

POLYTECHNIC ENGINEERING

Sri Satya Sai University of Technology And Medical Sciences, Sehore (M.P.)

Syllabus of Examination - AICTE Pattern

Undergraduate Diploma Courses in Engineering & Technology

Department of Computer Science and Engineering

Semester-VI

| | |
|-------------------|--|
| Course Code | DCSA-601 |
| Course Title | Computer Graphics Multimedia and Animation |
| Number of Credits | 4 (L:3; T:1; P:0) |

Course Objectives:

- To understand the basic concepts of computer graphics and multimedia elements such as images, audio, and video.
- To develop skills in creating and applying animation techniques using appropriate software tools.

Course outcomes:

- 1 Understand the fundamentals of computer graphics, including hardware components and display devices.
- 2 Apply algorithms for drawing basic graphics primitives such as lines, circles, and polygons.
- 3 Perform geometric transformations and clipping operations in 2D and 3D graphics.
- 4 Analyze and implement different projection techniques for viewing 3D objects.
- 5 Understand color models, shading techniques, and illumination methods for realistic image rendering.

UNIT 1:

Introduction to Computer Graphics o Definition of Computer Graphics o Application of Computer Graphics o Graphics Hardware o Input and Output Devices o Display Devices o Refreshing Display Devices • Raster-Scan • Random-Scan

UNIT 2:

Graphics Primitives: o Points and Lines o Line-drawing Algorithms DDA •Algorithm • Bresenham's line Algorithm o Circle-generating Algorithm • Midpoint Circle of Algorithm o Polygon Filling Algorithm: Scan-Line

UNIT 3:

Transformation, 2-D Viewing and Clipping • Basic Transformations (2D and 3D) o Translation o Rotation o Scaling o Shear o Reflection • Composite Transformations o Rotations about a point•Reflection about a line•Homogeneous Coordinate Systems • Clipping Point Clipping Line Clipping -Cohen-Sutherland Clipping algorithm. Polygon Clipping: Sutherland Hodgeman Algorithm

UNIT 4:

Projection • Parallel Projection: Orthographic, Axonometric, Oblique • Perspective Projection: Standard Perspective Projection General Perspective Projection, Vanishing Points

UNIT 5:

Shading, Colour model and Illumination • Chromaticity diagram- RGB, CMY, HSV, HLS, CIE models- • Realism in rendering, • Image manipulation: Illumination models, shading models for polygons, Gouraud and Phong shading, shadows, Transparency, Image Filtering, image processing, geometric Transformation of images.

Reference Books:

- Computer Graphics, Multimedia and Animations by Malay K. Pakhira, PHI Learning.
- Computer Graphics by Donald Hearn and M.Pauline Baker, PHI
- Computer Graphics Principles and Practices second edition by James D. Foley, Andeies van Dam, Stevan K. Feiner and John F. Hughes, 2000, Addison Wesley.
- Introduction to Computer Graphics By N. Krishnamurthy T.M.H
- Graphics, GUI, Games & Multimedia Projects in C by Pilia & Mahendra, Standard Pub

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| Course Code | DCSA-601 |
| Course Title | Computer Graphics Multimedia and Animation lab |
| Number of Credits | 1 (L:0; T:0; P:2) |

Course outcomes:

1. CO1:

Understand and implement basic raster graphics algorithms such as line drawing (DDA/Bresenham) and circle drawing algorithms.

2. CO2:

Apply polygon filling techniques (such as scan-line and seed fill) to render solid 2D objects.

3. CO3:

Analyze and implement clipping algorithms including line clipping (e.g., Cohen–Sutherland) and polygon clipping.

4. CO4:

Develop programs for 2D and 3D transformations, including translation, rotation, scaling, and perspective projection.

5. CO5:

Design simple computer graphics applications, including animation (shape transformation), bitmap image display, and multimedia handling (audio playback).

List of practical to be performed:

1. Write a program for 2D line drawing as Raster Graphics Display.
2. Write a program for circle drawing as Raster Graphics Display.
3. Write a program for polygon filling as Raster Graphics Display
4. Write a program for line clipping.
5. Write a program for polygon clipping.
6. Write a program for displaying 3D objects as display
7. using perspective transformation.
8. Devise a routine to produce the animation effect of a square
9. transforming to a triangle and then to a circle
10. Write a program to show a bitmap image on your computer screen.
11. Write a program to play “wave” or “midi” format sound files.

