Kurukshetra University, Kurukshetra

(Established by the State Legislature Act XII of 1956)
('A+' Grade, NAAC Accredited)

॥ योगस्थः कुरु कर्माणि ॥
समबुद्धि व योग युक्त होकर कर्म करो
(Perform Actions while Stead fasting in the State of Yoga)

Scheme of Examination for Under-Graduate Programmes
Bachelor of Computer Applications (BCA): **SCHEME D**
according to
Curriculum Framework for Under-Graduate Programmes
As per NEP-2020 (Multiple Entry-Exit, Internships and Choice Based Credit System)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

(For the Batches Admitted From 2023-2024)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

<table>
<tr><td colspan="4">Session: 2023-24</td></tr>
<tr><td colspan="4">Part A - Introduction</td></tr>
<tr><td>Subject</td><td colspan="3">BCA</td></tr>
<tr><td>Semester</td><td colspan="3">III</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Java OOP Foundations</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-CAP-301 (Common with B23-CAI-301, B23-CDS-301, B23-CTS-301)</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">CC</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3">100-199</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3">Knowledge of any Computer Programming Language</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="3">After completing this course, the learner will be able to:
1. Implement simple java programs.
2. Implement multiple inheritance using Interfaces
3. Implement Exception Handling and File Handling.
4. Use AWT to design GUI applications.

5* develop the project using java.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>4</td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td colspan="2">Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><td colspan="4">Part B- Contents of the Course</td></tr>
<tr><td colspan="4"><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.
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.</td></tr>
</table>

Unit	Topics	Contact Hours
I	Object Oriented Programming and Java Fundamentals: Structure of Java programs, Classes and Objects, Data types, Type Casting, Looping Constructs.	10
II	Interfaces: Interface basics; Defining, implementing and extending interfaces; Implementing multiple inheritance using interfaces Packages: Basics of packages, Creating and accessing packages, System packages, Creating user defined packages	10
III	Exception handling using the main keywords of exception handling: try, catch, throw, throws and finally; Nested try, multiple catch statements, creating user defined exceptions. File Handling Byte Stream, Character Stream, File I/O Basics, File Operations	10
IV	AWT and Event Handling: The AWT class hierarchy, Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Creating GUI applications using AWT.	10
V*	Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: • WAP to find the sum of 10 numbers, entered as command line arguments. • WAP to find the area of rectangle and circle using Interface. • WAP to implement multiple inheritance. • WAP to show the concept of packages. • WAP to handle the Exception using try and multiple catch blocks and a finally block. • WAP for Implementing Calculator in an Applet, use appropriate Layout Manager. • Write Applet code to add two integers in textbox and their sum should appear in third textbox. • Write AWT program in Java to find the sum, Multiplication and average of three numbers entered in three Text fields by clicking the corresponding Labeled Button. The result should be appearing in fourth text field. • Write Applet code to show all the activities of Mouse using Mouselistener and MouseMotionlistener. • What are various stream classes in Java? Write Java code to read character from a file and write into another file. • What are AWT Classes? Write Java Program to generate Even numbers and Odd Numbers in TextField “T1 and T2 respectively” while pressing Button “Even” and “Odd”. • Write a program to Copy the text from one file to another using byte stream.	25
Suggested Evaluation Methods		

Internal Assessment: ➢ **Theory** • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➢ **Practicum** • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA	**End Term Examination:** A three hour exam for both theory and practicum.

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Schildt, H. (2018). Java: The Complete Reference. 10th edition. McGraw-Hill Education.
- Balaguruswamy E. (2014). Programming with JAVA: A Primer. 5th edition. India: McGraw Hill Education
- Horstmann, C. S. (2017). Core Java - Vol. I – Fundamentals (Vol. 10). Pearson Education
- Schildt, H., & Skrien, D. (2012). Java Fundamentals - A Comprehensive Introduction. India: McGraw Hill Education.

*Applicable for courses having practical component.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

Session: 2023-24			
Part A - Introduction			
Subject	BCA		
Semester	III		
Name of the Course	Linux and Shell Programming		
Course Code	B23-CAP-302 (Common with B23-CAI-302, B23-CDS-302, B23-CTS-302)		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)	Must have basic knowledge of computer		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. understand Linux architecture. 2 use various Linux commands that are used to manipulate system operations. 3 acquire knowledge of Linux File System. 4 understand and make effective use of I/O and shell scripting language to solve problems. 5*. to implement the programs based on various shell commands and programs in linux.		
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. Examination will be of three-hour duration.

