

Deccan Education Society's
**Kirti M. Doongursee College of
Arts, Science and Commerce
(AUTONOMOUS)**



Affiliated to

UNIVERSITY OF MUMBAI

Syllabus for
Program: Bachelor of Science
Course: S.Y.B.SC.
Subject: Information Technology

Choice Based Credit System (CBCS)
with effect from
Academic Year 2024-2025

PROGRAM OUTCOMES

PO	Description
A student completing Bachelor's Degree in Science Program will be able to	
PO1	To think analytically, creatively and critically in developing robust, extensible and highly maintainable technological solutions to simple and complex problems.
PO2	To apply their knowledge and skills to be employed and excel in IT professional careers and/or to continue their education in IT and/or related postgraduate programmes.
PO3	To be capable of managing complex IT projects with consideration of the human, financial and environmental factors.
PO4	To work effectively as a part of a team to achieve a common stated goal in a professional manner.
PO5	To adhere to the highest standards of ethics, including relevant industry and organizational codes of conduct.
PO6	To communicate effectively with a range of audiences both technical and non-technical.
PO7	To develop an aptitude to engage in continuing professional development
PO8	To understand corporate approach towards the projects in a research oriented qualitative manner

Information Technology Department

S.Y.B.Sc. Syllabus (NEP 2020)

Academic year 2024-25

Semester	Course Code	Course Title	Vertical	Credit	
III	24ITMJ311	Computer Graphics & Animation	Major	2	
	24ITMJP31	Computer Graphics & Animation Practical	Major	2	
	24ITMJ312	Software Engineering	Major	2	
	24ITMJP32	Software Engineering Practical	Major	2	
	24ITMR321	Fundamentals of Statistics	Minor	2	
	24ITMRP31	ITMR R Programming Practical	Minor	2	
	24ITOE331	Digital Marketing	OE	2	
	24ITVC341	Advanced Database Management System	VSC	2	
	IV	24ITMJ411	Enterprise Java	Major	2
24ITMJP41		Enterprise Java Practical	Major	2	
24ITMJ412		Embedded System	Major	2	
24ITMJP42		Embedded System Practical	Major	2	
24ITMR421		Cryptography and Network Security	Minor	2	
24ITMRP41		ITMR Cryptography Practical	Minor	2	
24ITOE431		E-commerce 2	OE	2	
24ITSE441		Android Mobile Programming	SEC	2	

SEMESTER- III

Course Code	Major SEM III	Credits	Lectures/ Week
24ITMJ311	Paper I- Computer Graphics & Animation	2	2
<p>Course Outcomes:</p> <p>After successful completion of this course, students would be able to</p> <ul style="list-style-type: none"> • CO1:- Explain the applications, areas and graphic pipeline, display and storage technologies. • CO2:- Identify the principles and techniques of Computer Animation. • CO3:- Apply and compare the algorithms for drawing 2D images • CO4:- Analyze the clipping algorithms with the transformation on 2D images. 			
Unit	Topics	No of Lectures	
I	<p>Introduction to Computer Graphics: Overview of Computer Graphics, Computer Graphics Application and Software, Display Technologies, Storage Tube Graphics Displays, Calligraphic Refresh Graphics Displays, Raster Refresh (Raster-Scan) Graphics Displays, Cathode Ray Tube Basics, Random-Scan Display Processor</p> <p>Scan conversion – Digital Differential Analyzer (DDA) algorithm, Bresenhams’ Line drawing algorithm. Bresenhams’ method of Circle drawing, Midpoint Circle Algorithm, Midpoint Ellipse Algorithm, Clipping Lines algorithms– Cyrus-Beck, Cohen-Sutherland and Liang-Barsky.</p>	15	
II	<p>Two-Dimensional and Three-Dimensional Transformations: Overview, Transformations, Viewing and Modelling, Projections- Perspective and Parallel Projection, Orthographic and Oblique Parallel Projection.</p> <p>Determination of Visible Surfaces Overview and Computer Graphics pipeline</p> <p>Computer Animation: Principles of Animation, Key framing, Deformations, Character Animation, Physics-Based Animation, Procedural Techniques.</p>	15	