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| | |
|-------------------|------------------------------------|
| Course Code | DCSA-602 |
| Course Title | Elective IV (A-Dot Net Technology) |
| Number of Credits | 4 (L:3; T:1; P:0) |

Course Objectives:

To develop the ability to design and build dynamic, data-driven web applications using ASP.NET, ADO.NET, and XML technologies within the .NET framework.

Course outcomes:

CO1 Understand the architecture of the .NET framework and develop basic web applications using ASP.NET web forms and controls.

CO2 Apply ASP.NET objects (Response, Session, Application, Server) and manage state handling in web applications.

CO3 Develop database-driven applications using ADO.NET for data access, manipulation, and data binding.

CO4 Implement transaction handling and create web applications capable of sending emails.

CO5 Work with XML in ASP.NET, including parsing, validation, transformation, and integration with datasets.

UNIT 1:

Introduction to .NET Introduction to Microsoft.Net Framework, Building blocks in .Net, Drawback of previous languages, Understand .Net, Common language runtime (CLR), Common type system (CTS), Difference between ASP and ASP. Net, Introduction to IIS, web application and it's usage, ASP.Net IDE Visual studio .Net, Creation of web forms, Using web form controls.

UNIT 2 :

ASP.Net Objects and components Response object, Server object, Application object, Session object, ASP.Net scope, state, view state, post back and configuration, Object Creation: Scripting, Drive, Folder, File, Use of object, Server Components: Ad Rotator, Content Linker, Browser Capabilities Use and Creation of global.asa file, Application object: Events, Methods and collections, Example, Session object: Enabling and disabling of session, Event, Properties, Method, Collection.

UNIT 3:

ADO.Net ADO.Net in ASP. Net: Connection, Dataset and data reader, Data table and data row, Web.config introduction, Binding data with data grid, Accessing and manipulating data, ADO .Net: Server control templates and data binding techniques, Data access in .Net using ADO.Net,

UNIT 4:

ASP Transactions and e-mail Transactions, Transaction db design, CDONTS object, Email sending web page creation

UNIT 5:

5 Working with XML in ASP.NET Basics of XML, XML support in .NET, XML Validation Overview, XML Parsing API's in .NET, Parsing XML with the XmlTextReader, Parsing XML using DOM Objects, Generating XML with the XmlTextWriter, Introduction to XSLT, Transforming XML using .NET's XSLT classes, Viewing relational data as XML, Dataset XML Properties and Methods, Using the XmlDataDocument Class Syncing between DataSets and XmlDataDocuments.

Reference Books:

- 1) G. Andrew Duthie Microsoft ASP.Net ,Step, Microsoft .Net
- 2) Programming with C# .NET by J.G. R. Sathiaseelan and N. Sasikaladevi ,PHI Learning
- 3) Stephen Walther, ASP.Net Unleashed, SAMS
- 4) Microsoft ASP.NET 4.0 Step by Step by Shepherd, PHI Learning
- 5) Jesse Liberty, Dan Hurwitz-Programming ASP.Net 6) Dave Mercer-ASP.Net,TMH

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Undergraduate Diploma Courses in Engineering & Technology

Department of Computer Science and Engineering

Semester-V

| | |
|-------------------|---|
| Course Code | DCSA-602 |
| Course Title | Elective IV (B-Data Mining and Data Warehousing) |
| Number of Credits | 4 (L:3; T:1; P:0) |

Course Objectives:

To provide knowledge of data mining concepts, techniques, and tools (like Weka) for extracting meaningful patterns and insights from large datasets.

Course outcomes:

CO1 Understand the fundamentals of data mining, including its techniques, applications, and challenges.

CO2 Apply data preprocessing methods and data warehousing concepts for efficient data analysis.

CO3 Use the Weka tool for data visualization, preprocessing, and performing basic data mining tasks.

CO4 Analyze and implement association rule mining techniques, including the Apriori algorithm.

CO5 Apply clustering techniques such as K-means and evaluate their performance for data analysis.

UNIT 1:

FUNDAMENALS OF DATA MINING

1.1 Data mining 1.2 The history of the data mining 1.3 Data Mining strategies 1.4 Popular data mining techniques 1.5 Data mining applications 1.6 Challenges of data mining 1.7 The future of data mining.

