Networks, and Genetic Learning.

TEXT BOOKS:

TB1. Elaine Rich, Kevin Knight and Shivashankar B. Nair, "Artificial Intelligence", 3rd Edition, McGraw Hill Education, 2009.

TB2. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education, 4th Edition, 2022

REFERENCE BOOKS:

RB1. Ivan Bratko, "Prolog Programming for Artificial Intelligence", Addison-Wesley, 4th Edition, 2011

RB2. George F. Luger, "Artificial Intelligence: Principles and Practice", Springer, 1st Edition, 2025

RB3. Ben Coppin, "Artificial Intelligence Illuminated", Jones & Bartlett Learning, 1st Edition, 2004

Course Code: BCA 305T

L T C

Course Name: Natural Language Processing

4 0 4

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To understand the fundamentals of Natural Language Processing (NLP), its scope, challenges, and real-world applications.
2. To develop an understanding of text preprocessing techniques and basic linguistic concepts used in NLP.
3. To learn fundamental methods for text representation, language modeling, and text classification.
4. To understand the concepts of word embeddings and gain an introductory knowledge of modern NLP techniques.
5. To explore practical applications of NLP, including sentiment analysis, machine translation, chatbots, and generative AI.

PRE-REQUISITES:

1. Fundamentals of Computers and IT
2. Basic knowledge of Python programming.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Explain the fundamental concepts, challenges, and applications of Natural Language Processing and perform basic text preprocessing tasks.
CO2	Apply basic linguistic techniques such as tokenization, Part-of-Speech tagging, Named Entity Recognition, and language modeling for text analysis.
CO3	Use feature extraction techniques and basic machine learning methods for text classification and sentiment analysis.
CO4	Describe the concepts of word embeddings, deep learning, Transformers, and Large Language Models used in modern NLP.
CO5	Identify and analyze real-world applications of NLP, including machine translation, question answering, chatbots, and generative AI systems.

Course Outcomes	Program Outcomes (Scale: 1 – Very Low, 2 – Low, 3 – Medium, 4 – High)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	4	4	4	4	4	4	4	4	4	1
CO2	4	3	3	3	1	3	1	2	1	1
CO3	4	4	3	4	2	3	2	2	1	2
CO4	3	3	3	4	2	4	2	2	1	3
CO5	3	3	3	3	3	3	2	3	2	4

UNIT – I

No. of Hours: 12 Chapter/Book Reference: TB1, TB2

Introduction to Natural Language Processing (NLP): scope, challenges, and applications. Levels of language processing: morphological, lexical, syntactic, semantic, and discourse. Text preprocessing: tokenization, normalization, stemming, lemmatization, stop-word removal. Regular expressions.

UNIT – II

No. of Hours: 12 Chapter/Book Reference: TB1, TB2

Part-of-Speech (POS) tagging. Introduction to Context-Free Grammar (CFG) and syntactic parsing. Named Entity Recognition (NER). Word Sense Disambiguation (WSD). Introduction to language models and n-grams.

UNIT – III

No. of Hours: 12 Chapter/Book Reference: TB1, TB2

Feature Extraction- Introduction, Need, importance. Feature extraction techniques: Bag of Words (BoW) and TF-IDF. Text classification using Naïve Bayes. Sentiment analysis. Information extraction. Introduction to text summarization.

UNIT – IV

No. of Hours: 10 Chapter/Book Reference: TB1, TB2

Word embeddings: Word2Vec. Introduction to deep learning for NLP. Introduction to Transformers and Large Language Models (LLMs). Applications of Natural Language Processing: sentiment analysis, machine translation, question answering, text summarization, chatbots, speech assistants, and generative AI.

TEXT BOOKS:

TB1. Jacob Eisenstein, "Introduction to Natural Language Processing", MIT Press, 2019.

TB2. Steven Bird, Ewan Klein and Edward Loper, "Natural Language Processing with Python", O'Reilly Media, 2009.

REFERENCE BOOKS:

RB1. Yoav Goldberg, "Neural Network Methods for Natural Language Processing", Morgan & Claypool Publishers, 2017.

