Scheme & Syllabus of UG

Engineering Program

Bachelor of Technology

(B.Tech.)

Electronics & Communication Engineering

2020-21

IPS ACADEMY

INSTITUTE OF ENGINEERING & SCIENCE, INDORE

(A UGC Autonomous Institute affiliated to RGPV)

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Scheme Based on AICTE Flexible Curriculum

Department of Electronics & Communication Engineering

Bachelor of Technology (B.Tech.) VI Semester

S.No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem.	Mid Sem. Exam.	Quiz/Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1.	EC601	DC	Digital Signal Processing	70	20	10	30	20	150	2	1	2	4
2.	EC602	DC	Antenna & Wave propagation	70	20	10	30	20	150	2	1	2	4
3.	EC603	DE	Departmental Elective	70	20	10	-	-	100	4	-	-	4
4.	EC604	OE	Open Elective	70	20	10	-	-	100	4	-	-	4
5.	EC605	D Lab	JAVA Lab	-	-	-	30	20	50	-	-	6	3
6.	EC606	O/E Lab	OOPS (Object Oriented Programming & Systems)	-	-	-	30	20	50	-	-	6	3
7.	EC607	IN	Internship-III	To be completed anytime during Fifth/Sixth semester. Its evaluation/credit to be added in Seventh Semester.									
8.	EC608	P	Minor Project II	-	-	-	-	50	50	-	-	4	2
9.	Additional Credits#	#*Additional credits can be earned through successful completion of credit based MOOC's Courses available on SWAYAM platform (MHRD) at respective UG level.*											
			Total	280	80	40	120	130	650	12	2	20	24

Departmental Electives	Open Electives
603 (A) Data Communication & Computer Network	604 (A) OOPS (Object Oriented Programming & Systems)
603 (B) CMOS Design	604 (B) Microcontroller & Embedded system
603(C) Satellite Communication	604 (C) Bio-medical Electronics

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

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Department of Electronics & Communication Engineering

Subject Code	Name of the Subject	L: T: P (Hrs.)	Credits
EC601	Digital Signal Processing	2:1:2 (40 Hrs.)	4

Recommended Prerequisite: Mathematics

Course Objective: The purpose of this subject is to make the students learn about theoretical basis of DSP, with the method of description of discrete and digital signals and systems in the domain-and transform domain, including discrete and Fast Fourier Transform and also learn the different DSP processor.

THEORY:

Module 1 **(10 Hrs.)**

Discrete-time signals, discrete-time systems, the z-Transform, Analysis of linear time-invariant systems in the z- domain, Analysis of stability and causality in z domain, block diagrams and signal flow graph representation of digital network, matrix representation.

Module 2 **(9 Hrs.)**

Discrete Fourier transform (DFT), properties of DFT, circular convolution. FFT,Efficient Computation of the DFT FFT algorithms, decimation in time algorithm, decimation in frequency algorithm, decomposition for 'N'composite number.

Module 3 **(8 Hrs.)**

Digital filters Design Techniques Design of IIR and FIR digital filters, Butterworth, Chebyshev and Elliptic Approximations, impulse invariant and bilinear transformation, windowing techniques rectangular and other windows, examples of FIR filters, design using windowing.

Module 4 **(6 Hrs.)**

Fundamentals of DSP: Multiplier and Multiplier accumulator, Modified Bus Structures and Memory access in P-DSPs, Multiple access memory , Multi-ported memory , VLIW architecture, Pipelining , Special Addressing modes in P- DSPs , On chip Peripherals, Computational accuracy in DSP processor, Von Neumann and Harvard Architecture, MAC.

Module 5 **(7 Hrs.)**

DSP Architecture, compare with other processor, architecture of TMS320C 5416/6713 /DSP56374 architecture, Bus Structure & memory, CPU, addresses modes.

Assessment: Mid-term test, Assignment, Tutorial, Quiz and End semester exam.

PRACTICALS

Experiments List:

1. Write a MATLAB program for Addition, Subtraction, Multiplication & Division operation.
2. Generation, analysis and plots of discrete-time signals (Module impulse, Module step, Ramp).
3. Generation, analysis and plots of discrete-time signals (Sine, Cosine).
4. Implementation the scaling, shifting and folding operations on discrete time sequences.
5. Computation and plot of DFT of sequences.
6. Computation and plot of IDFT of sequences.
7. Computation and plots circular convolution of two sequences.
8. Compute the DFT & IDFT of sequences using FFT Algorithm.
9. Computation and plot poles and zeros of Z-transform.
10. IIR filter design using bilinear transformation

Assessment: Internal viva, Continuous evolution of experiments, Journal write-up, Quiz and End semester exam.

Course outcome:

Students earning credits will develop ability to:

1. Analyze and Implement the discrete time LTI system, Z-Transform to realize the digital network and evaluate ROC.
2. Compute DFT by using FFT algorithm to analyze the complex discrete sequence.
3. Design IIR and FIR filters and evaluate the performance of digital filters.
4. Understanding the fundamentals of DSP Processors.
5. Understanding the different architecture of DSP Processor.

