

**E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.**

*(An Autonomous Institution – Affiliated to Madurai Kamaraj University)*

Re-accredited (**3<sup>rd</sup> Cycle**) with Grade **A+** & **CGPA 3.51** by NAAC

## **DEPARTMENT OF COMPUTER APPLICATIONS**



### **CBCS SYLLABUS**

### **BACHELOR OF COMPUTER APPLICATIONS**

**PROGRAMME CODE - J**

### **COURSE STRUCTURE**

(w.e.f. 2021 – 2022 Batch onwards)



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## **CRITERION - I**

### ***1.2.2 Details of Programmes offered through Choice Based Credit System (CBCS) / Elective Course System***

**Syllabus copies with highlights of contents focusing on  
Elective Course System**



**To be Noted:**

HIGHLIGHTED	COURSE
<div></div>	Elective

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(w.e.f. 2021 – 2022 Batch onwards)

**COURSE STRUCTURE - SEMESTER WISE**

Sem	Part	Sub. Code	Title of the Paper	Teaching hrs (per week)	Exam Duration(hrs)	Marks allotted			Credits
						C.I.A	S.E	Total	
V	III	<b>21J51</b>	<b>Core : Operating System</b>	5	3	25	75	100	4
	III	<b>21J52</b>	<b>Core : Software Engineering</b>	6	3	25	75	100	4
	III	<b>21J53</b>	<b>Core : Python Programming</b>	5	3	25	75	100	4
	III	<b>21J5P</b>	<b>Core : Python Programming Lab</b>	5	3	40	60	100	3
	III		<b>Elective I</b>	5	3	25	75	100	5
	IV	<b>21SEJ5P</b>	<b>SBE :Dot Net Programming Lab</b>	2	3	40	60	100	2
	IV	<b>214EV5</b>	Environmental Studies	2	3	25	75	100	2
VI	III	<b>21J61</b>	<b>Core : Data Communication and Computer Networks</b>	6	3	25	75	100	4
	III	<b>21J62</b>	<b>Core : Web Technology</b>	5	3	25	75	100	4
	III	<b>21J6P</b>	<b>Core : Web Technology Lab</b>	5	3	40	60	100	3
	III		<b>Elective II</b>	5	3	25	75	100	5
	III	<b>21JEPR6</b>	<b>Elective III (Project)</b>	5	3	20	80	100	5
	IV	<b>21SEJ6P</b>	<b>SBE :Android Lab</b>	2	3	40	60	100	2
	IV	<b>214VE6</b>	Value Education	2	3	25	75	100	2

**Semester - V****Elective I (Choose any one)**

1. Computer Graphics - **21JE5A**
2. Compiler Design - **21JE5B**

**Semester - VI****Elective II (Choose any one)**

1. Data Mining - **21JE6A**
2. Internet of Things - **21JE6B**

**Elective III**

- Project - **21JEPR6**

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## CBCS

### DEPARTMENT OF COMPUTER APPLICATIONS

B.C.A

(w.e.f. 2021– 2022 Batch onwards)

#### Elective-I

<b>Title of the Paper</b>	<b>: Computer Graphics</b>	
<b>Semester</b>	<b>: V</b>	<b>Contact Hours: 5</b>
<b>Sub Code</b>	<b>: 21JE5A</b>	<b>Credits: 5</b>

#### Objectives:

To make students understand about fundamentals of Graphics to enable them to design animated scenes for virtual object creations.

#### Unit- I

**A Survey of computer graphics:** Computer –Aided Design – Presentation Graphics – Computer Art – Entertainment – Education and Training – Visualization – Image Processing – Graphical user Interfaces. **Overview of Graphics system:** Video display devices- Refresh Cathode-Ray Tubes, Raster scan Displays, Random-Scan Displays, Color CRT Monitors, Direct-View Storage Tubes, Flat - Panal Displays, Three-Dimensional Viewing Devices, Stereoscopic and Virtual-Reality Systems- Raster-Scan systems-Random-Scan systems –Graphics Monitors and Workstations-Input Devices-Hard copy devices.