Books and References:**Sr. No. Title Author/s Publisher Edition Year**

1. Computer Graphics -Principles and Practice, J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes, Pearson, 2nd
2. Steve Marschner & Peter Shirley Fundamentals of Computer Graphics, CRC press, 4th 2016
3. Computer Graphics Hearn, Baker Pearson, 2nd
4. Principles of Interactive Computer Graphics, William M. Newman and Robert F. Sproull, TMH, 2nd

Course Code	Major SEM – III	Credits	Lectures/Week
24ITMJP31	Paper I - Computer Graphics Practical	2	4
Course Outcomes:			
After successful completion of this course, students will have the knowledge and skill to:			
<ul style="list-style-type: none"> ● CO1-Demonstrate different types of transformations in computer graphics programs. ● CO2-Implement different computer graphics algorithms. ● CO3-Extract scene with different clipping methods and its transformation to graphics display device. ● CO4-Compare and evaluate different graphical techniques. 			
Unit	Topics		
1	Solve the following: a. Study and enlist the basic functions used for graphics in C++ language. Give an example for each of them. b. Draw a coordinate axis at the center of the screen.		
2	Solve the following: a. Divide your screen into four regions, draw a circle, rectangle, ellipse and half ellipse in each region with appropriate messages. b. Draw a simple hut on the screen.		
3	Draw the following basic shapes in the center of the screen : i. Circle ii. Rectangle iii. Square iv. Concentric Circles v. Ellipse vi. Line		
4	Solve the following: a. Develop the program for the DDA Line drawing algorithm. b. Develop the program for Bresenham’s Line drawing algorithm.		
5	Solve the following: a. Develop the program for the midpoint circle drawing algorithm.		
6	Solve the following: a. Develop the program for the mid-point ellipse drawing algorithm.		
7	Solve the following: a. Write a program to implement 2D scaling. b. Write a program to perform 2D translation.		
8	Solve the following: a. Perform 2D Rotation on a given object. b. Program to create a house like figure and perform the following operations. i. Scaling about the origin followed by translation.		

	<ul style="list-style-type: none">ii. Scaling with reference to an arbitrary point.iii. Reflect about the line $y = mx + c$.
9	<p>Solve the following:</p> <ul style="list-style-type: none">a. Write a program to implement Cohen-Sutherland clipping.b. Write a program to implement Liang - Barsky Line Clipping Algorithm
10	<p>Solve the following:</p> <ul style="list-style-type: none">a. Perform smiling face animation using graphic functions.b. Draw the moving car on the screen.

Course Code	SEM III-Major 2	Credits	Lectures/Week
24ITMJ312	Paper II-Software Engineering	2	2
<p>Course Objective: The learner is introduced to the software engineering lifecycle to be applied in one or more significant application domains</p> <p>Course Outcome: After successful completion of this course, students would be able to CO1: Describe various approaches like waterfall, incremental, prototyping. CO2: Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects. CO3: Develop a project by applying the software engineering principles like project management, interface design and cost estimation.</p>			
Unit	Topics	No of Lectures	
I	<p>Introduction: What is software engineering? Software Development Life Cycle, Requirements Analysis, Software Design, Coding, Testing, Maintenance etc.</p> <p>Software Requirements: Functional and Non-functional requirements, User Requirements, System Requirements, Interface Specification, Documentation of the software requirements.</p> <p>Software Processes: Process and Project, Component Software Processes. Software Development Process Models. • Waterfall Model. • Prototyping. • Iterative Development. • Rational Unified Process. • The RAD Model • Time boxing Model. Agile software development: Agile methods, Plan-driven and agile development, Extreme programming, Agile project management, Scaling agile methods.</p>	15	
II	<p>Critical system: Types of critical system, A simple safety critical system, Dependability of a system, Availability and Reliability, Safety and Security of Software systems.</p> <p>Requirements Engineering Processes: Feasibility study, Requirements elicitation and analysis, Requirements Validations, Requirements Management. System Models: Models and its types, Context Models, Behavioral Models, Data Models, Object Models, Structured Methods. Resource Allocation - Introduction, Nature of Resources using the UML - Class diagram, Object diagram, Use case diagram, Sequence diagram, Collaboration diagram, State chart diagram, Activity diagram, Component diagram, Deployment diagram.</p>	15	