Unit	Topics	Contact Hours
I	Introduction to Linux: Linux distributions, Overview of Linux operating system, Linux architecture, Features of Linux, Accessing Linux system, Starting and shutting down system, Logging in and Logging out, Comparison of Linux with other operating systems.	10
II	Commands in Linux: General-Purpose commands, File oriented commands, directory oriented commands, Communication-oriented commands, process oriented commands, etc. Regular expressions & Filters in Linux: Simple filters viz. more, wc, diff, sort, uniq, grep; Introducing regular expressions.	10
III	Linux file system: Linux files, inodes and structure and file system, file system components, standard file system, file system types. Processes in Linux: Starting and Stopping Processes, Initialization Processes, Mechanism of process creation, Job control in linux using at, batch, cron & time.	10
IV	Shell Programming: vi editor, shell variables, I/O in shell, control structures, loops, subprograms, creating & executing shell scripts in linux.	10
V*	Practicum: Students are advised to do laboratory/practical practice not limited to, but including the following types of problems: • Basic Linux command • Basic Shell Programming (Fibonacci Series generation, Factorial of a given number, Checking for Armstrong number) • Designing an Arithmetic calculator • Generation of Multiplication table • Base Conversion (Decimal to Binary, Binary to Decimal) • Finding the information about the Login name and File name. • Write a shell script to exchange the contents of two variables. • Write a shell script, which accepts three subject marks scored by a student and declare the result. • Write a shell script program to find area of a square, rectangle, circle and triangle. • Write a shell script to print integer numbers from 1 to 20.	25

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory** • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➢ **Practicum**	**End Term Examination:** A three hour exam for both theory and practicum.

• Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA	

Part C-Learning Resources
Recommended Books/e-resources/LMS: • Yashwant Kanetkar, Unix & Shell programming – BPB Publications. • Richard Petersen, The Complete Reference – Linux, McGraw-Hill. • M.G.Venkateshmurthy, Introduction to Unix & Shell Programming, Pearson Education. • Stephen Prata, Advanced UNIX-A Programmer's Guide, SAMS Publication. • Sumitabha Das, Your Unix - The Ultimate Guide, Tata McGraw-Hill.

*Applicable for courses having practical component.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

Session: 2023-24			
Part A - Introduction			
Subject	BCA		
Semester	III		
Name of the Course	Data Base Technologies		
Course Code	B23-CAP-303 (Common with B23-CAI-303, B23-CDS-303, B23-CTS-303)		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC		
Level of the course (As per Annexure-I	100-199		
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: 1. understand the concepts of problem solving on computer 2. understand the basics of C programming along with various I/O functions 3. understand various operators and branching statements in C 4. understand loops, functions and arrays in C 5*. to design programs based on theoretical concepts of C.		
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			

Unit	**Topics**	**Contact Hours**
I	Basic Concepts – Data, Information, Records, Files, Schema and Instance etc. Limitations of File Based Approach,	10

	Characteristics of Database Approach, Database Management System (DBMS), Components of DBMS Environment, DBMS Functions and Components, Database Interfaces, Advantages and Disadvantages of DBMS. Database Users: Data and Database Administrator, Role and Responsibilities of Database Administrator, Database Designers, Application Developers etc. Database System Architecture – 1-Tier, 2-Tier & Three Levels of Architecture, External, Conceptual and Internal Levels, Schemas, Mappings and Instances, Data Independence – Logical and Physical Data Independence.	
II	Data Models: Hierarchical, Network and Relational Data Models. Entity-Relationship Model: Entity, Entity Sets, Entity Type, Attributes: Type of Attributes, Keys, Integrity Constraints, Designing of ER Diagram, Symbolic Notations for Designing ER Diagram,	10
III	SQL: Meaning, Purpose and Need of SQL, Data Types, SQL Components: DDL, DML, DCL and DQL, Basic Queries, Join Operations and Sub-queries, Views, Specifying Indexes. Constraints and its Implementation in SQL. Relational Algebra: Basic Operations: Select, Project, Join, Union, Intersection, Difference, and Cartesian Product etc. Relational Calculus: Tuple Relational and Domain Relational Calculus. Relational Algebra Vs. Relational Calculus.	10
IV	Relational Model: Functional Dependency, Characteristics, Inference Rules for Functional Dependency, Types of Functional Dependency, Normalization: Benefits and Need of Normalization, Normal Forms Based on Primary Keys- (1NF, 2NF, 3NF, BCNF), Multi-valued Dependencies, 4 NF, Join dependencies, 5 NF, Domain Key Normal Form.	10
V*	The following activities be carried out/ discussed in the lab during the period of the semester. Programming Lab: • Performing various SQL statement. Creating various tables and performing all possible queries based on syllabus. • Understanding relational model concepts • Understanding normalization • Understanding various concepts of databases.	25
Suggested Evaluation Methods		
Internal Assessment: ➢ **Theory** • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10		**End Term Examination:** **A three hour exam for both theory and practicum.**

➢ **Practicum** • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA	
Part C-Learning Resources	
Recommended Books/e-resources/LMS: • Elmasri & Navathe, Fundamentals of Database Systems, Pearson Education. • A Silberschatz, H Korth, S Sudarshan, Database System and Concepts, McGraw-Hill. • Thomas Connolly Carolyn Begg, Database Systems, Pearson Education. • C. J. Date, An Introduction to Database Systems, Addison Wesley.	

*Applicable for courses having practical component.