UNIT 2:

DATA PROCESSING AND DATA WAREHOUSING

2.1 Data, information and knowledge 2.2 Types of data 2.3 Data warehouses 2.4 Data cleaning 2.5 Data de-normalization 2.6 Data transformation 2.7 Data quality measure 2.8 OLAP(Online Analytical Processing) 2.9 Data Sampling

UNIT 3:

WEKA AN ATTRACTIVE DATA MINING TOOL

3.1 Introduction 3.2 Installing Weka 3.3 Weka data file format 3.4 Starting Weka 10 3.5 Data Visualization 3.5 Data filtering 3.6 Selecting Attributes 3.7 Data Mining with Weka

UNIT 4:

ASSOCIATION RULE MINING

4.1 Transaction data 4.2 Concepts of association rules 4.3 Relevance of association rule mining 4.4 Functions of association rule mining 4.5 Improvement and share 4.6 The problem of large datasets 4.7 Apriority algorithm 4.8 Strengthens and weakness of Association Rule Mining 4.9 Application of Association Rule Mining

UNIT 5:

THE CLUSTERING TASK

5.1 Introduction 5.2 Distance Measure 5.3 Types of clustering 5.4 Clustering through Weka: K-Means algorithms 5.5 Clustering Validation 5.6 Strengthens and weakness of Clustering algorithms 5.6 Applications of Clustering algorithms

Reference Books:

1. Data Mining and Data Warehousing by Bharat Bhushan Agarwal

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Semester-VI

| | |
|-------------------|---|
| Course Code | DOEA-603 |
| Course Title | Elective – II (A Artificial Intelligence) |
| Number of Credits | 4 (L:3; T:1; P:0) |

Course Objectives

1. To develop an understanding of intelligent agents and environments, including their types, behaviors, and properties.
2. To provide foundational knowledge of AI methodologies, including search algorithms, fuzzy logic systems, and neural networks, and how these can be applied to problem-solving.

Course outcomes:

At the end of the course, the student will be able to:

CO1: Define Artificial Intelligence, describe its goals, and outline its historical evolution and applications in various fields.

CO2: Analyze the types and characteristics of intelligent agents and the environments in which they operate.

CO3: Apply various search algorithms, including brute-force and heuristic strategies, to solve real-world AI problems.

CO4: Explain the working of fuzzy logic systems, including membership functions, fuzzification, and defuzzification processes.

CO5: Describe the structure and functioning of neural networks and implement basic models like the perceptron for classification tasks.

Unit 1 – Introduction to Artificial Intelligence

- Artificial Intelligence (AI) definition
- Goals of AI
- History of AI
- Applications of AI

Unit 2 – Agents and Environments

- Agent Terminology, Types of Agents – Simple Reflex Agents, Model Based Reflex Agents, Goal Based Agents
- Nature of Environments, Properties of Environments

Unit 3 – Search Algorithms

Terminology

- Brute Force Search Strategies – Breadth First Search, Depth First Search.
- Heuristic Search Strategies, Local Search Algorithms.

Unit 4 – Fuzzy Logic Systems

Introduction to Fuzzy Logic and Fuzzy systems,

- Membership functions,
- Fuzzification/Defuzzification

Unit 5 – Neural Networks

Basic structure of Neural Networks

- Perceptron
- Back-propagation

Suggested Learning Resources:

Artificial Intelligence By Example: Develop machine intelligence from scratch using real artificial intelligence use cases Denis Rothman Packt Publishing ISBN – 978-1788990547

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|-------------------|---|
| Course Code | DOEA-603 |
| Course Title | Elective – II (B Renewable Energy Technologies) |
| Number of Credits | 4 (L:3; T:1; P:0) |

Course Objectives

Maintain the renewable energy technology equipment.

Course outcomes:

At the end of the course, the student will be able to:

CO1: Explain the working principles, construction, and site-specific implications of various ocean energy technologies such as tidal, wave, marine current, and OTEC systems.

CO2: Analyze different types of solar energy systems, including PV and concentrated solar power technologies, and evaluate their components, layout, and functioning.

CO3: Compare the configurations and components of large wind power plants and differentiate between constant speed and variable speed generator systems.