Textbooks:

- Software Engineering, A Practitioner's Approach, Roger S, Pressman, 2019
- Software Engineering: principles and Practices, Deepak Jain, OXFORD University Press, 2008

Additional References:

- Software Engineering, Ian Sommerville, Pearson Education, 2017
- Fundamentals of Software Engineering, Fourth Edition, Rajib Mall, PHI, 2018
- Software Engineering: Principles and Practices, Hans Van Vliet, John Wiley & Sons, 2010
- A Concise Introduction to Software Engineering, Pankaj Jalote, Springer

Course Code	SEM – III-Major-2 Practical	Credits	Lectures/Week
24ITMJ32	Paper II Software Engineering Practical	2	4

Course Outcomes:

After successful completion of this course, students would be able to

- CO1- List the errors and warnings for the given input.
- CO2- Explain and demonstrate the execution process of the programs.
- CO3- Solve the problems based on each OO concept.
- CO4-Write modularized program code for implementing OO concepts.

Unit	Topics
1	Write down the problem statement for a suggested system of relevance.
2	Perform requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested systems.
3	Draw the function oriented diagram: Data Flow Diagram (DFD) and Structured chart.
4	Draw the user's view analysis for the suggested system: Use case diagram.
5	Draw the structural view diagram for the system: Class diagram, object diagram.
6	Draw the behavioral view diagram : State-chart diagram, Activity diagram.
7	Draw the behavioral view diagram for the suggested system: Sequence diagram, Collaboration diagram.
8	Draw the implementation and environmental view diagram: Component diagram, Deployment diagram.
9	Perform Estimation of effort using FP Estimation.
10	Prepare timeline chart/Gantt Chart/PERT Chart.

Course Code	Minor SEM –III	Credits	Lectures/Week
24ITMR321	Paper III - Fundamentals of Statistics	2	2
<p>Course Outcomes: After successful completion of this course, students would be able to</p> <ul style="list-style-type: none"> • CO1:-Recalling basic statistical terms and definitions • CO2:-Identify the appropriate measure of central tendency and dispersion for a particular situation. • CO3:- Tabulate and represent the data in graphs and diagrams • CO4:- Correlate the nature of data and interpret the measures 			
Unit	Topics	No of Lectures	
I	Data Classification – Tabulation – Frequency and graphic Representation – Measures of Central Tendency – Measures of Variation – Quartiles and Percentiles – Moments - Skewness and Kurtosis. Scatter Diagram – Karl Pearson’s Correlation Coefficient – Regression Coefficients – Fitting of Regression Lines.	15	
II	Sampling & Its Distribution: The Central limit theorem. Point Estimation: Method of maximum likelihood estimation. Interval Estimation: Confidence interval for one normal population Hypothesis Testing: Statistical hypothesis, Null and alternative hypothesis, Critical region, Two types of errors, Level of significance, Power of test Tests based on normal, Chi-square, T and F distribution, Chi-square test of goodness of fit, Critical function, standard error of estimate.	15	
<p>Textbooks:</p> <ul style="list-style-type: none"> • Fundamental of Mathematical Statistics, S. C. Gupta and V. K. Kapoor, Sultan Chand and Sons. <p>Additional References:</p> <ul style="list-style-type: none"> • Probability and Statistics for Engineers and Sciences by J. L. Devore, CENGAGE Learning, 8th edition • Statistical Inference, George Casella and Roger L. Berger 			

