Rajiv Gandhi ProudyogikiVishwavidyalaya, Bhopal

New Scheme of Examination as per AICTE Flexible Curricula

III Semester Bachelor of Technology (B.Tech.)

[3 D Animation & Graphics]Syllabus

ES301ENERGY & ENVIRONMENTAL ENGINEERING

Course Objective: The objective of this course is to provide an introduction to energy systems and renewableenergy resources, with a scientific examination of the energy field and an emphasis onalternative energy sources and their technology and application.

Unit IIntroduction to Energy Science: Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment; Overview of energy systems, sources, transformations, efficiency, and storage; Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems; possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries)

Unit IIEcosystems: Concept of an ecosystem; Structure and function of an ecosystem; Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystem (a.)Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit IIIBiodiversity and its conservation: Introduction – Definition: genetic, species and ecosystem diversity; Bio-geographical classification of India; Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, National and local levels; India as a mega-diversity nation; Hot-sports of biodiversity; Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and endemic species of India; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit IVEnvironmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soilpollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards; Solidwaste Management: Causes, effects and control measures of urban and industrialwastes; Role of an individual in prevention of pollution; Pollution case studies;Disaster management: floods, earthquake, cyclone and landslides

Unit VSocial Issues and the Environment: From Unsustainable to Sustainable development; Urban problems related to energy;Water conservation, rain water harvesting, watershed management; Resettlement andrehabilitation of people; its problems and concerns.
Case Studies- Environmental ethics: Issues and possible solutions. Climate change, global warming,acid rain, ozone layer depletion, nuclear accidents and holocaust.
Case Studies- Wasteland reclamation; Consumerism and waste products; Environment ProtectionAct; Air (Prevention and Control of Pollution) Act; Water (Prevention and control ofPollution) Act; Wildlife Protection Act; Forest Conservation Act; Issues involved inenforcement of environmental legislation; Public awareness.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

Field work

- Visit to a local area to document environmental assets river/forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

References-

1. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc.
2. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB).
3. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001,Environmental Encyclopedia, Jaico Publ. House, Mumabai,
4. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
5. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliancesand Standards', Vol I and II, Enviro Media (R)
6. Boyle, Godfrey, Bob Everett, and Janet Ramage (Eds.) (2004), Energy Systemsand Sustainability: Power for a Sustainable Future. Oxford University Press.
7. Schaeffer, John (2007), Real Goods Solar Living Sourcebook: The CompleteGuide to Renewable Energy Technologies and Sustainable Living, Gaiam

Course Outcomes:

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

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

AG302 -MULTIMEDIA SYSTEMS

Course Objective:
The objective of this course is to introduce the fundamentals of Multimedia and its components.

Unit I
Fundamentals: Multimedia, Multimedia Objects, Multimedia in business and work, Multimedia hardware- Processor, capture devices like video camera, video recorder, graphic tablets, digitizing / sampling hardware, tactile sensors, VR Devices, Memory & Storage devices- primary, secondary, flash memory, Input devices- keyboard, mouse, joystick, light pen , track ball, scanner, digitizer, MICR, OCR, Barcode readers, OMR, Voice systems- microphone, speaker,3D input devices, Output devices- monitors and its types, Printers and its types

Unit II
Sound/Audio: Perception of sound, hearing sensitivity, frequency range, sound- wave length, the speed of sound. measuring the sound, musical sounds, noise signal, dynamic range, pitch, harmonics-equalization- reverberation time, Sound isolation and room acoustics- treatments- studio layout –room dimensions. The Basic set-up of recording system; The production chain and responsibilities. Microphones types -phantom power, noise, choosing the right mike; Mixing console; Input devices; Output devices; Audio Publishing

Unit III
Graphics/Image: Image file formats and how and where it is used, Principles of animation,2D and 3D animation, Morphing, Kinematics, tweening, Motion capture, character animation, modeling, special effects, and compositing, Video Conferencing, Web Streaming, Video Streaming, Internet Telephony - Virtual Reality - Artificial intelligence.

Unit IV
Video and Camera: Video FileFormats, Analog Editing, Editing Equipment's and Consoles, Video Signal, various video standards, Analogue and Digital camera, About lenses-viewing and monitoring, Types of Films - various storage media - Types of lights - video lights - cine lights – reflectors - Digital Video Camera- Types Format-Major Components, Operation and Functions, Aperture Shutter, Focusing Methods, Focal Length, Depth of Field

Unit V
Post Production: Post production setup, Architecture of a sound card, capturing card - Media systems - Linear editing ,Nonlinear editing, Video mixers and its functions, effects – plugins; Various display devices - personal, retail, corporate - LCD - Plasma - Media servers- Streaming - Graphic cards - video games - various mobile devices -narrow casting protocols - personal casting devices, Emerging Fields in Multimedia Technology , Multimedia tools and its classification.