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

<table>
<tr><td colspan="4">Session: 2023-24</td></tr>
<tr><td colspan="4">Part A - Introduction</td></tr>
<tr><td>Subject</td><td colspan="3">COMPUTER SCIENCE</td></tr>
<tr><td>Semester</td><td colspan="3">III</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Advance IT Skills</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-SEC-301</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">SEC</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3"></td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3"></td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="3">After completing this course, the learner will be able to:
1. Use e-Governance applications; and use computer to improve existing skills and learn new skills
2. Using internet for Digital Financial services
3. understand the concept of Cyber security and issues and challenges associated with it
4. Develop knowledge about Future Skills
5*. to understand the various concepts in the syllabi practically.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>2</td><td>1</td><td>3</td></tr>
<tr><td>Contact Hours</td><td>2</td><td>2</td><td>4</td></tr>
<tr><td colspan="2">Max. Marks:75(50(T)+25(P))
Internal Assessment Marks:20(15(T)+5(P))
End Term Exam Marks: 55(35(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><td colspan="4">Part B- Contents of the Course</td></tr>
<tr><td colspan="4"><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.
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</td></tr>
</table>

three-hour duration.		
Unit	**Topics**	**Contact Hours**
I	WWW and E-Governance - Website Address and URL, Introduction to IP, Address, ISP and Role of ISP, Internet Protocol, Modes of Connecting Internet (HotSpot, Wifi, LAN Cable, BroadBand, USB Tethering), Identifying and uses of IP/MAC/IMEI of various devices, Downloading Web Pages, Printing Web Pages Introduction to Blogs, Basics of E-commerce, Netiquettes, Overview of e-Governance Services like Railway Reservation, Passport, eHospital [ORS], Accessing e-Governance Services on Mobile	5
II	Digital Financial Tools and Applications Digital Financial Tools, Understanding OTP [One Time Password]and QR [Quick Response] Code, UPI [Unified Payment Interface], AEPS [Aadhaar Enabled Payment System], USSD[Unstructured Supplementary Service Data], Card [Credit / Debit], eWallet, PoS [Point of Sale], Internet Banking, National Electronic Fund Transfer (NEFT), Real Time Gross Settlement (RTGS), Immediate Payment Service (IMPS), Online Bill Payment	5
III	Cyber Security: Cyber Security, Defining Cyberspace, Architecture of cyberspace, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security. Classification of cybercrimes, Common cybercrimes- cybercrime targeting computers and mobiles, cybercrime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi , Reporting of cybercrimes, Remedial and mitigation measures, Legal perspective of cybercrime, IT Act 2000 and its amendments, Cybercrime and offences, Organisations dealing with Cybercrime and Cyber security in India.	7
IV	Overview of Futureskills: Introduction to Internet of Things (IoT), Big Data Analytics, Cloud Computing, Virtual Reality, Artificial Intelligence, Social & Mobile, Blockchain Technology, 3D Printing/ Additive Manufacturing, Robotics Process Automation.	7
V*	Practicum: WWW and E-Governance: • Understanding the various devices related to Internet • Using e-governance services • Writing e-blogs. Digital Financial Tool: • Using digital financial tools. Cyber Security: • Checklist for reporting cyber-crime at Cybercrime Police Station • Checklist for reporting cybercrime online • Reporting phishing emails	25

	• Demonstration of email phishing attack and preventive measures. Futuristic Technology: • Introducing various futuristic technologies.	

Suggested Evaluation Methods	
Internal Assessment: ➢ **Theory** • Class Participation: 4 • Seminar/presentation/assignment/quiz/class test etc.: 4 • Mid-Term Exam: 7 ➢ **Practicum** • Class Participation: 2 • Seminar/Demonstration/Viva-voce/Lab records etc.: 3 • Mid-Term Exam: NA	**End Term Examination:** A three hour exam for both theory and practicum.

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Cyber Crime Impact in the New Millennium, by R. C Mishra, Auther Press. Edition 2010.
- Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
- Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson, 13th November, 2001)
- Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.
- Computer Fundamentals - By Pradeep K. Sinha, Priti Sinha, BPB Publications, 6th Edition

*Applicable for courses having practical component.

Part A - Introduction			
Subject	**Business Administration**		
Semester	**II**		
Name of the Course	**Fundamentals of Investing**		
Course Code	**B23-BBA-MDC-302**		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	**MDC-3**		
Level of the course (As per Annexure-I	**Intermediate-Level**		
Pre-requisite for the course (if any)	**None**		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1. Understand different investment avenues and their characteristics. 2. Gain knowledge about the functioning of the Indian Securities Market and the role of SEBI. 3. Analyze the relationship between returns and risks in financial investments. 4. Recognize the significance of depositories in securities transactions and investor protection measures. _____ 5*.		
Credits	Theory	Practical	Total
	3	**0**	**3**
Contact Hours	**45**	**0**	**45**
Max. Marks: **75** Internal Assessment Marks: **25** End Term Exam Marks: **50**		Time: **3 Hours**	

Part B- Contents of the Course

Instructions for Paper- Setter

The Paper-Setter shall set *nine* questions in all and the question paper shall be divided into two parts. **Part 'A'** shall comprise *four* short answer type questions from the whole of the syllabus carrying 2.5 marks each, which shall be compulsory. **Part 'B'** shall comprise *eight* questions (*two* questions from each unit) carrying 10 marks each and the student will be required to attempt *four* questions selecting *one* question from each unit.