Course Code	Minor SEM III	Credits	Practicals/Week
24ITMRP31	Paper III Practical	2	4
<p>After successful completion of this course, students would be able to</p> <ul style="list-style-type: none"> • CO1:- Recalling the definition of matrix and its operation • CO2:-Understand the R environment by downloading and installing the packages, • CO3:- Apply correlation analysis to different realistic situations using R • CO4:- Calculate the skewness and kurtosis of data sets and analyze their types. 			
Unit	Topics		
Practicals using R			
1	Execute the basic commands, array, list and frames		
2	Execute the statistical functions: mean, median, mode, quartiles, range, inter quartile range, histogram		
3	Import the data from Excel/ .CSV file and find mean, median, mode, quartiles, range, inter quartile range, histogram.		
4	Import the data from Excel/ .CSV file and find standard deviation, variance and covariance.		
5	Import the data from Excel/ .CSV file and find skewness and kurtosis.		
6	Create a table in it		
7	Plot scatter diagram and correlation		
8	Perform Linear Regression		
9	Create a Matrix using R and Perform the operations addition, subtraction, multiplication, transpose, inverse		
10	Perform Hypothesis Testing		
<p>Additional References:</p> <ul style="list-style-type: none"> • Crawley, M. J. (2006). Statistics - An introduction using R. John Wiley, London 32 • Statistics Using R, Narosa Publishing House, New Delhi. Eighth Ed. East - West Press. Statistics, Vol. 1, 6th revised edition, The World Press Pvt. Ltd., Calcutta. 			

Course Code	OPEN ELECTIVE SEM – III	Credits	Lectures /Week
24ITOE331	Paper I Digital Marketing	2	2
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> ● CO1- Recall the basic components of a digital marketing strategy. ● CO2- Understand the principles behind effective digital marketing. ● CO3- Implement Search Engine Optimization strategies to improve website visibility. ● CO4- Compare different digital marketing channels. 			
Unit			
Topics			
1	Fundamentals of Digital marketing & Its Significance, Traditional marketing Vs Digital Marketing, Evolution of Digital Marketing, Digital Marketing Landscape, Key Drivers, Digital Consumer & Communities. The Digital users in India, Digital marketing Strategy, POEM Framework, Digital advertising Market in India, Skills in Digital Marketing, Digital marketing Plan.		
2	Terminology used in Digital Marketing, PPC and online marketing through social media, Social Media Marketing, SEO techniques, Keyword advertising, Affiliate Marketing, Email Marketing. Display advertising, types of display ads, different ad formats, Ad placement techniques, Important ad terminology, Programmatic Digital Advertising.		
TextBooks			
<ol style="list-style-type: none"> 1. Digital Marketing –Kamat and Kamat-Himalaya 2. Marketing Strategies for Engaging the Digital Generation, D. Ryan, 3. Digital Marketing, V. Ahuja, Oxford University Press 4. Digital Marketing, S.Gupta, McGraw-Hill 5. Quick win Digital Marketing, H. Annmarie , A. Joanna, Paperback edition 			

Course Code	Vocational Skill Course	Credits	Lectures /Week
24ITVC341	Paper I -Advanced Database Management System	2	4
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> ● CO1- Recall fundamental concepts of database management systems, such as normalization and indexing. ● CO2- Interpret the role of transaction management in a distributed environment. ● CO3- Implement advanced SQL queries involving subqueries, joins, and nested queries. ● CO4-Analyze the impact of concurrency control mechanisms on database performance. ● CO4-Evaluate the performance of different indexing methods in specific database scenarios. 			
Unit			
Topics			
1	Restricting and Sorting Data using clauses		
2	Use of Aggregate and Mathematical functions		
3	Use of SubQueries in DBMS		
4	Use of Views in Database systems (Creating and dropping of views)		
5	Use of Joins in Database systems		
6	Use of Database triggers in DBMS (Create, insert, update and Delete triggers)		
7	Implementing Views in Database Systems		
8	Practicals on Basics of PL/SQL		
9	Write a PL/SQL block to satisfy some conditions by accepting input from the user.		
10	Writing PL/SQL Blocks with basic programming constructs by including Sequential Statements.		