References-

1. Tay Vaughan, Multimedia: Making it Work, 9th Edition, McGraw Hill Education
2. Ranjan Parekh, Principles of Multimedia, 2nd Edition, McGraw Hill Education.

Course Outcomes:
After the completion of this course, the students will be able to:

1. Define Multimedia and its components
2. Use the knowledge of sound recording setup in multimedia projects
3. Understand and use knowledge of various image file formats
4. Apply knowledge of various video standards in multimedia projects
5. Justify the right way of manipulating multimedia systems.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

AG 303- DATA STRUCTURE

Course Objective:
The objective of this course is to enable the students to write algorithms for solving various problems using data structures

Unit I Introduction: Data, data type, data object. Types of data structure – primitive &nonprimitive, linear & non-linear. Operations on data structures – traversing, searching, inserting, deleting, Complexity analysis – worst case, best case, and average case. Time – space trade off, algorithm efficiency, asymptotic notations – big oh , omega , theta.

Unit II Arrays & Structure: Introduction , declaration of arrays , operations on arrays – inserting , deleting , merging of two arrays , 1 dimensional & 2 dimensional arrays, row & column major representation , address calculation in array , storing values in arrays , evaluation of polynomial – addition & representation. Searching & sorting – Introduction, sequential search, binary search, Fibonacci search, indexed sequential search, hashed search. Types of sorting with general concepts – bubble, heap, insertion, selection, quick, heap, shell, bucket, radix and merge
sort.

Unit III Stacks & Queues Basic concept of stacks & queues, array representation of stacks,operation on stacks – push , pop , create , getTop , empty , linked representation of stack ,multiple stack. Application of stack – Conversion: infix,prefix, postfix and evaluation ofarithmetic expression. Linked representation of queue, operations on queue – insertion &deletion. Types of queue with functions – circular,deque,and priority queue. Applications ofqueues – job scheduling, Josephus problem.

Unit IV Linked List Introduction – basic terminology, memory allocation & deallocation for linked list. Linked list variants – head pointer, head node, types linked list – linear & circular linked list. Doubly linked list, creation of doubly list, deletion of node from doubly linked list, insertion of a node from doubly linked list, traversal of doubly linked list. Circular linked list – singly circular linked list , circular linked list with header node , doubly circular linked list. Applications of linked list – polynomial representation & garbage collection.

Unit V
Trees Basic terminology – general tree , representation of general tree, types of trees, binary tree- realization and properties , traversal in binary trees – inorder , preorder , postorder , applications of trees. Graph- Basic Terminologies and representations, Graph search and traversal algorithms.

References-
1.Varsha H. Patil “Data Structure Using C++” Oxford.
2. ReemaThareja“ Data Structure Using C ” Oxford.
3. D. S Malik “Data Structure Using C++ ” Second Edition Cengage.
4. Kushwaha and Mishra “Data Structure: A programming Approach with C”, PHI Learning.
5. A. K Sharma “Data Structure Using C” Pearson.
6. Ellis Horowitz, SartajSahni, “Fundamentals of Data Structures”, Computer Science Press

Course Outcomes:
After the completion of this course, the students will be able to:

1. For a given search problem (linear search and binary search) student will be able toimplement it.
2. Perform operations on arrays
3. For a given problem of stacks, queues and link lists, students will be able to implement itand analyze the same to determine the time and computation complexity

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

4. Students will be able to write an algorithm for selection sort, insertion sort, quick sort,merge sort, heap sort, bubble sort and compare their performance
5. Students will be able to implement tree, graph search and traversal algorithms

List of Experiments

1. Write a program to search an element in the array using Linear and Binary Search.
2. Write a program to perform the following operation in Matrix:
a. Addition b. Subtraction c. Multiplication d. Transpose
3. Write a program to perform the following operation on strings using string functions:
a. Addition b. Copying c. Reverse d. Length of String
4. Write program for implementing the following sorting methods to arrange a list of integers in ascending order:
a) Quick sort b) Selection sort c) Insertion sort d) Merge sort
5. Write a program that uses stack operations to convert a given infix expression into its postfix equivalent.
6. Write a program to merge two sorted array into one sorted array.
7. Write a program to implement stack using array and linked list.
8. Write a program to implement queue and circular queue using array.
9. Write a program to insert an element in the beginning and end of singly linked list.
10. Write a program to insert an element at any position in singly and doubly linked list.
11. Insert and delete a node at any position in doubly linked list.
12. Write a program of Tower of Hanoi.
13. Write a program that uses functions to perform the following:
a) Create a binary search tree of integers.
b) Traverse the above Binary search tree non recursively in in order.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

AG304- OBJECT ORIENTED PROGRAMMING & METHODOLOGY

Course Objective:
The objective of this course is tohelp students to understand the key features of Object Oriented Programming and Methodology like objects, methods, instance, message passing, encapsulation, polymorphism, data hiding, abstract data and inheritance.