CO4: Illustrate the working of small wind turbines of various types and describe installation methods and suitable electric generators for rooftop and field applications

CO5: Evaluate the properties of biomass fuels and describe the layout and functioning of biochemical, thermochemical, and agrochemical biomass-based power plants.

Unit – I Ocean Energy Technologies

Ocean energy map of India and its implications; Specification, Construction and working of the following ocean energy technologies:

- Tidal power technologies
- Wave power technologies
- Marine current technologies
- Ocean Thermal Energy Conversion (OTEC) technologies

Unit – II Solar PV and Concentrated Solar Power Plants

- Solar Map of India: Global solar power radiation, Solar PV
- Concentrated Solar Power (CSP) plants, construction and working of: Power Tower, Parabolic Trough, Parabolic Dish, Fresnel Reflectors
- Solar Photovoltaic (PV) power plant: components layout, construction, working.
- Rooftop solar PV power system

Unit – III Large Wind Power Plants

Wind Map of India: Wind power density in watts per square meter, Lift and drag principle; long path

theory, Geared type wind power plants: components, layout and working, Direct drive type wind power plants: components, layout and working, Constant Speed Electric Generators: Squirrel Cage Induction Generators (SCIG), Wound Rotor Induction Generator (WRIG), Variable Speed Electric Generators: Doubly-fed induction generator (DFIG), wound rotor synchronous generator (WRSG), permanent magnet synchronous generator (PMSG).

Unit– IV Small Wind Turbines

Horizontal Unit– IV Small Wind Turbines

- Horizontal axis small wind turbine: direct drive type, components and working.
- Horizontal axis small wind turbine: geared type, components and working.
- Vertical axis small wind turbine: direct drive and geared, components and working.
- Types of towers and installation of small wind turbines on roof tops and open fields.
- Electric generators used in small wind power plants.

Unit– V Biomass-based Power Plants

- Properties of solid fuel for biomass power plants: bagasse, wood chips, rice husk, municipal waste.
- Properties of liquid and gaseous fuel for biomass power plants: Jatropha, bio-diesel gobar gas.
- Layout of a Bio-chemical based (e.g. biogas) power plant.
- Layout of a Thermo-chemical based (e.g. Municipal waste) power plant.
- Layout of a Agro-chemical based (e.g. bio-diesel) power plant.

Reference Books:

1. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi
2. Neill, Simon P.; Hashemi, M. Reza: Fundamentals of Ocean Renewable Energy: Generating Electricity from the Sea, Academic Press, ISBN:978-0-12-810448-4
3. David M. Buchla, Thomas E. Kissell, Thomas L. Floyd, Renewable Energy Systems, Pearson Education New Delhi , ISBN: 9789332586826,
4. Rachel, Sthuthi, Earnest, Joshua; -Wind Power Technologies, PHI Learning, New Delhi, ISBN: 978-93-88028-49- 3; E-book 978-93-88028-50-9
5. Deambi, Suneel: From Sunlight to Electricity: a practical handbook on solar photovoltaic application; TERI, New Delhi ISBN:9788179935736
6. Gipe, Paul: Wind Energy Basics, Chelsea Green Publishing Co; ISBN: 978-1603580304
7. Wizelius, Tore, Earnest, Joshua - Wind Power Plants and Project Development, PHI Learning, New Delhi, ISBN:978-8120351660
8. Kothari, D.P. et al: Renewable Energy Sources and Emerging Technologies, PHI Learning, New Delhi, ISBN: -978-81-203-4470-9
9. Bhadra, S.N., Kastha, D., Banerjee, S, Wind Electrical Systems installation; Oxford University Press, New Delhi, ISBN: 9780195670936.

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| | |
|-------------------|--------------------------------|
| Course Code | DHSA - 604 |
| Course Title | Entrepreneurship and Start-ups |
| Number of Credits | 3 (L:3; T:0; P:0) |

Course Objectives:

1. Acquiring Entrepreneurial spirit and resourcefulness.
2. Familiarization with various uses of human resource for earning dignified means of living.
3. Understanding the concept and process of entrepreneurship - its contribution and role in the growth and development of individual and the nation.
4. Acquiring entrepreneurial quality, competency, and motivation.
5. Learning the process and skills of creation and management of entrepreneurial venture.