SEMESTER- IV

Course Code	SEM – IV- Major 1	Credits	Lectures/Week
24ITMJ411	Paper I-Enterprise Java	2	2
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> ● CO1- Recall the syntax and basic concepts of Java programming language. ● CO2- Understand the Java Servlet and JavaServer Pages (JSP) technologies. ● CO3- Develop and implement Java applications using Java EE. ● CO4- Evaluate the performance of enterprise Java applications. 			
Unit	Topics	No of Lectures	
I	<p>Understanding Java EE: What is an Enterprise Application? What is java enterprise edition? Java EE Technologies, Java EE evolution, Glassfish server Java EE Architecture, Server and Containers: Types of System Architecture, Java EE Server, Java EE Containers.</p> <p>Introduction to Java Servlets: The Need for Dynamic Content, Java Servlet Technology, Why Servlets? What can Servlets do? Servlet API and Lifecycle: Java Servlet API, The Servlet Skeleton, The Servlet Life Cycle, A Simple Welcome Servlet</p> <p>Working With Servlets: Getting Started, Using Annotations Instead of Deployment Descriptor.</p> <p>Working with Databases: What Is JDBC? JDBC Architecture, Accessing Database, The Servlet GUI and Database Example.</p>	15	
II	<p>Request Dispatcher: Requestdispatcher Interface, Methods of Requestdispatcher, Requestdispatcher Application. COOKIES: Kinds Of Cookies, Where Cookies Are Used? Creating Cookies Using Servlet, Dynamically Changing The Colors Of A Page SESSION: What Are Sessions? Lifecycle Of Http Session, Session Tracking With Servlet API, A Servlet Session Example</p> <p>Working With Files: Uploading Files, Creating an Upload File Application, Downloading Files, Creating a Download File Application.</p> <p>Introduction To Java Server Pages: Why use Java Server Pages? Disadvantages Of JSP, JSP v\s Servlets, Life Cycle of a JSP Page, How does a JSP function? How does JSP execute? About Java Server Pages</p> <p>Getting Started With Java Server Pages: Comments, JSP Document, JSP Elements, JSP GUI Example. Action</p>	15	

	Elements: Including other Files, Forwarding JSP Page to Another Page, Passing Parameters for other Actions, Implicit Objects, Scope And El Expressions: Implicit Objects, Character Quoting Conventions, Unified Expression Language [Unified El], Expression Language. Java Server Pages Standard Tag Libraries:	
<p>Textbooks:</p> <ul style="list-style-type: none">● Java: The Complete Reference" by Herbert Schildt● Core Java, Volume II - Advanced Features" by Cay S. Horstmann● Beginning Java EE 7" by Antonio Goncalves <p>Additional References:</p> <ul style="list-style-type: none">● Java EE Development with Eclipse" by Deepak Vohra● Effective Java EE 7● Designing Enterprise Applications with Java 2, Enterprise Edition		

Course Code	SEM – IV-Major-1 Practical	Credits	Lectures/Week
24ITMJP41	Paper I- Enterprise Java Practical	2	4
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> ● CO1-Memorize common Java libraries and packages used in enterprise development. ● CO2- Understand the principles of Java EE (Enterprise Edition) and its role in enterprise development. ● CO3- Apply Java programming skills to develop web applications using servlets and JSP. ● CO4- Analyze and debug Java code to identify and resolve issues in enterprise applications. 			
Unit			
Topic			
1	Create a simple calculator application using servlet		
2	Create a servlet for a login page. If the username and password are correct then it says message “Hello ” else a message “login failed”		
3	Create a registration servlet in Java using JDBC. Accept the details such as Username, Password, Email, and Country from the user using HTML Form and store the registration details in the database.		
4	a. Write a JDBC program that displays the data of a given table b. Write a JDBC program to return the data of a specified record from a given table c. Write a JDBC program to insert / update / delete records into a given table		
5	Using Requestdispatcher Interface create a Servlet which will validate the password entered by the user, if the user has entered "Servlet" as password, then he will be forwarded to Welcome Servlet else the user will stay on the index.html page and an error message will be displayed.		
6	a. Create a servlet that uses Cookies to store the number of times a user has visited servlet b. Create a servlet demonstrating the use of session creation and destruction. Also check whether the user has visited this page first time or has visited earlier also using sessions.		
7	a. Write a registration Servlet that accepts the data for a given table and stores it in the database. b. Write a Servlet that displays all the records of a table.		
8	Create an html page with fields, eno, name, age, desg, salary. Now on submit this data to a JSP page which will update the employee		