Unit	Topics	Contact Hours
I	Investment avenues-money market and capital market instruments, Investment process, Objectives of investment.	12
II	Indian Securities Market, Process of investing through stock exchange, Stock Market Indices, NEAT System, BOLT System, Role of SEBI.	11
III	Returns and Risks in financial investment, Fixed-Income Securities and variable income securities, Bonds and Mutual funds and role of AMFI.	11
IV	Role of Depositories in India, Investor Protection in India, Rights and Duties of Investors.	11
V*		

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory** ● Class Participation: **05** ● Seminar/presentation/assignment/quiz/class test etc.: **07** ● Mid-Term Exam: **13** ➢ **Practicum** ● Class Participation: ● Seminar/Demonstration/Viva-voce/Lab records etc.: ● Mid-Term Exam:	End Term Examination: **50**

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

<table>
<tr><td colspan="4">Scheme: 2024-25, Syllabus: 2024-25</td></tr>
<tr><td colspan="4">Part A - Introduction</td></tr>
<tr><td>Subject</td><td colspan="3">BCA</td></tr>
<tr><td>Semester</td><td colspan="3">III</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Basics of Data Science using Excel</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-CAP-304</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">CC-M3</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3">200-299</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3">Basic knowledge of mathematics and computer</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="3">After completing this course, the learner will be able to:
1. understand the fundamental concepts of data science and the role of Excel in data analysis.
2. learn data cleaning, preparation, and visualization techniques using Excel.
3. apply statistical analysis and predictive modeling using Excel.
4. To explore advanced Excel functions and data analysis tools.
_____
5*. Implement the various functions in Excel</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>4</td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td colspan="2">Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><td colspan="4">Part B- Contents of the Course</td></tr>
</table>

Instructions for Paper-Setter

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 must attempt five questions, selecting one from each unit. The first question will be compulsory.

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 Data Science: Definition, importance, and applications. Overview of Excel: Interface, basic functions, and features. Data Types and Formats in Excel: Text, numbers, dates, and custom formats. Basic Data Manipulation: Sorting, filtering, and basic formulas (SUM, AVERAGE, COUNT).	11
II	Data Import and Export: CSV, TXT, and Excel files. Data Cleaning Techniques: Handling missing values, duplicates, and errors. Data Transformation: Text-to-columns, concatenation, and data validation. Data Visualization: Creating and customizing charts (bar, line, pie).	11
III	Descriptive Statistics: Mean, median, mode, standard deviation, and variance. Inferential Statistics: Hypothesis testing, t-tests, and chi-square tests. Regression Analysis: Simple linear regression and multiple regression. Predictive Modeling: Introduction to basic predictive models and their implementation in Excel.	11
IV	Advanced Excel Functions: VLOOKUP, HLOOKUP, INDEX-MATCH, and PivotTables. Data Analysis ToolPak: Using Excel's built-in data analysis tools such as Descriptive Statistics, Histograms, Correlation, and Regression. What-If Analysis Tools: Scenario Manager, Goal Seek, and Data Tables.	12
V*	The following activities will be carried out/ discussed in the lab during the semester. Familiarize with Excel interface and basic operations. • Explore Excel ribbons, toolbars, and interface. • Practice data entry, formatting, and basic calculations. • Create a simple spreadsheet and perform basic functions. Import data and perform basic cleaning tasks.	30

	• Import datasets from CSV and text files. • Identify and handle missing values. • Remove duplicates and correct data errors. Manipulate data through sorting and filtering. • Apply sorting to datasets based on different criteria. • Use filters to analyze subsets of data. • Create custom filters to extract specific data points. Utilize formulas for data transformation. • Practice text functions: LEFT, RIGHT, MID, CONCATENATE. • Use date functions: TODAY, DATE, DATEDIF. • Implement basic mathematical formulas: SUM, AVERAGE, COUNT. Calculate and interpret descriptive statistics. • Calculate measures of central tendency: mean, median, mode. • Compute measures of dispersion: range, variance, standard deviation. • Use built-in Excel functions for statistical analysis. Apply conditional formulas and formatting. • Use IF, SUMIF, and COUNTIF functions for conditional analysis. • Apply conditional formatting to highlight data trends and anomalies. • Create data-based rules for formatting. Create and customize basic charts and graphs. • Generate line charts, bar charts, and pie charts. • Customize chart elements: titles, labels, and legends. • Analyse data visually through chart types. Summarize data using PivotTables. • Create PivotTables to aggregate data. • Group data and create custom summaries. • Utilize slicers to filter and analyze PivotTable data interactively. Apply lookup and reference functions. • Use VLOOKUP and HLOOKUP for data retrieval. • Implement INDEX and MATCH functions for advanced lookups. • Practice using the OFFSET function for dynamic data ranges. Perform statistical analysis using the Data Analysis Toolpak. • Install and activate the Data Analysis Toolpak. • Conduct regression analysis and ANOVA. • Explore other statistical tests available in the Toolpak.	