Text/Reference Books:

1. Oppenheim and Schafer: Digital Signal Processing, PHI Learning.1975.
2. Proakis: Digital Signal Processing, Pearson Education.2009
3. Sanjay Sharma, “Digital Signal Processing” 5th Edition, S. K. Kataria & Sons. 2009.
4. Ingle and Proakis: Digital Signal Processing- A MATLAB based
5. Approach, Thompson, Cengage Learning.2012.
6. S. Salivahanan, “Digital signal processing”: Tata McGraw-Hill Education. 2011.

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Department of Electronics & Communication Engineering

Subject Code	Name of the Subject	L: T: P (Hrs.)	Credits
EC602	Antenna and wave propagation	2:1:2 (40 Hrs.)	4

Prerequisite: Engineering Mathematics, Electromagnetic theory.

Course Objective: The objective of this subject is that the student must be familiar with the basic concept behind the radiation of energy by elementry antenna and designing of different kinds of antenna and antenna array to get desired radiation pattern.

THEORY:

Module 1 **(10 Hrs.)**

Antenna terminologies and fundamentals: Radiation pattern, radiation power density, radiation intensity, directivity, gain, antenna efficiency, half power beam width, bandwidth, antenna polarization, input impedance, antenna radiation efficiency, effective length, effective area, reciprocity, Friis Transmission equation, Antenna Temperature.Solution of Maxwell's equations: Radiation Integrals: Vector potentials **A, J, F, M**, Electric and magnetic fields electric and magnetic current sources, solution of inhomogeneous vector potential wave equation, far field radiation.

Module 2 **(6 Hrs.)**

Linear wire antenna: Current distribution on linear antennas, Infinitesimal dipole, Small dipole, Region separation, Finite length dipole, half wave dipole, Ground effects. Loop Antennas: Small Circular loop, Circular Loop of constant current, Circular loop with non uniform current.

Module 3 **(8 Hrs.)**

Linear antenna array: Two element array, pattern multiplication N-element linear array, uniform amplitude and spacing, broad side and end-fire array, N-element array: Uniform spacing, non uniform amplitude, array factor, binomial and dolph chebyshev array.

Module 4 **(6 Hrs.)**

Aperture and slot antenna: Radiation from rectangular apertures, Uniform and Tapered aperture, Horn antenna, Reflector antenna, Aperture blockage, Feeding structures, Slot antennas.

Module 5 **(10 Hrs.)**

Special antennas: lens antenna, turnstile antenna, V-antenna, rhombic antenna, beverage antenna Structural details, dimensions, radiation pattern, specifications, features and applications of following antennas: log periodic antenna, helical antenna, biconical antenna, folded dipole antenna, Yagi-Uda antenna. Resonant and travelling wave antennas for different wave lengths. Designing microstrip antenna.

Assessment: Mid-term test, Assignment, Tutorial, Quiz and End semester exam.

PRACTICALS

Experiments List:-

1. To perform & plot the radiation pattern of omni-directional antenna using AMS.
2. To study the radiation pattern of directional antenna.
3. To perform & plot the radiation pattern of dipole antenna using AMS.
4. To perform & plot the radiation pattern of folded dipole antenna using AMS.
5. To perform & plot the radiation pattern of monopole antenna using AMS.
6. To perform & plot the radiation pattern of rectangular loop antenna using AMS.
7. To perform & plot the radiation pattern of helical antenna using AMS.
8. To perform & plot the radiation pattern of collinear array antenna using AMS.
9. To perform & plot the radiation pattern of E- horn antenna using AMS.
10. To perform & plot the radiation pattern of patch antenna using AMS.

Assessment: Internal viva, Continuous evolution of experiments, Journal write-up, Quiz and End semester exam.

Course outcome:

Students earning credits will develop ability to:

1. Understand the basic terminologies and parameters related to antenna and also analyze Maxwell's equations in context of waves radiated by antenna.
2. Analyze the radiation pattern of an infinitesimal current element, half wave dipole etc. and derived the equation of E and H component of EM wave radiated by such antennas.
3. Analyze uniform antenna array and learn to design non uniform antenna array.
4. Understand analytical methods for analysis of aperture antenna and their application to various specific antennas.
5. Analyze some special antennas, their specifications along with their applications and design Micro strip patch antenna.

Text/Reference Books:

1. A. Balanis, "Antenna theory- analysis and design", 2 nd Edition, Wileys, 2005.
2. J. D. Krauss, "Antennas", 4 th Edition, McGraw Hill, 2010.
3. A. R. Harish, M. Sachhidanand, "Antennas and wave propagation" Oxford university press, 2010.
4. Chatterji, Rajeshwari, "Antenna theory and practice", New edge publication, 2006.
5. K. D. Prasad, "Antenna and wave propagation", Satya prakashan, 2003.
6. G. S. N. Raju, "Antennas and wave propagation", Pearson education, 2008.
7. B. L. Smith, "Modern antennas", Springer India Pvt. Ltd., 2 nd edition, 2008.