#### Unit-II

**Output Primitives:** Points and lines-Line Drawing Algorithms: DDA Algorithm, Bresenham's Line Algorithm, Parallel Line Algorithms-Loading the frame buffer-Circle generating algorithms- Other curves-Pixel Addressing-Filled area primitives: Inside-Outside Tests- Boundary-Fill Algorithm -Flood-Fill Algorithm -Fill-Area Functions-Cell Array-Character Generation.

### Unit- III

**Attributes of Output Primitives:** Line attributes: Line Type, Line Width, Line Color-Color and grayscale levels-Area fill attributes-Character attributes-Bundled attributes-**Antialiasing:** Antialiasing Area Boundaries.

### Unit- IV

**Two- Dimensional Geometric Transformations:** Basic Transformations: Translation-Rotation-Scaling-Matrix representations and homogeneous coordinates-Composite transformations: Translations-Rotations-Scaling-General pivot point Rotation-General Scaling Directions-Concatenation Properties. **Structure & Hierarchical Modeling:** Structure Concepts: Basic Structure Functions– Setting Structure Attributes– Editing Structures: Structure Lists and the Element Pointer– Setting the Edit Mode-Inserting Structure Elements-Replacing Structure Elements-Deleting Structure Elements-Labeling Structure Elements. **Basic Modeling Concepts:** Model Representations- Symbol Hierarchies- Modeling Packages.

### Unit- V

**Two –Dimensional Viewing:** The Viewing Pipeline-Window-to-View port Coordinate transformation-Two-Dimensional Viewing functions-Clipping Operations-Point clipping-Line clipping: Cohen-Sutherland Line Clipping, Liang- Barsky Line Clipping, Nicholle-Lee-Nicholl Line Clipping- Line Clipping using Non Rectangular – Clip Windows – Splitting Concave Polygon - Polygon Clipping: Sutherland-Hodgeman Polygon Clipping – Weiler Atherton Polygon Clipping - Other Polygon Clipping Algorithms-Curve Clipping-Text clipping –Exterior Clipping.

### Text Book:

Donald Hearn & Pauline Baker M, *Computer Graphics C version*, Pearson Education, India, 2<sup>nd</sup> Edition, 2017.

### Chapters:

Unit - I : 1,2.1-2.6

Unit - II : 3.1,3.2,3.3, 3.5,3.7, 3.10-3.14

Unit - III : 4

Unit - IV : 5.1-5.4 , 7

Unit - V : 6

**Reference Books:**

1. Malay K. Pakhira, *Computer Graphics, Multimedia and Animation* –, Prentice Hall Of India Pvt. Ltd. , New Delhi – 2008.
2. D. P. Mukherjee, *Fundamentals Of Computer Graphics And Multimedia* Prentice Hall Of India Pvt. Ltd. , New Delhi – 1<sup>st</sup> Edition 2009.
3. Peter Shirley, *Fundamentals of Computer Graphics*, A.K. Peters Ltd, Wellesley, United States, 3<sup>rd</sup> Edition, 2009.
4. Dr. Jeffrey McConnell J , *Computer Graphics Theory into Practice* , Jones & Bartlett Publishers, Sudbury , 1<sup>st</sup> Edition , 2006.
5. Donald D. Hearn, *Computer Graphics with Open GL*, University of Illinois at Urbana-Champaign, India, 4<sup>th</sup> Edition, 2011.

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## **DEPARTMENT OF COMPUTER APPLICATIONS**

**B.C.A**

(w.e.f. 2021– 2022 Batch onwards)

### **Elective-I**

<b>Title of the Paper</b>	<b>: Compiler Design</b>	
<b>Semester</b>	<b>: V</b>	<b>Contact Hours: 5</b>
<b>Sub Code</b>	<b>: 21JE5B</b>	<b>Credits: 5</b>

#### **Objectives:**

To acquire knowledge about Compilers , Lexical Analysis , Syntax Analysis, Intermediate Code Generation, Code Generation, Code Optimization.