Kurukshetra University, Kurukshetra

(Established by the State Legislature Act XII of 1956)

('A+' Grade, NAAC Accredited)

॥ योगस्थ: कुरु कर्माणि ॥

समबुद्धि व योग युक्त होकर कर्म करो

(Perform Actions while Stead fasting in the State of Yoga)

Syllabus of Examination (4th Semester) 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)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

(For the Batches Admitted From 2023-2024)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

<table>
<tr><td colspan="4">Session: 2023-24</td></tr>
<tr><td colspan="4">Part A - Introduction</td></tr>
<tr><td>Subject</td><td colspan="3">BCA</td></tr>
<tr><td>Semester</td><td colspan="3">IV</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Data Structures and Applications</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-CAP-401</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">CC</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3">200-299</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3">Knowledge of any Computer Programming Language</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="3">After completing this course, the learner will be able to:
1. learn the basics of data structure and algorithm complexities.
2. acquire knowledge of arrays and strings.
3. understand the idea of implementation for linked lists and stacks.
4. learn various searching and sorting techniques along with the implementation of queues.
5* develop the project with data structures.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>4</td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td colspan="2">Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><td colspan="4">Part B- Contents of the Course</td></tr>
<tr><td colspan="4"><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.</td></tr>
</table>

Unit	Topics	Contact Hours
I	**Data Structure** Definition, Data Type vs. Data Structure, Classification of Data Structures, Data Structure Operations, Applications of Data Structures. **Algorithm Specifications**: Performance Analysis and Measurement (Time and Space Analysis of Algorithms- Average, Best and Worst Case Analysis). **Arrays**: Introduction, Linear Arrays, Representation of Linear Array in Memory, Two Dimensional and Multidimensional Arrays, Sparse Matrix and its Representation, Operations on Array: Algorithm for Traversal, Selection, Insertion, Deletion and its implementation.	11
II	**String Handling**: Storage of Strings, Operations on Strings viz., Length, Concatenation, Substring, Insertion, Deletion, Replacement, Pattern Matching **Linked List**: Introduction, Array vs. linked list, Representation of linked lists in Memory, Traversing a Linked List, Insertion, Deletion, Searching into a Linked list, Type of Linked List.	11
III	**Stack**: Array Representation of Stack, Linked List Representation of Stack, Algorithms for Push and Pop, Application of Stack: Polish Notation, Postfix Evaluation Algorithms, Infix to Postfix Conversion, Infix to Prefix Conversion, Recursion. **Introduction to Queues**: Simple Queue, Double Ended Queue, Circular Queue, Priority Queue, Representation of Queues as Linked List and Array, Applications of Queue. Algorithm on Insertion and Deletion in Simple Queue and Circular Queue. Priority Queues.	12
IV	**Tree:** Definitions and Concepts, Representation of Binary Tree, Binary Tree Traversal (Inorder, postorder, preorder), Binary Search Trees – Definition, Operations viz., searching, insertions and deletion; Searching and Sorting Techniques, Sorting Techniques: Bubble sort, Merge sort, Selection sort, Quick sort, Insertion Sort. Searching Techniques: Sequential Searching, Binary Searching.	11
V*	**Practicum**: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: • Write a program that uses functions to perform the following operations on an array i) Creation ii) Insertion iii) Deletion iv) Traversal. • Write a program that uses functions to perform the following operations on strings i) Creation ii) Insertion iii) Deletion iv) Traversal. • Write a program that uses functions to perform the following operations on a singly linked list i) Creation ii) Insertion iii) Deletion iv) Traversal. • Write a program that uses functions to perform the following operations on a doubly linked list i) Creation ii) Insertion iii) Deletion iv) Traversal • Write a program that implement stack (its operations) using i) Arrays ii) Linked list(Pointers).	30

	• Write a program that implements Queue (its operations) using i) Arrays and ii) Linked lists (Pointers). • Write a program that implements the following sorting i) Bubble sort ii) Selection sort iii) Quick sort. • Write programs for various types of tree traversals.	

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:

- Seymour Lipschutz, Data Structures, Tata McGraw- Hill Publishing Company Limited, Schaum's Outlines.
- Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, Data Structures Using C, Pearson Education.
- Trembley, J.P. And Sorenson P.G., An Introduction to Data Structures with Applications, McGraw-Hill.
- Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Addison- Wesley.

* Applicable for courses having practical components.