RB2. Dipanjan Sarkar, "Text Analytics with Python: A Practitioner's Guide to Natural Language Processing", 3rd Ed., Apress, 2021.

Course Code: BCA 307T

L T C

Course Name: Network Security

4 0 4

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following

1. To learn the basic security issues and fundamental concepts of Network Security.
2. To understand the applications of Cryptography and Steganography for securing information.
3. To develop the ability to identify, analyse, and mitigate network security breaches.
4. To understand the concepts, principles, and applications of Firewalls in network security.
5. To understand the concept of Kerberos authentication and its applications in secure communication.
6. To design and implement different network security algorithms using programming techniques.
7. To understand computer network security issues, secure communication challenges, and their possible remedies.
8. To learn and evaluate different network security algorithms through practical implementation.

PRE-REQUISITES:

1. Computer Network
2. C, C++ (Programming Knowledge of C/C++)

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Define and explain the issues and basic concepts of Network Security. To understand how to draw a network model.
CO2	To Explain, understand and summarize the concepts, types and features of Firewall.
CO3	Explain and implement working of authentication, authorization, Packet security, IP Security, Firewall by using some suitable examples.
CO4	Classify and organize the architecture of network security management.

CO5	Evaluate different Network Security algorithms with the help of program.
CO6	Design and create a network security architecture for an organization.

Course Outcomes	Program Outcomes (Scale: 1 – Very Low, 2 – Low, 3 – Medium, 4 – High)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	4	2	3	2	1	2	4	2	1	2
CO2	4	2	3	2	2	2	4	2	1	2
CO3	4	2	4	4	2	3	4	3	1	2
CO4	4	2	3	4	2	3	4	3	1	2
CO5	4	2	4	4	2	4	4	4	1	2
CO6	4	3	4	4	3	4	4	4	2	3

UNIT-I

No. of Hours: 12 Chapter/Book Reference: TB2

Introduction to Network Security and related issues- authentication, confidentiality, integrity, anonymity, etc. Network Security Models, Network Security Threats, Secure socket layer (SSL)/ Transport layer security (TLS), Public Key Infrastructure, Digital Signature Schemes.

UNIT-II

No. of Hours: 11 Chapter/Book Reference: TB1

Firewalls: Overview, Types, Features, User Management, Intrusion Detection and Prevention Systems, Intruders, Viruses and Related Threats, Firewall Design Principles, Packet filtering firewall, VPN

UNIT-III

No. of Hours: 11 Chapter/Book Reference: TB1

Authentication applications - Kerberos, X.509, E-Mail security, pretty good privacy (PGP), Secure Multipurpose Internet Mail Extensions (S/MIME), IP security overview, IP security policy, Encapsulating security payload (ESP). Network Management Security: Overview of SNMP Architecture. Available software platforms/case tools, Configuration Management.

UNIT-IV

No. of Hours: 10 Chapter/Book Reference: TB2

Intrusion Detection: Intruders, Intrusion Detection, Host-Based Intrusion Detection, Distributed Host-Based Intrusion Detection, Network-Based Intrusion Detection, Distributed Adaptive Intrusion Detection, Intrusion Detection Exchange Format, Honeypots, Virtual Private Network.

TEXT BOOKS:

TB1. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security: Private Communication in a Public World", 2nd Ed., Prentice Hall, 2002.

TB2. William Stallings and Lawrie Brown, "Computer Security: Principles and Practice", 5th Ed., Pearson, 2024.

REFERENCE BOOKS:

RB1. Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding Theory", 3rd Ed., Pearson, 2020

RB2. Michael E. Whitman and Herbert J. Mattord, "Principles of Information Security", 7th Ed.,

Cengage Learning, 2022.

RB3. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security: Private Communication in a Public World", 2nd Ed., Prentice Hall, 2002.

RB4. Wenbo Mao, "Modern Cryptography: Theory and Practice", Pearson Education, 2004.