	table of database with matching eno.
9	<p>a. Write a JSP that accepts a User Name from a HTML form and stores it as a cookie. Write another JSP that returns the value of this cookie and displays it.</p> <p>b. Write a JSP that displays the names and values of the cookie stored on the client.</p> <p>c. Write a JSP that accepts a User Name from a HTML form and stores it as a session variable. Write another JSP that returns the value of this session variable and displays it.</p>
10	<p>a. Write a JSP code that accepts username and password from HTML file and validates the user from the database</p> <p>b. Write a registration JSP that accepts the data for a given table and stores it in the database.</p> <p>c. Write a JSP that displays all the records of a table</p>

Course Code	Major SEM IV	Credits	Lectures /Week
24ITMJ412	Paper II- Embedded System	2	2
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> ● CO1-Memorise the basics of computer architecture and microcontrollers. ● CO2-Understand the characteristics and quality attributes of embedded systems ● CO3-Use different types of sensors for appropriate systems ● CO4-Differentiate between general purpose and embedded systems 			
Unit	Topics	No of Lectures	
I	<p>Introduction:Basics of computer architecture, computer languages, RISC and CISC architectures, number systems, number format conversions, computer arithmetic, units of memory capacity.</p> <p>Embedded systems-Introduction to Embedded System, The hardware point of view Microcontroller unit(MCU), a popular 8-bit MCU, memory for embedded systems, low power design, pull up and pull down resistors</p> <p>Getting Started with Arduino: Introduction, Arduino Variants, Install the Drivers, Arduino IDE</p> <p>Basic Functions: Overview, Structure, Digital I/O Functions, Analog I/O Functions, Advanced I/O Functions, Timer Functions,Communication Functions, Interrupt Functions, Math Functions, Programming Language Reference</p>	15	
II	<p>Using Sensors with the Arduino: Light Sensitive Sensors, Temperature Sensors, Temperature and Humidity Sensor, Line-Tracking Sensor, Ultrasonic Sensors, Digital Infrared Motion Sensor, Joystick Module, Gas Sensor and others.</p> <p>Electromechanical Control Using the Arduino: DC Motor, Stepper Motor, Servo Motor</p> <p>Examples of embedded systems: Mobile phone, automotive electronics, radio frequency identification (RFID), wireless sensor networks(WISENET),Serial Peripheral Device, robotics, biomedical applications, brain machine interface.</p> <p>Case Studies:</p> <ul style="list-style-type: none"> • Air Quality Monitor Using Arduino • A Fire-Fighting Robot Using Arduino • Intelligent Lock System Using Arduino 	15	
Text Books:			
1. Lyla B Das, Embedded systems: An Integrated Approach, 1st Ed., Pearson, 2013 Reference Books:			

1. Shibu, K.V., Introduction to Embedded Systems, 1st Ed., TMH, 2009
2. Kanta Rao B, Embedded Systems, 1st Ed., PHI
3. Frank Vahid & Tony Givargis, Embedded System Design, 2nd Edition, John Wiley