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<table>
<tr><td colspan="4">Session: 2023-24</td></tr>
<tr><td colspan="4">Part A - Introduction</td></tr>
<tr><td>Subject</td><td colspan="3">BCA</td></tr>
<tr><td>Semester</td><td colspan="3">IV</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Front-end Development</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-CAP-402</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">CC</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3">200-299</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3">B23-CAP-202</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="3">After completing this course, the learner will be able to:
1. understand the basic concept of objects and regular expressions in JavaScript;
2. acquire knowledge of JavaScript events and DOM
3. learn to use forms and BOM in JavaScript;
4. get familiar with jQuery
5*. Understand the programming of web pages and handling events using JavaScript and jQuery.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>4</td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td colspan="2">Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><td colspan="4">Part B- Contents of the Course</td></tr>
<tr><td colspan="4"><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.</td></tr>
</table>

The practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.		
Unit	**Topics**	**Contact Hours**
I	**Objects in JavaScript**: Introduction to objects, Type of objects in JavaScript, creating objects, Object methods, Constructor function, Prototype in JavaScript, Inheritance using prototype chain. **Regular Expressions**: Introduction to RegExp, Regular expression usage, Modifiers, RegExp patterns, RegExp methods, String methods for RegExp, Type conversion in JavaScript.	11
II	**Event handling**: JavaScript events, Event handler, Event flow, Event bubbling and capturing, Event listeners, Event types. **Document Object Model (DOM)**: Introduction to DOM, Types of DOM, DOM standards and methods, Manipulating documents using DOM, Handling images, Table manipulation, Animation, Node and Node-list handling	11
III	**Browser Object Model (BOM)**: Introduction to BOM, DOM vs BOM differences, Window object and methods, BOM navigator, BOM history, BOM location, BOM timer, Introduction to Cookies, Session and persistent cookies. **Form Handling**: Introduction to forms, Form processing, Forms object, Accessing data from forms, Form validation, Additional features in forms, Validation APIs	12
IV	**Introduction to jQuery**: jQuery Syntax, jQuery Selectors, jQuery Events, jQuery Effects, jQuery HTML, jQuery Traversing, jQuery AJAX, jQuery Misc.	11
V*	Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: • Use of JavaScript in Web page designing • Effective web page design • Creation of Event listeners in JavaScript • Update and modify website elements dynamically using asynchronously retrieved data • Style HTML content with JavaScript • Iterate over arrays and objects using JavaScript for syntax. • JavaScript Program to Create Objects (4 Different Ways) • JavaScript Program to Iterate Over an Object • JavaScript Program to Find Max/Min Value of an Attribute in an Array of Objects • JavaScript Program to Remove Duplicates from an Array of Objects • Writing programs for event handling in JavaScript. • Write a JavaScript function to add rows to a table. • Write a JavaScript program to remove items from a drop-down list. • Write a JavaScript program to calculate sphere volume.	30

	• Write a JavaScript program to get the window width and height • Using BOM navigation and location • Creating cookies and sessions. • How can you create forms and perform validations on the forms? • How can you use jQuery and perform various functions using jQuery?	

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: • David Flanagan, JavaScript: The Definitive Guide: The Definitive Guide. • Kogent Learning, Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML, AJAX – Black Book, Wiley India Pvt. Ltd. • JavaScript and jQuery: Interactive Front-End Web Development by Jon Duckett • Head First JavaScript Programming: A Brain-Friendly Guide by Elisabeth Robson and Eric Freeman

*Applicable for courses having practical components.

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<table>
<tr><td colspan="4">Session: 2023-24</td></tr>
<tr><td colspan="4">Part A - Introduction</td></tr>
<tr><td>Subject</td><td colspan="3">BCA</td></tr>
<tr><td>Semester</td><td colspan="3">IV</td></tr>
<tr><td>Name of the Course</td><td colspan="3">Computer Graphics</td></tr>
<tr><td>Course Code</td><td colspan="3">B23-CAP-403</td></tr>
<tr><td>Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)</td><td colspan="3">CC</td></tr>
<tr><td>Level of the course (As per Annexure-I</td><td colspan="3">200-299</td></tr>
<tr><td>Pre-requisite for the course (if any)</td><td colspan="3">Basic Knowledge of computer</td></tr>
<tr><td>Course Learning Outcomes(CLO):</td><td colspan="3">After completing this course, the learner will be able to:
1. understand the concepts of computer graphics
2. learn and implement point, line, and circle drawing algorithms.
3. acquire knowledge of two-dimensional transformations and line clipping algorithms.
4. understand 3-D graphics concepts and acquire skills for designing 3-D graphics
5*. to design programs based on theoretical concepts of Computer Graphics.</td></tr>
<tr><td rowspan="2">Credits</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>3</td><td>1</td><td>4</td></tr>
<tr><td>Contact Hours</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td colspan="2">Max. Marks:100(70(T)+30(P))
Internal Assessment Marks:30(20(T)+10(P))
End Term Exam Marks: 70(50(T)+20(P))</td><td colspan="2">Time: 3 Hrs.(T), 3Hrs.(P)</td></tr>
<tr><td colspan="4"><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.</td></tr>
</table>