Course Code: BCA 309T

L T C

Course Name: Full Stack Development using Java

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INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To understand the fundamentals of full stack web development and the architecture of modern web applications.
2. To develop responsive and interactive web pages using HTML5, CSS3, JavaScript, and Bootstrap.
3. To learn server-side web application development using Java Servlets, JSP, and JDBC.
4. To understand database connectivity, RESTful web services, and the basics of Spring Boot and Hibernate.
5. To develop simple full stack web applications by integrating front-end, back-end, and database technologies.

PRE-REQUISITES:

1. Fundamentals of Computers and IT.
2. Basic knowledge of Java programming.
3. Basic knowledge of HTML and Database Management Systems.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Explain the fundamentals of full stack web development and develop responsive web pages using HTML5, CSS3, JavaScript, and Bootstrap.
CO2	Develop server-side web applications using Java Servlets, JSP, and session management techniques.
CO3	Design database-driven web applications using JDBC and MySQL by performing CRUD operations.
CO4	Explain the concepts of RESTful web services, Spring Boot, and Hibernate for developing modern Java web applications.
CO5	Develop and integrate front-end, back-end, and database components to build simple full stack web applications.

Course Outcomes	Program Outcomes (Scale: 1 – Very Low, 2 – Low, 3 – Medium, 4 – High)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	1	3	3	2	1	1	1	1	1
CO2	2	2	3	4	2	1	1	2	1	1
CO3	3	2	4	4	3	2	1	2	1	1
CO4	2	2	3	4	3	2	1	2	1	2
CO5	3	3	4	4	3	3	2	3	2	3

UNIT – I

No. of Hours: 12 Chapter/Book Reference: TB1, TB2

Introduction to Full Stack Development: Client-server architecture, front-end, back-end and database technologies.

HTML5: Structure of web pages, text formatting, lists, tables, hyperlinks, images, forms and multimedia elements.

CSS3: Selectors, colors, fonts, box model, positioning, responsive web pages using Bootstrap.

JavaScript: Variables, operators, control statements, functions, events, DOM manipulation and client-side form validation.

UNIT – II

No. of Hours: 12 Chapter/Book Reference: TB1, TB2

Java Web Development: Java EE overview, HTTP protocol and web application architecture.

Servlets: Servlet life cycle, request and response handling, deployment, session management using cookies and HttpSession.

JavaServer Pages (JSP): JSP life cycle, directives, Expression Language (EL), JSTL and introduction to MVC architecture.

UNIT – III

No. of Hours: 12 Chapter/Book Reference: TB1, TB2

Database Connectivity: JDBC architecture, MySQL connectivity, CRUD operations, PreparedStatement and ResultSet.

RESTful Web Services: Introduction to REST APIs, HTTP methods (GET, POST, PUT and DELETE) and JSON.

UNIT – IV

No. of Hours: 10 Chapter/Book Reference: TB1, TB2

Spring Boot: Introduction, project structure, Dependency Injection and Spring MVC.

Hibernate/JPA: Introduction to ORM, entity mapping and basic CRUD operations.

Full Stack Application Development: Integration of front-end, back-end and database to develop a simple full stack web application.

TEXT BOOKS:

TB1. Herbert Schildt and Danny Coward, "Java: The Complete Reference", 13th Edition,

McGraw Hill, 2024.

TB2. Y. Daniel Liang, "Introduction to Java Programming and Data Structures, Comprehensive Version", 13th Edition, Pearson, 2025.

TB3. Jon Duckett, "HTML and CSS: Design and Build Websites", Wiley, 2011.

REFERENCE BOOKS:

RB1. Marty Hall and Larry Brown, "Core Servlets and JavaServer Pages", 2nd Edition, Pearson Education.

RB2. Craig Walls, "Spring Boot in Action", Manning Publications, 2016.