Course Code	Major SEM IV	Credit	Lectures/Week
24ITMJP42	Paper II- Embedded System Practical	2	4
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> • CO1-Develop embedded application using Embedded C Programming • CO2-Choose right microcontroller with Embedded C Programming for various Applications • CO3-Apply different types of sensors for appropriate systems • CO4-Design and develop embedded systems using Arduino. 			
Unit			
Topics			
Introduction to Arduino			
1	Introduction to Arduino circuits and breadboarding Blinking of LEDs		
2	Program using Light Sensitive Sensors		
3	Program using temperature sensors		
4	Programs using humidity sensors		
5	Programs using Line tracking sensors		
6	Programs using Ultrasonic Sensors		
7	Programs using digital infrared motion sensors		
8	Programs using gas sensors		
9	Programs using servo motors		
10	Programs making Joystick with Arduino		

Course Code	SEM – VI- Minor	Credits	Lectures /Week
24ITMR421	Cryptography and Network Security	2	2
Course Outcomes:			
After successful completion of this course, students would be able to			
CO1- Define fundamental terms related to cryptography and network security, such as encryption, decryption, authentication, and key management.			
CO2- Explain the principles of encryption and how cryptographic algorithms work.			
CO3- Apply cryptographic techniques to secure data transmission and storage.			
CO4- Evaluate the effectiveness of different cryptographic algorithms in specific scenarios.			
Unit	Topic	No of Lectures	
I	Introduction to security attacks - services and mechanism - introduction to cryptography Conventional Encryption: Conventional encryption model - classical encryption techniques substitution ciphers and transposition ciphers – cryptanalysis – steganography - stream and block ciphers - Modern Block Ciphers: Block ciphers principals - Shannon’s theory of confusion and diffusion.	15	
II	Data encryption standard(DES), Principles of public key crypto systems - RSA algorithm - security of RSA - key management – Diffle-Hellman key exchange algorithm - introductory idea of Elliptic curve cryptography	15	
Textbooks:			
<ul style="list-style-type: none"> W. Stallings, Cryptography and Network Security: Principles and Practice 			
Additional References:			
<ul style="list-style-type: none"> Cryptography and Network Security Principles and Practices, Fourth Edition, WilliamStallings, PHI(Pearson) 			

Course Code	SEM – IV -Minor Practical	Credits	Lectures/Week
24ITMRP41	ITMR Cryptography Practical	2	4
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> ● CO1- Recall different types of cryptographic algorithms, including symmetric and asymmetric encryption, hashing, and digital signatures. ● CO2- Understand the role of cryptography in securing communication over computer networks. ● CO3- Configure and apply network security measures in practical scenarios. ● CO4- Evaluate the strengths and weaknesses of various cryptographic algorithms. 			
Unit			
Topic			
1	Substitution Techniques a) Write a program to perform substitution ciphers to encrypt the plain text to Caesar cipher and to decrypt it back to plain text. b) Write a program to perform substitution ciphers to encrypt the plain text to ModifiedCaesar cipher and to decrypt it back to plain text.		
2	2 Transposition Ciphers: a) Write a program to perform transposition ciphers to encrypt the plain text to cipher and to decrypt it back to plain text using rail fence technique. b) Write a program to encrypt a plain text to a cipher text and decrypt it back to plain text using vernal cipher as the transposition technique		
3	Write a program to generate asymmetric Keys for the following Cipher algorithm: DSA (Digital Signature Algorithm).		
4	Write a program to generate asymmetric Keys for the following Cipher algorithm: DH (DiffieHellman)		
5	Write a program to generate asymmetric Keys for the following Cipher algorithm: RSA.		
6	Write a program to encrypt input string by using SecretKey of the following algorithms, and then decrypt the encrypted string and compare the decrypted string with the input string. Use the following algorithms for encryption and decryption: DES		
7	Write a program to encrypt input string by using SecretKey of the following algorithms, and then decrypt the encrypted string and compare the decrypted string with the input string. Use the following algorithms for encryption and decryption: BlowFish		
8	Write a program to encrypt input string by using SecretKey of the following		

	algorithms, and then decrypt the encrypted string and compare the decrypted string with the input string. Use the following algorithms for encryption and decryption: a.RSA
9	Implement following HashFunctions: RSHash, JSHash, BKDRHash, SDBMHash, DJBHash
10	Write a program to encrypt the given string by using RC4 & MD5 algorithms.