#### **Unit- I**

Introduction To Compilers-Introduction-What are Compilers: Analysis-Synthesis Model- Examples of Software Tools Used for Analysis-Conventional Compiler-Classification of Compilers-Analysis of source program-Phases of a Compiler: Lexical Analysis(Scanning/Scanner)-Syntax Analysis(Parsing/Parser)-Semantic Analysis-Code Optimisation-Code Generation-Symbol Table Management -Error Detection and ReportingCousins of Compiler: Preprocessor-Assemblers-Loaders-Linkers-Grouping of Phases:Front End and Back End-Passes-Reducing the Number of Passes-Compiler Construction Tools-Scanner Generator-Parser Genetator-Syntax-Directed Translation Engines-Automatic Code GeneratorData-Flow Engines Lexical Analysis -Introduction-Definition of Lexical Analysis-Role of Lexical Analyser: Issues in Lexical Analysis-Tokens, Patterns, Lexemes- Attributes for TokensLexical Errors-Panic Mode Error Recovery Strategy-Input Buffering:Buffer Methods-Buffer Pairs-Sentinels-Specification of Tokens-Recognition of Tokens:Finite AUTOMATA-NFA-DFARegular Expression to NFA-Conversion of NFA to DFA-Minimisation of DFA Optimisation of DFA from Regular Expression-LEX Tool-Declarations-Transition Rules-Auxiliary Procedures- Lexical Library.

**Unit- II**

Syntax Analysis-Introduction-Role of the Parser:Error Handling-Error Recovery Strategies-Writing Grammars-Grammars-Definition-Type of Grammar-Context-free-grammar-A Production(Productions for A)-Derivations using a Grammar-Notations for CFG-Sentential Forms-Parse Tree (Derivation tree)-Yield of Parser Tree. Parsing-Introduction-Types of Parsing:Top down Parsing(LI(K))-Bottom up Parsing(LR(K))-Shift Reduce Parsing-Operator Precedence Parsing:Detailed Steps for Solving Operator Precedence Parsing Problems-Error Recovery in Operator Precedence Parsing-Handling Errors during Reductions-LR Parsers:SLR Parser-Canonical LR Parser-LALR Parser.

**Unit- III**

Intermediate Code Generation-Introduction-Generation of Intermediate Code:Representation of intermediate language-Types of three address statement-Implementation of three address Code-styles of syntax directed Translations-Declarations:Declaration in a procedure- Translation scheme for declaration in a procedure-Declaration in nested proceduresAssignment statement: Syntax directed translation scheme Ready using Temporary names- Addressing array elements- Boolean Expression:Numerical representation-Flow of control statements - Case Statements - Backpatching-Procedural calls-Calling the Procedure - Type Conversion

**Unit- IV**

Code Generation-Issues in the Design of Code Generator : Input to the code Generator Target programs-Memory management -Instruction Selection - Register Allocation -Evaluation Order - The Target machine -Runtime Storage Management: Static allocation -Stack allocation - Basic Blocks and flow Graphs: Basic Block -Transformation on Basic Block - Flow graph - Loops-Next use Information -A Simple Code Generator : Code Generation- Code Generation Algorithm - Register and Address Descriptors-Function Gatereg()-Conditional Statements -DAG Representation of Basic Blocks: DAG for Basic Block - DAG Construction -Applications of DAGS-Peepphole Optimisation : Definition Goals-Method

**Unit- V**

Code Optimisation - Introduction : Criteria for code Improving Transformation Getting Better Performance -An Organisation for an Optimising Compiler - Principal sources of optimisation : function -Preserving Transformations -loop Optimisation -Optimisation of Basic Blocks: Basic Blocks-Basic Block Optimisation -Building Expression DGAs-Introduction to Global Data Flow Analysis: Point and paths-Reaching Definitions-Global Data Flow Analysis

Dataflow Analysis of Structured Programs-Dataflow Equations for Reaching DefinitionsComputation of "gen" and "kill" - Computation of "in" and "out"-Dealing with loops Representation of sets.

**Text Book:**

Dr.R.Venkatesh, Dr.N.Uma Maheshwari,Ms.S.Jeyanthi, Compiler Design, Published by Yes Dee Publishing Pvt Ltd,India,2015.

**Chapters:**

Unit- I : 1.1 to 1.7, 2.1 to 2.8.

Unit- II: 3.1 to 3.5, 4.1 to 4.5.

Unit- III: 5.1 to 5.9.

Unit- IV: 6.1 to 6.9.