Unit I
Introduction: Object oriented programming, Introduction, Application, characteristics, difference between object oriented and procedure programming, Comparison of C and C++, Cout, Cin, Data Type, Type Conversion, Control Statement, Loops, Arrays and string arrays fundamentals, Function, Returning values from functions, Reference arguments, Overloaded function, Inline function, Default arguments, Returning by reference.

Unit II
Object and Classes: Implementation of class and object in C++, access modifiers, object as data type, constructor, destructor, Object as function arguments, default copy constructor, parameterized constructor, returning object from function, Structures and classes, Classes objects and memory, static class data, Arrays of object, Arrays as class Member Data, The standard C++ String class, Run time and Compile time polymorphism.

Unit III
Operator overloading and Inheritance: Overloading unary operators, Overloading binary operators, data conversion, pitfalls of operators overloading, Concept of inheritance, Derived class and base class, access modifiers, types of inheritance, Derived class constructors, member function, public and private inheritance.

Unit IV
Pointer and Virtual Function: Addresses and pointers, the address-of operator & pointer and arrays, Pointer and Function pointer, Memory management: New and Delete, pointers to objects, debugging pointers, Virtual Function, friend function, Static function, friend class, Assignment and copy initialization, this pointer, dynamic type information.

Unit V
Streams and Files: Streams classes, Stream Errors, Disk File I/O with streams, file pointers, error handling in file I/O with member function, overloading the extraction and insertion operators, memory as a stream object, command line arguments, printer output, Function templates, Class templates Exceptions, Containers, exception handling.

References-
1. E. Balaguruswami, ”Object Oriented Programming in C++”, TMH.
2. Robert Lafore, “Object Oriented Programming in C++”, Pearson.
3. M.T. Somashekare, D.S. Guru, “ Object-Oriented Programming with C++”, PHI.
4. Herbert Shildt, “The Complete Reference C++”, Tata McGraw Hill publication.

Course Outcomes:
After the completion of this course, the students will be able to:
1. Understand the key features of Object Oriented Programming and Methodology
2. Recognize attributes and methods for given objects.
3. Implement programs of inheritance and operator overloading
4. Understand and use concept of pointers, memory management and virtual functions in programs
5. Perform file handling in programs

List of Experiments:

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

1. Write a program to find out the largest number using function.
2. Write a program to find the area of circle, rectangle and triangle using function overloading.
3. Write a program to implement complex numbers using operator overloading and type conversion.
4. Write a program using class and object to print bio-data of the students.
5. Write a program which defines a class with constructor and destructor which will count number of object created and destroyed.
6. Write a program to implement single and multiple inheritances taking student as the sample base class.
7. Write a program to add two private data members using friend function.
8. Write a program using dynamic memory allocation to perform 2x2 matrix addition and subtraction.
9. Write a program to create a stack using virtual function.
10. Write a program that store five student records in a file.
11. Write a program to get IP address of the system.
12. Write a program to shutdown the system on windows operating system.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

AG305-DIGITAL CIRCUITS AND SYSTEMS

Course Objective:
The objective of this course is to enable the students to understand the working of logic gates, to design and implement combinational and sequential logic circuits, understand the process of analog to digital and digital to analog conversion, various logic families

Unit I
Number systems and logic gates: Decimal, Binary, Octal, Hexadecimal number systems and radix conversion. Codes- BCD, excess 3, gray, ASCII. Boolean algebra- Theorems and properties, Boolean functions, canonical and standard forms, De Morgans theorem, digital logic gates, Karnaugh maps.

Unit II
Combinational circuits: Introduction to combinational circuits, multilevel NAND, NOR implementation. Designing binary Adders and Subtractors. Decoder, Encoder, Multiplexer, Demultiplexer circuits

Unit III
Sequential circuits: Introduction to Sequential circuits, flip-flops, RS, D, T, JK, M/S JK-flipflops, truth tables, excitation tables and characteristic equations, clocked and edge triggered flipflops, Registers- Definition, serial, parallel, shift left/right registers, Johnson counter, asynchronous and synchronous counters.

Unit IV
Digital logic families: Bipolar and unipolar logic families, Digital IC specifications, RTL, DTL, All types of TTL circuits, ECL, IIL, PMOS, NMOS & CMOS Logic.

Unit V
Clocks and timing circuits: Bistable, Monostable&Astablemultivibrator, Schmitt trigger circuit, Introduction of Analog to Digital & Digital to Analog converters, Display devices, 7 and 16 segment LED display, LCD.