Course Outcome:

At the end of the course, the student will be able to:

1. Understanding the dynamic role of entrepreneurship and small businesses
2. Organizing and Managing a Small Business
3. Financial Planning and Control
4. Forms of Ownership for Small Business
5. Strategic Marketing Planning

Unit 1 - Introduction to Entrepreneurship and Start – Ups

- Definitions, Traits of an entrepreneur, Intrapreneurship, Motivation
- Types of Business Structures, Similarities/differences between entrepreneurs and managers.

Unit 2 – Business Ideas and their implementation

- Discovering ideas and visualizing the business
- Activity map
- Business Plan

Unit 3 – Idea to Start-up

- Market Analysis – Identifying the target market,
- Competition evaluation and Strategy Development,
- Marketing and accounting,
- Risk analysis

Unit 4 – Management

- Company's Organization Structure,
- Recruitment and management of talent.
- Financial organization and management

Unit 5 - Financing and Protection of Ideas

- Financing methods available for start-ups in India
- Communication of Ideas to potential investors – Investor Pitch
- Patenting and Licenses.

Reference Books:

1. The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company Steve Blank and Bob Dorf K & S Ranch
2. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses Eric Ries Penguin UK ISBN – 978-0670921607
3. Demand: Creating What People Love Before They Know They Want It Adrian J . Slywotzky with Karl Weber Headline Book Publishing ISBN – 978-0755388974
4. The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business Clayton M. Christensen Harvard business

SUGGESTED SOFTWARE/LEARNING WEBSITES:

- a. <https://www.fundable.com/learn/resources/guides/startup>
- b. <https://corporatefinanceinstitute.com/resources/knowledge/finance/corporatestructure/>
- c. <https://www.finder.com/small-business-finance-tips>
- d. <https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/>

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| | |
|-------------------|--------------------------------------|
| Course Code | DCSA - 606 |
| Course Title | Major Project-II (Project Execution) |
| Number of Credits | 3 (L:2; T:0; P:6) |

Course Objectives:

To design and develop a real-world software system by applying core computer science concepts, tools, and technologies, demonstrating problem-solving, teamwork, and project management skills.

Course Outcomes

CO1: Understand and analyze real-world problems and convert them into software requirements.

CO2: Design system architecture using appropriate models and tools.

CO3: Develop efficient software solutions using suitable programming languages and frameworks.

CO4: Apply testing techniques to ensure functionality, reliability, and performance of the system.

CO5: Demonstrate teamwork, documentation skills, and presentation of the developed project effectively.

Guidelines

- Choose a relevant and practical problem
- Define objective, scope, and plan
- Use appropriate technology stack
- Prepare design diagrams (UML/ER)
- Write clean and modular code
- Perform testing and debugging
- Create proper documentation & report
- Give clear presentation and demo
- Ensure team participation

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Semester-VI

| | |
|-------------------|---------------------|
| Course Code | DEA - 607 |
| Course Title | Indian Constitution |
| Number of Credits | 0 (L:2; T:0; P:0) |

Unit 1 – The Constitution - Introduction

- The History of the Making of the Indian Constitution
- Preamble and the Basic Structure, and its interpretation
- Fundamental Rights and Duties and their interpretation
- State Policy Principles

Unit 2 – Union Government

- Structure of the Indian Union
- President – Role and Power
- Prime Minister and Council of Ministers
- Lok Sabha and Rajya Sabha

Unit 3 – State Government

- Governor – Role and Power
- Chief Minister and Council of Ministers
- State Secretariat

Unit 4 – Local Administration

- District Administration
- Municipal Corporation
- Zila Panchayat

Unit 5 – Election Commission

- Role and Functioning
- Chief Election Commissioner
- State Election Commission

Reference Books:

1. Ethics and Politics of the Indian Constitution Rajeev Bhargava Oxford University Press, New Delhi,2008
2. The Constitution of India B.L. Fadia Sahitya Bhawan; New edition (2017)
3. Introduction to the Constitution of India DD Basu Lexis Nexis; Twenty-Third 2018 edition

Suggested Software/Learning Websites:

- a. <https://www.constitution.org/cons/india/const.html>
- b. <http://www.legislative.gov.in/constitution-of-india>
- c. <https://www.sci.gov.in/constitution>
- d. <https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/>