RB3. Vasan Subramanian, "Pro Spring Boot 3 with Spring Framework 6", Apress, 2023

Course Code: BCA 311*
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L T

Course Name: Summer Training*
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Summer Training Project Guidelines

Objective:

All the students enrolled for BCA Programme, have to undergo compulsory summer training/ Project of minimum 06weeks in an organization in the IT field. The aim of the project is to give the students an integrated experience in solving a real-life problem by applying knowledge and skills gained on completion of theory papers and in-house practical papers during BCA course. It provides an occasion for students to realize the importance of resource and time management, ownership of task towards deliverables, innovation and efficiency in the task management. It also provides a good opportunity for students to build, enhance and sustain high levels of professional conduct and performance and evolves a problem solver frame of mind in students at early stage. It also prepares students for taking up responsible assignments in the corporate establishment.

General Guidelines:

1. The project should be original, of real-life value, and not copied from existing material from any source. A student should ensure that he understands what is expected by preparing a requirement document of his understanding and get it reviewed by the guide.
2. Design document should also be reviewed and code should also be peer reviewed.
3. A user manual has to be prepared and reviewed.
4. Testing has to be thorough and at various levels, followed by an acceptance test based on the requirement document and user manual.
5. Students should follow the steps as discussed in Software Development Life Cycle while writing dissertation and use Software Engineering Methodologies for development of deliverables, mere programming will not be sufficient. Students must note that interviewers for job are often more interested in the problem solved, alternatives that could have been tried and the benefits derived from the developed application, rather than just implementation details.
6. One Project will be submitted only by one student. However, if the nature of the project is very big & large enough to be divided in different independent big modules having an estimated required effort of minimum 06weeks to be developed by one person, can be taken up and designed in such a way that every student will be responsible for one module and will submit only that specific module as it were a complete software project.
7. Every student has to get his / her synopsis approved from the guide.
8. The synopsis must be brief i.e., not more than 4-6 pages. It must address details like (however, students may follow the SRS format of IEEE for writing Synopsis).
 - a. Name / title of the project
 - b. Statement about the problem
 - c. Why the Particular topic is chosen? It must address Present State of the Art.
 - d. Objective and scope of the project

- e. Analysis, Design, Development & Testing Methodology
 - f. H/W & S/W to be used
 - g. Testing Technologies to be used
 - h. What contribution / value addition would the project make
 - i. Limitations / constraints of the project
 - j. Conclusion, Future Scope for Modification
 - k. References and Bibliography.
9. After approval of the Synopsis, Students will need to give Two Presentations / Demonstration, as per the schedule fixed by their respective Institutions or University. First Presentation will ideally be given after Design phase is over. Second should be given when System Testing is over. First Presentation (Summer Training) should be given in the first month. Second Presentation (Projects) is in second month. Final Project reports should be given latest by the end of the third month of the semester.
 10. Summer Training report has to be submitted by 31st October of every academic year.
 11. The student will submit his/her project report/thesis in the prescribed format, as given hereunder, after the second presentation. The project report/thesis should include:
 - a. ONE hard copy (Maroon color with golden print) of the project report / thesis.
 - b. Soft copy of project on CD including all resource code/ compiled binary code and the manuscript in MS-Word document format.
 12. Note the following guidelines with respect to Preparation of the Documentation. Please note that documentation is meant for other people, and hence it must be self-explanatory, in all respect.
 - 12.1 The sequence of the Pages in the Project Report will be as follows:
 1. One Transparency Sheet
 2. Title Page (Strictly as per the sample supplied)
 3. Institute's Certificate
 4. Company's Certificate
 5. Candidate Declaration of originality of work
 6. Acknowledgement.
 7. Abstract
 8. List of Figures (Strictly as per the sample supplied)
 9. List of Tables (Strictly as per the sample supplied)
 10. List of Abbreviations (Strictly as per the sample supplied)
 11. Contents (Strictly as per the sample supplied) and then body of the dissertation according to the content.
 - 12.2 The pages coming under the preview of the CONTENTS will only be numbered in the BOTTOM of the Page Centrally Aligned.
 - 12.3 ONE Hardbound Copies (One Original and Two Xerox) will be submitted with the Institute out of which one will be given back to the candidate. All the students are required to follow the same binding format in maroon color with back quote mentioning title of the project, name of the student and year.
 - 12.4 At the end of the Project Report Two White blank sheets must be attached.
 - 12.5 At the beginning of each chapter one blank page (Strictly as per the sample supplied) must be attached. These pages will neither be numbered nor counted in total numbering of pages. They will only indicate the beginning of a New Chapter with

its learning objectives.