References-
1. M. Morris Mono, “Digital logic design”, Pearson Education Pvt. Ltd.
2. A Anand Kumar, “Fundamentals of digital circuits“, PHI Learning Pvt Ltd.
3. A K Maini, “Digital Electronics Principles and Integrated Circuits, Wiley India Pvt Ltd.
4. R P Jain, “Modern Digital Electronics”, Tata McGraw-Hill publishing company Ltd.
5. D P Kothari and J S Dhillon, "Digital Circuits and Design", Pearson Education Pvt. Ltd.

Course Outcomes:
After the completion of this course, the students will be able to:
1Perform number base conversions, use Boolean logic to create digital circuits.
2. Understand use of encoders, decoders, multiplexers and demultiplexers in communication systems.
3Learn design of combinational and sequential circuits use it in digital systems such as computers, communication systems and other modern technologies.
4 Study ADC and DAC along with display devices will enable students to understand signal conversion and its display and their applications in digital devices.
5. Apply knowledge of clocks and timing circuits in design of circuits

List of Experiments:
1. Study and verify the operation of AND, OR, NOT, NOR and NAND logic gates.
2. Design all basic logic gates using NOR universal gate.
3. Design all basic logic gates using NAND universal gate.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

4. Verification of Demorgan’s theorem.
5. Construction and verification of half adder andfull adder circuits.
6. Construction and verification of half subtractor and full subtractor circuits.
7. Design of Binary to Grey & Grey to Binary code Converters .
8. Design of BCD to excess-3 code converter.
9. Design and verification of Multiplexer circuit
10. Design and verification of De-multiplexer circuit.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

AG306-JAVA PROGRAMMING LAB

Course Objectives:

The objective of this course is to familiarize the students with the fundamentals of programming such as variables, conditional and iterativeexecution, methods, etc. and object-oriented programming in Java

Unit I-Overview of Java, Installation, First Simple Program, Compilation process, JavaKeywords,Identifiers, Literals, Comments, Data Types, Variables, Dynamic initialization, typeconversion and casting, Operators, Control Statements.

Unit II-Declaring Objects, Introducing Methods, Constructors, this Keyword, GarbageCollection, finalize Method, Overloading Methods, Overloading Constructors, Using Objects asParameters, Inheritance, Creating a Multilevel Hierarchy, Packages and Interfaces, ExceptionHandling, Multithreaded

Unit III-The Applet Class: Applet Basics, The Applet Class, Applet Architecture, AppletInitialization and Termination , Simple Applet Display Methods, Simple Banner Applet, Usingthe Status Window, The HTML APPLET Tag, Passing Parameters to Applets, Improving theBanner Applet.

Unit IV-Introducing the AWT: Working with Windows, Graphics, and Text, AWT Classes,Window Fundamentals, Component, Container, Panel, Frame, Working with Frame Windows,Handling Events in a Frame Window, AWT Controls, Layout Managers, and Menus, Addingand Removing Controls, Grid Layout, Border Layout, introduction to swing and servlet.

Unit V-Event Handling, Two Event Handling Mechanisms, The Delegation Event Model,Events, Event Sources, Event Listeners, Event Classes, The Mouse Event Class and others,JDBC: JDBCODBC bridge, the connectivity model, the driver manager, navigating the result setobject contents, the JDBC exceptional classes, connecting to remote database.

References:

1. E. Balagurusamy, “Programming with java A Primer”, McGrawHill.
2. Sharanam Shah, “ Core Java 8 for Beginners”, Shroff Publisher.
3. Naughton&Schildt, “The Complete Reference Java 2”, Tata McGraw Hill.
4. Horstmann& Cornell, “Core Java 2” (Vol I &II), Pearson.

Course Outcomes:

On the completion of this course students will be able to understand:

1. The concepts of Java programming
2. The basic terminology used in computer programming and write, compile and debugprograms in JAVA language.
3. The different data types, decision structures, loops, functions to design Java programs.
4. Develop program using the java collection API as well as the java standard class library.
5. Develop Java applets

List of Experiments:

1. Write a program that accepts two numbers from the user and print their sum.
2. Write a program to calculate addition of two number using prototyping of methods.
3. Program to demonstrate function overloading for calculation of average.
4. Program to demonstrating overloaded constructor for calculating box volume.
5. Program to show the detail of students using concept of inheritance.
6. Program to demonstrate package concept.
7. Program to demonstrate implementation of an interface which contains two methods declaration square and cube.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**

8. Program to demonstrate exception handling in case of division by zero error.
9. Program to demonstrate multithreading.
10. Program to demonstrate JDBC concept using create a GUI based application for student information.
11. Program to display “Hello World” in web browser using applet.
12. Program to add user controls to applets.
13. Write a program to create an application using concept of swing.
14. Program to demonstrate student registration functionality using servlets with session management.

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	**1 Credit**	**1 Credit**