Course Code	SEM – IV -Open Elective	Credits	Lectures /Week
24ITOE431	Paper I- E-Commerce 2	2	2
Course Outcomes: After successful completion of this course, students would be able to <ul style="list-style-type: none"> ● CO1-Know the role of electronic media in the business ● CO2-Understand the types and ways of doing business over internet ● CO3-Apply the knowledge after becoming a professional or an entrepreneur ● CO4-Analyze the security concerns while transacting using electronic media 			
Unit	Topics	No of Lectures	
I	Introduction to E-Business and E-Commerce:- Define the e-Commerce and e-Business, Define e-Commerce Types of EC transactions. Define e-Business Models. Internet Marketing and e-Tailing. Elements of e-Business Models. Explain the benefits and limitations of e-Commerce.	15	
II	E-Business applications, E-Procurement and E-Payment Systems:- Integration and e-Business suits. ERP, e-SCM, CRM, E-Payment. E-Procurement definition, processes, methods and benefits. Discuss the categories and users of smart cards. Describe payment methods in B2B EC	15	
Textbooks: <ul style="list-style-type: none"> ● Electronic Commerce: A Managerial Perspective, Turban, E. et al., Prentice Hall-2008. ● Frontiers of e-commerce, Ravi Kalakota, Pearson. Additional References: <ul style="list-style-type: none"> ● Electronic Business and Electronic Commerce Management, 2nd edition, Dave Chaffey, Prentice Hall, 2006 ● E-Learning Tools and Technologies, Horton and Horton, Wiley Publishing 			

Course Code	SEC SEM – IV	Credits	Lectures/ Week
24ITSE441	Android Mobile Programming Practical	2	4
Course Outcomes:			
After successful completion of this course, students would be able to			
<ul style="list-style-type: none"> • CO1- Learn the fundamentals of Flutter platform. • CO2- Build a cross-platform APP. • CO3- Use DART language • CO4- Deploy application with single codebase. 			
Unit			
Topics			
	Setting up Flutter, PhoneGAP Project and environment.		
1	Program to demonstrate the features of Dart language.		
2	Designing the mobile app to implement different widgets.		
3	Designing the mobile app to implement different Layouts.		
4	Designing the mobile app to implement Gestures.		
5	Designing the mobile app to implement the theming and styling.		
6	Designing the mobile app to implement the routing.		
7	Designing the mobile app to implement the animation.		
8	Designing the mobile app to implement the state management.		
9	Designing the mobile app working with SQLite Database.		
10	Designing the mobile app working with Firebase.		

Evaluation Scheme for Second Year (UG) under NEP (2 credits)

I. Internal Evaluation for Theory Courses – 20 Marks

- 1) Continuous Internal Assessment(CIA) Assignment - Tutorial/ Case Study/ Project / Presentations/ Group Discussion / Ind. Visit. – 10 marks
- 2) Continuous Internal Assessment(CIA) ONLINE Unit Test – 10 marks

II. External Examination for Theory Courses – 30 Marks

Duration: 1 Hours

Theory question paper pattern: All questions are compulsory.

Question	Based on	Marks
Q.1	Unit I	15
Q.2	Unit II	15

- All questions shall be compulsory with internal choice within the questions.
- Each Question may be subdivided into sub questions as a, b, c, d, etc. & the allocation of Marks depends on the weightage of the topic.

III. Practical Examination

- Each core subject carries 50 Marks.
- Duration: 2 Hours for each practical course.
- Minimum 80% practical from each core subjects are required to be completed.
- Certified Journal is compulsory for appearing at the time of Practical Exam

NOTE: To pass the examination, attendance is compulsory in both Internal & External (Theory + Practical) Examinations.