12.6 Font size of the documentation will be 12 Times New Roman and the pages will be one and half line spaced. The page margin will be as under: -

Top – 1 inch, Bottom – 1 inch,

Left – 1.5 inch, Right – 1 inch.

12.7 Kindly note that all-methodological details and theoretical aspects must be written in students' own words. Copying from books or other students will not be accepted, in any case.

All students are informed not to write definition of various concepts in index, mention the topics w. r. t. to your project (i.e., how various concepts have been implemented in the project)

*** No detailed theories required**

TEMPLATE FOR CHAPTER SCHEME

C O N T E N T S

(font size -18)

CHAPTER 1: PROBLEM FORMULATION	Page No.
1.1 Introduction about the Company	1
1.2 Introduction about the Problem	4
1.3 Present State of the Art	6
1.4 Need of Computerization	10
1.5 Proposed Software / Project	13
1.6 Importance of the work	15
 CHAPTER 2: SYSTEM ANALYSIS	 Page No.
2.1 Feasibility Study	20
2.1.1 Technical Feasibility	20
2.1.2 Economic Feasibility	22
2.1.3 Operational Feasibility	22
2.1.4 Other Feasibility Dimensions	23
2.2 Analysis Methodology	24
2.3 Choice of the Platforms	25
2.3.1 S/W used	26
2.3.1 H/W used	28
 CHAPTER 3: SYSTEM DESIGN#	 Page No.
3.1 Design Methodology	32
3.2 Database Design	36
3.2.1 ERD	37
3.2.2 DFD	39
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3.4 Output Design	48

3.5	Code Design and Development	49
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4.1.1	Unit Testing	55
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4.1.3	Integration Testing	57
4.1.4	System Testing	59
4.1.5	White Box / Black Box Testing	62
4.1.6	Acceptance Testing	69
4.2	Test Data & Test Cases	70
4.3	Test Reports and Debugging	71
4.4	Implementation Manual	73
4.5	Implementation	75
4.6	Users' Training	76
4.6	Post Implementation Maintenance	79

CHAPTER 5: CONCLUSION AND REFERENCES Page No.

5.1	Conclusion	81
5.2	System Specifications	83
5.2.1	H/W Requirement	83
5.2.2	S/W Requirement	84
5.3	Limitations of the System	85
5.4	Future Scope for Modification	86
5.5	References/Bibliography (as per format)	88

CHAPTER 6: ANNEXURES (Screen Snapshots must be annexed) Page No.

A-1	Menu Flow Diagram	92
A-2	Structure Chart	94
A-3	Decision Table/Tree	95
A-4	Data Dictionary	97
A-5	Test Reports	106
A-6	Sample Inputs	109
A-7	Sample Outputs	111
A-8	Coding (Optional)	118

Please note that for all the System Design (Database, Input & Output) the basic Prototype, format, Table Structure, etc. is to be discussed along with related validations, verifications & normalization. However, the sample Input & Output (Screen Snapshots) will be attached in the annexure.

Under Testing, you have to discuss the approach of Testing, Test Data, Test Cases and Test

Applicable from Batch Admitted in Academic Session 2024-25 onwards

Report. How Debugging has been performed, on the basis of Test Report, must be also discussed?

Course Code: BCA 313T

L T C

Course Name: Introduction to Management & Entrepreneurship Development3 0 3

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 10 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Development of critical thinking and to inspire students to developed an entrepreneurial mind-set.
2. Acquisition of values and attitudes towards understanding complex business problems.
3. Promoting active participation in solving current business problems and preventing the future ones.
4. Encouraging students to understand the fundamentals of management.