Unit- V: 7.1 to 7.4.

**Reference Books:**

1. Alfred V.Aho , Ravi sethi Jeffrey D.Ullman , Compilers Principles , Techniques and Tools Pearson Education, 3rd Edition, 2007.
2. D.Chithra , Principles of Compiler Design , CBS , 2nd Edition , 2011.
3. Alfred V.Aho , Ravi Sethi Jeffrey D.Ullman , Compilers Principles , Techniques and Tools , Darling Kindersley ( India ) , 1st Edition , 2007.
4. Sandeep Saxena and Rajkumar Singh Rathore , Compiler Design , S.Chand and Co Ltd. , 2nd Edition , 2013.
5. Aho, Ravi Sethi , Ullman , Compilers , Narosa Publishing House , 2nd Edition , 2006

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## CBCS

### DEPARTMENT OF COMPUTER APPLICATIONS

B.C.A

(w.e.f. 2021– 2022 Batch onwards)

#### Elective-II

**Title of the Paper** : Data Mining  
**Semester** : VI  
**Sub Code** : 21JE6A

**Contact Hours: 5**  
**Credits: 5**

#### Objectives:

To acquire knowledge about retrieval of data from voluminous data in a desired manner, Association Rules, Decision Trees, Clustering Techniques.

#### Unit-I

**Introduction:** Basic Data Mining –Data Mining Versus Knowledge Discovery in Databases – Data Mining Issues – Data Mining Metrics – Social Implications of Data Mining – Data Mining from a Database Perspective. **Related Concepts:** Database / OLTP Systems – Fuzzy Sets and Fuzzy Logic – Information Retrieval – Decision Support Systems – Dimensional Modeling – Data Warehousing – OLAP.

#### Unit-II

**Data Mining Techniques:** Introduction – A Statistical Perspective on Data Mining – Similarity Measures – Decision Tress – Neural Networks – Genetic Algorithms. **Classification:** Introduction – Statistical-Based Algorithms –Distance-Based Algorithms –Decision Tree-Based Algorithms.

#### Unit-III

**Clustering:** Introduction – Similarity and Decision Measures – Outliers – Hierarchical Algorithms – Partitional Algorithms – Clustering Large Databases – Clustering with Categorical Attributes.

**Unit-IV**

**Association Rules:** Introduction – Large Itemsets –Basic Algorithms – Parallel and Distributed Algorithms. **Web Mining:** Introduction – Web Content Mining - Web Structure Mining.

**Unit-V**

**Spatial Mining:** Introduction – Spatial Data Overview – Spatial Data Mining Primitives – Generalization and Specialization – Spatial Classification Algorithms – Spatial Clustering Algorithm. **Temporal Mining:** Introduction – Modeling Temporal Events – Time Series.

**Text Book:**

Margaret H. Dunham, S.Sridhar, *DataMining: Introductory and Advanced Topics*,  
Published by Pearson Education, 1<sup>st</sup> Edition, 2004.

**Chapters:**

Unit I	: 1.1 to 1.6, 2.1. to 2.7.
Unit II	: 3.1 to 3.6, 4.1 to 4.4.
Unit III	: 5.1 to 5.7.
Unit IV	: 6.1 to 6.4, 7.1 to 7.3.
Unit V	: 8.1 to 8.4, 8.6, 8.7, 9.1 to 9.3

**Reference Books:**

1. Arun K.Pujari, *Data Mining Techniques* , Universities press, 3<sup>rd</sup> Edition, 2013.
2. S.K. Mourya, Shalu Gupta, *Data Mining and Data warehousing* , Narosa Publishing House Private Ltd , 1<sup>st</sup> Edition , 2013.
3. Jiawei Han & Micheline Kamber, *Data Mining Concepts & Techniques*, Morgan Kaufmann Publishers, San Francisco, USA, 2<sup>nd</sup> Edition, 2010.
4. Margaret Dunham H & Sridhar S, *Introductory and Advanced topics in Data Mining*, Pearson Education, New Delhi, 2<sup>nd</sup> Edition, 2016.
5. G. K. Gupta, “*Introduction To Data Mining With Case Studies*”, Eastern Economy Edition, Prentice Hall Of India, 2<sup>nd</sup> Edition 2011.