Part B- Contents of the Course		
Unit	**Topics**	**Contact Hours**
I	**Introduction**: History of Computer Graphics (CG), Applications of Computer Graphics, Components of interactive graphics systems **Display devices**: Refresh CRT, Color CRT, Plasma Panel displays LCD Panels, Raster-scan System, Random scan System, Graphic software, Input/Output Devices, Tablets	11
II	**Output Primitives**: Points and Lines, Line Drawing Algorithms: DDA algorithm, Bresenham's algorithm, **Circle drawing Algorithms**: Polynomial Method, Bresenham's algorithm. Parametric representation of Cubic Curves, Bezier Curves	11
III	**2D Transformation**: Use of Homogeneous Coordinates Systems, Composite Transformation: Translation, Scaling, Rotation, Mirror Reflection, Rotation about an Arbitrary Point. Clipping and Windowing, Clipping Operations. **Line Clipping Algorithms**: The Mid-Point subdivision method, Cohen-Sutherland Line Clipping Algorithms, Polygon Clipping, Sutherland Hodgeman Algorithms, Text Clipping.	12
IV	**3-D Graphics**: 3-D object representations, 3-D Transformations: Translation, Rotation, Scaling, Projections, **Hidden surface elimination**: Back face removal, Depth Buffer algorithm, Scan-line algorithm, Depth sort algorithm, Shading.	11
V*	The following activities be carried out/ discussed in the lab during the semester. Programming Lab: • Implement DDA line drawing algorithm for all types of slope. • Implement Bresenham's line drawing algorithm for all types of slopes. • Implement Bresenham's Circle drawing algorithm. • Implement Bresenham's Ellipse drawing algorithm. • Implement various 2-D transformations on objects like lines, rectangles, etc. • Implement to clip a line using the Mid-Point subdivision algorithm • Implement to clip a line using Cohen-Sutherland algorithm • Implement 3-D transformations on objects.	30
Suggested Evaluation Methods		
Internal Assessment: ➢ **Theory** • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➢ **Practicum**		**End Term Examination:** **A three-hour exam for both theory and practicum.** **End Term Exam**

• Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA	**Marks: 70(50(T)+20(P))**

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Donald Hearn, M. Pauline Baker, Computer Graphics, Pearson Education.
- J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes, Computer Graphics - Principles and Practice, Pearson Education.
- Newmann & Sproull, Principles of Interactive Computer Graphics, McGraw Hill.
- Rogers, David F., Procedural Elements of Computer Graphics, McGraw Hill.
- Zhigang Xiang, Roy Plastock, Computer Graphics, Tata McGraw Hill.

*Applicable for courses having practical components.

Part A – Introduction			
Subject	**Business Administration**		
Semester	**IV**		
Name of the Course	**E-Commerce**		
Course Code	**B23-VAC-417**		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/VAC)	**VAC-4**		
Level of the course (As per Annexure-I	**Intermediate Level**		
Pre-requisite for the course (if any)	**None**		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1. To describe the foundation and importance of E - Commerce. 2. To compare the different electronic payment system. 3. To create business model and strategy for online business. 4. To select the infrastructure for E-Commerce. 5*.		
Credits	Theory	Practical	Total
	2	**0**	**2**
Contact Hours	**30**	**0**	**30**
Max. Marks: **50** Internal Assessment Marks: **15** End Term Exam Marks: **35**		Time: **3 Hours**	

Part B- Contents of the Course

Instructions for Paper- Setter

The Paper-Setter shall set *nine* questions in all and the question paper shall be divided into two parts. **Part 'A'** shall comprise *four* short answer type questions from the whole of the syllabus carrying 1.75 marks each, which shall be compulsory. **Part 'B'** shall comprise *eight* questions (*two* questions from each unit) carrying 7 marks each and the student will be required to attempt *four* questions selecting *one* question from each unit.

Unit	Topics	Contact Hours
I	Introduction – Meaning, Nature, Concepts, Advantages and reasons for transacting online, Categories of e-commerce; Planning Online Business: nature and dynamics of the internet, pure online vs. brick and click business.	8
II	Technology for Online Business – internet, IT infrastructure; middleware contents: text and integrating e-business applications; mechanism of making payment through internet: online payment mechanism, electronic payment systems, payment gateways.	8
III	Applications in e-commerce – e-commerce applications in manufacturing, wholesale, retail and service sector.	7
IV	Virtual Existence – Concepts, working, advantages and pitfalls of virtual organizations, Security in e-commerce: digital signatures, network security, data encryption secret keys, data encryption.	7
V*		

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory** ● Class Participation: **4** ● Seminar/presentation/assignment/quiz/class test etc.: **4** ● Mid-Term Exam: **7** ➢ **Practicum** ● Class Participation: ● Seminar/Demonstration/Viva-voce/Lab records etc.: ● Mid-Term Exam:	End Term Examination: **35**

Part C-Learning Resources
Recommended Books/e-resources/LMS: 1. Murty, C.V.S., E-Commerce, Himalaya Publications, New Delhi 2. Kienam, Managing Your E-Commerce business, Prentice Hall of India, N.Delhi. 3. Kosiur, Understanding E-Commerce, Prentice Hall of India, N.Delhi. 4. Kalakota, Whinston, Frontiers of Electronic Commerce, Addison Wesley

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Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	II		
Name of the Course	Software Testing		
Course Code	B23-VOC-216		
Course Type: (CC/MCC/MDC/CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)	VOC		
Level of the course (As per Annexure-I			
Pre-requisite for the course (if any)			
Course Learning Outcomes(CLO):	On the completion of the course students will: 1.To understand the basic terminologies and types of testing 2.Understand different testing methods 3.Understand the testing process 4.Manage the tests, plan testing process and create reports 5. Testing the software/projects using various techniques		
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. Examination will be of three-hour duration.