PRE-REQUISITES:

1. Basic awareness about the Entrepreneurship Development.

COURSE OUTCOMES (COs):

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

CO #	Detailed Statement of the CO
CO1	Gain in-depth knowledge on Entrepreneurial development in today's global scenario.
CO2	Understand the concept of entrepreneurs and to help the students to develop an entrepreneurial mind-set.
CO3	Develop critical thinking for shaping strategies and help them to become an successful entrepreneur.
CO4	Acquire values and attitudes towards understanding complex business problems, and active participation in solving current business problems.
CO5	Understand the concept of the fundamentals of management

Course Outcomes	Program Outcomes (Scale: 1 – Very Low, 2 – Low, 3 – Medium, 4 – High)									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	4	2	2	1	3	1	1	4	3

Applicable from Batch Admitted in Academic Session 2024-25 onwards

CO2	2	4	3	2	2	4	1	1	4	3
CO3	2	4	4	4	2	4	1	2	4	3
CO4	2	4	4	4	3	3	1	2	4	4
CO5	3	4	2	3	2	2	1	1	4	3

UNIT – I

No. of Hours: 10 Chapter/Book Reference: TB1, TB2, TB3

Introduction to Entrepreneurship: Meaning and concept of entrepreneurship, the history of entrepreneurship development, Role of entrepreneurship in economic development, General characteristics and personality traits of entrepreneurs. Factors affecting entrepreneurship, Agencies in entrepreneurship development in India.

UNIT – II

No. of Hours: 10 Chapter/Book Reference: TB1, TB2, TB3

Creativity: Necessity of Creativity in the development of entrepreneur, Steps in Creativity, Defining Innovation, importance of innovation. Identification of opportunities for problem solving with innovation. Decision making and Problem Solving (steps in decision making). Example from industry, day to day operations.

UNIT – III

No. of Hours: 10 Chapter/Book Reference: TB1, TB2

Role of an Entrepreneur: The Entrepreneur's role in the context of contribution to society; Examples from industry; the role of changing the mindset and the development of out of box thinking. Introduction to Design Thinking. Entrepreneurs as role models, mentors and influencers. Entrepreneurial success stories. Historical Perspective, Global Indian Entrepreneurs, Institutions, Modern Entrepreneurs.

UNIT – IV

No. of Hours: 10 Chapter/Book Reference: TB3

Fundamentals of Management: Meaning of Business and its management the role and importance of leadership in entrepreneurship. Difference between Management and Leadership. The importance of planning in entrepreneurship venture. The role and importance of business plan in entrepreneurship venture.

TEXT BOOKS:

TB1. S. S. Khanka, "Entrepreneurial Development", 5th Edition, S. Chand Publishing, 2026.

TB2. Sangram Keshari Mohanty, "Fundamentals of Entrepreneurship", Revised Edition, PHI Learning Private Limited, 2019.

TB3. Abha Mathur, "Entrepreneurship Development", 3rd Edition, Taxmann Publications, 2024

REFERENCE BOOKS:

RB1. S. B. Srivastava, "A Practical Guide to Industrial Entrepreneurs", Latest Edition, Sultan Chand & Sons.

RB2. Prasanna Chandra, "Projects: Planning, Analysis, Selection, Financing, Implementation and Review", 9th Edition, McGraw Hill Education, 2021.

RB3. T. N. Chhabra, "Entrepreneurship Development", Latest Edition, Sun India Publications

Course Code: BCA 301P

L P C

Course Name: Computer Networks Lab

- 2 1

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 301T as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement

Course Code: BCA 303P

L P C

Course Name: Artificial Intelligence Lab

- 4 2

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 303T as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement

Course Code: BCA 305P

L P C

Course Name: Natural Language Processing Lab

- 4 2

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 305T as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement

Course Code: BCA 307P

L P C

Course Name: Network Security Lab

- 4 2

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 307T as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement

Course Code: BCA 309P

L P C

Course Name: Full Stack Development using Java Lab

- 4 2

INSTRUCTIONS

1. The course objectives and course outcomes are identical to that of BCA 309T as this is the practical component of the corresponding theory paper.
2. The practical list shall be notified by the teacher in the first week of the class commencement