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(w.e.f. 2021– 2022 Batch onwards)

**Elective-II**

<b>Title of the Paper</b>	<b>: Internet of Things</b>	
<b>Semester</b>	<b>: VI</b>	<b>Contact Hours: 5</b>
<b>Sub Code</b>	<b>: 21JE6B</b>	<b>Credits: 5</b>

**Objectives:**

The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time. It's becoming the Internet of Things (IoT).

**Unit –I**

**Introduction of Internet of Things:** Introduction – Physical design of IoT – Logical Design of IoT – IoT Enabling Technologies IoT Levels & Deployment Templates. – **Domain Specific IoTs:** Introduction – Home Automation – Cities – Environment - Energy.

**Unit – II**

**IoT and M2M:** Introduction – M2M – Difference between IoT and M2M – SDN and NFV for IoT. **IoT System Management with NETCONF-YANG:** Need for IOT Systems Management Protocol (SNMP) – Network Operator Requirements – NETCONF – YANG – IoT Systems Management with NETCONF-YANG.

**Unit – III**

**IoT Platforms Design Methodology:** Introduction – IoT Design Methodology. **IoT Systems – Logical Design using Python:** Introduction – Installing Python – Python Data Types & Data Structures – Control Flow – Functions – Modules – Packages – File Handling.

## Unit –IV

**IoT Physical Devices & Endpoints:** What is an IoT devices – Exemplary Device: Raspberry Pi – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python – Other IoT Devices. **IoT Physical Services & Cloud Offerings:** Introduction to Cloud Storage Models & Communication APIs – Wamp-Auto Bahn for IOT – Xively Cloud for IoT – Python Web Application Framework–Django – Designing a RESTful Web API – Amazon Web Services for IoT.

## Unit-V

**Data Analytics for IOT:** Introduction – Apache Hadoop – Using Hadoop MapReduce for Batch data Analysis – Apache Oozie – Apache Spark – Apache Storm. **Tools for IoT:** Introduction – Chef – Chef Case Studies – Puppet –Puppet Case Study – Multi-tier Deployment.

### Text Book:

Arshdeep Bahga, Vijay Madiseti.,*Internet of Things* , Universities Press (India)  
Private Ltd ,1 st Edition , 2017.

### Chapters:

Unit - I : 1.1 to 1.5, 2.1 to 2.5  
Unit - II : 3.1 to 3.4, 4.1 – 4.5  
Unit - III : 5.1, 5.2, 6.1 – 6.8  
Unit - IV : 7.1, 7.2,7.4 – 7.7  
Unit - V : 10.1 to 10.6, 11.1 – 11.5

### Reference Books:

1. Jamil Y. Khan and Mehmet R. Yuce, *The Internet of Things, Systems and Applications*, Jenny Stanford Publishing , 1 st Edition ,2019.
2. Pethuraj and Anupama C. Raman, *The Internet of Things*, CRC Press,An Auerbach Book, 2017.
3. AdrianMcEwen & HakimCassimally, *Designing , The Internet of Things*, Willey Publication, 1 st Edition, 2014.
4. Pradeeka seneviratne, *Hands – on Internet of Things with Blynk*, Packt Publishing, 2018.
5. Sean Smith, *The Internet of Risky Things: Trusting the Devices that Surround us*, O'Reilly Media, 1 st Edition 2017

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## **DEPARTMENT OF COMPUTER APPLICATIONS**

**B.C.A**

**(w.e.f. 2021– 2022 Batch onwards)**

### **Elective-III**

<b>Title of the Paper</b>	<b>: Project</b>	
<b>Semester</b>	<b>: VI</b>	<b>Contact Hours: 5</b>
<b>Sub Code</b>	<b>: 21JEPR6</b>	<b>Credits: 5</b>

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The students are allowed to develop their project within our campus with the help of the internal staff members.

In the first review the students submit their title of the project and synopsis, and also submit the determination of the modules.

In the second review 50% of the project is completed and demonstrate the project.

In the final review the students prepare the PowerPoint presentation. The oral is must for the completion of the project.

This report will be valuated 80marks for external examiner and 20marks for internal examiner.