Unit	**Topics**	**Contact Hours**

I	Introduction: Definition of Software Testing and its Role, Terms: - Failure, Error, Fault, Defect, Bug, Goals of Testing, Principles of Testing, Software Testing Life Cycle, Verification and Validation: - V-testing Life cycle	10
II	Types of Testing: Black Box Testing: Overview: What is & When? Techniques: Boundary Value Analysis, Equivalence class testing, Decision Table White Box Testing: What is white box Testing, Need of white box Testing, Classification , Structural : Coverage, Path testing	10
III	Levels of Testing Unit Testing : Overview, Integration Testing : Overview, Techniques: Graph based & Path based, Functional Testing, System Testing : Overview, Categories: Reliability Security Performance Recovery, Acceptance Testing : Overview, Types of Acceptance Testing	10
IV	Test Planning: Preparing a Test plan, Scope management, Decide Test Approach, Setting Up Criteria, for testing, Identifying responsibilities, Staffing, training needs, Resource requirements, Test deliverables, Testing Tasks	10
V*	Practicum: 1. Prepare a small project and submit SRS, design, coding and test plan. 2. Study of any one of the testing tools. (e.g win runner, test direct, etc) **3. MANUAL TESTING for the project** a. Whitebox Testing b. Blackbox Testing **4. Functional Testing** a. Boundary value Testing b. Equivalence class testing **5. Structural Testing** a. Path testing b. Data-flow testing	25

Suggested Evaluation Methods

Internal Assessment: ➢ **Theory** • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➢ **Practicum** • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA	**End Term Examination:** A three hour exam for both theory and practicum.

Part C-Learning Resources

Recommended Books/e-resources/LMS:

- Software Testing: Principles and Practice by Srinivasan Desikan, Gopalaswamy Ramesh,

Pearson Publication

- Software Testing: Principles and Practice by Naresh Chauhan, Oxford
- Software Testing: Easy Learning Approach by Shubha Agarwal Kundlas

*Applicable for courses having practical component.

English

Semester-IV

Nomenclature of the Course: **English Language and Communication Skills: Level 4**

Course Code: **B23-AEC-411**

Course Type: **AEC-4**

Level of the Course: **200-299**

Credits: 2 (Theory 2)

Total Marks: 50

End Term Exam Marks: 35

Internal Assessment Marks: 15

Exam Time: 3 Hrs.

Workload: Theory 2 hours

Course Learning Outcomes

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

E401.1. The students will enhance their vocabulary by learning formation of words.

E401.2. They will learn the various types of sentences.

E401.3. They will comprehend the public speaking techniques and art of oratory.

E401.4. They will learn practical use of coherence in writing and contextual vocabulary

Contents of the Course:

Unit I: Vocabulary Building

Word formation and understating word roots, prefixes, and suffixes

Unit II: Types of Sentences and Transformation of Sentences

Unit III: Public Speech, Persuasion Techniques

Various Aspects of Conversation: Starting a Conversation/Controlling a Conversation

Unit IV: Coherence and Unity in a Paragraph, Transition Words and Phrases

Learning Contextual Vocabulary through Reading a Passage or Literary Text

Suggested Readings:

Lewis, Norman. *Word Power Made Easy: The Complete Handbook for Building a Superior Vocabulary*. Anchor, 2014.

Nida, Eugene A. *Morphology: The Descriptive Analysis of Words*. University of Michigan Press, 1965.

Tortora, Christina. *Understanding Sentence Structure: An Introduction to English Syntax*. John Wiley & Sons, 2018.

Instructions to the Paper Setters:

1. Question No 1 will be compulsory and will have 7 parts based on all the four Units and the students will be required to attempt all the 7.
2. Question No 2 and 3 will be set on Unit-I covering the entire Unit. Students will be required to attempt any one.
3. Question No 4 and 5 will be set on Unit-II covering the entire Unit. Students will be required to attempt any one.
4. Question No 6 and 7 will be set on Unit-III covering the entire Unit. Students will be required to attempt any one.
5. Question No. 8 and 9 will be based on Unit-IV. Students will be required to attempt any one of these.

Evaluation of Internal Assessment

Internal Assessment (Theory) will be based on the following components.

i.	Class Participation	4 Marks
ii.	Seminar/Presentation/Assignments/ Quiz/Class Test etc.	4 Marks
iii.	Mid-Term Exam	7 Marks
	Total	15 Marks