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Subject Code	Name of the Subject	L: T: P (Hrs.)	Credits
EC603 (A)	Data Communications and Computer Networks	4:0:0 (40 Hrs.)	4

Course Objective: The purpose of this subject is to cover the basic concepts and techniques used in data communication. By this student gets the depth knowledge of data transmission in wired and wireless environment using various phenomena.

THEORY:

Module 1 **(8 Hrs.)**

Review of synchronous and asynchronous transmission, circuit switching, message switching, packet switching and their comparison, various detector techniques, parity check, vertical and longitudinal redundancy check and CRC code and their error detecting capabilities. RS -232 C and X.21 standards, modern operation, null model.

Module 2 **(8 Hrs.)**

Data link control, point-to-point and multi-point links, flow control, sliding window protocol, various ARQ technique for error control and their comparison and performance analysis, HDLC as a bit oriented link control protocol.

Module 3 **(8 Hrs.)**

Communication Network: Virtual circuit and datagram, routing algorithm, dijkstera and Bellman ford least cost, algorithm, various routing protocol, congestion control technique, deadlock and its avoidance.

Module 4 **(8 Hrs.)**

Local Area network: Various topologies and medium access control schemes such as contention, polling, token parsing and performance analysis, various IEEE standards for LAN, UBS LANs, FDDI.

Module 5 **(8 Hrs.)**

Introduction to WAN packet switching technologies such as ATM and Frame relay. Introduction to TCP / IP protocols.

Course outcomes:

Students earning credits will develop ability to

1. Illustrate the different modes of data transmission, and summarize different interfaces.
2. Analyze the function of Data link layer, and to apply data link layer's different techniques and protocol for designing network.
3. Analyze the function of Network layer, and to apply layer's different techniques and Routing protocol on network in different congestion problems.
4. Illustrate the various topologies and medium access control schemes. Also, to analyze various IEEE standards for LAN.
5. Apply Switching techniques and Analyze different protocol of TCP/IP for transmission of data on network.

Text/ Reference Books:

1. Tanenbaum A. S., "Computer Networks", Pearson Education, 5th edition, 2011.
2. Behrouz A Forouzan, "Data communication and networking", 4th edition, McGrawHill Education, 2017.
3. Comer, "Internetworking with TCP/ IP Vol-1", Pearson education, 6th edition, 2015.
4. Peterson & Davie, "Computer Networks", 5th edition, Morgan Kaufmann, 2011.
5. W. Richard Stevens, "TCP/IP Illustrated Vol-1", 2nd edition, Addison-Wesley, 2011.
6. Craig Zacker, "Networking the Complete Reference", 2nd edition, TMH, 2001.

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Subject Code	Name of the Subject	L: T: P (Hrs.)	Credits
EC602(B)	CMOS Design	4:0:0 (40 Hrs.)	4

Course Objective: The course is designed to give the student an understanding of the different design steps required to carry out a complete digital VLSI (Very-Large-Scale Integration) design in silicon and the fundamental concepts and structures of designing digital VLSI systems include CMOS devices and circuits, standard CMOS fabrication processes.

THEORY:

Module 1 **(8 Hrs.)**

CMOS circuits: MOS Transistors: Operating principle of MOS transistor, Channel Length Modulation, CMOS logic, CMOS inverter- DC characteristics, Switching Threshold, Noise in MOS, Dynamic behavior of CMOS inverter, computing capacitances, propagation delay, power consumption, stick diagram, IC layout design.

Module 2 **(8 Hrs.)**

Practical Consideration and Technology in VLSI Design: Introduction, Size and complexity of Integrated Circuits, The Microelectronics Field, IC Fabrication Process, Crystal Growth and wafer preparation, Epitaxial growth methods, oxidation, Metallization, Physical Vapor Deposition and Sputtering. Patterning: Lithography, Photo masking steps, Diffusion, Ion Implantation

Module 3 **(9 Hrs.)**

CMOS Technology: Basic CMOS Technology, A Basic n-well CMOS Process, Twin Tub Processes, CMOS Process Enhancement, Interconnects and Circuit Elements, Layout Design Rules, Latch up, Physical Origin, Latchup Triggering, Latch up Prevention, Internal Latch up Prevention Techniques.

Module 4 **(8 Hrs.)**

Device Modeling: Dc Models, Small Signal Models, MOS Models, MOSFET Models in High Frequency and small signal, Short channel devices, Sub threshold Operations, Modeling Noise Sources in MOSFET's, Diode Models, Bipolar Models, Passive component Models.

Module 5 **(7 Hrs.)**

Circuit Simulation: Introduction, Circuit Simulation Using Spice, MOSFET Model, Level 1 Large signal model, Level 2 Large Signal Model, High Frequency Model, Noise Model of MOSFET, Large signal Diode Current, High Frequency BJT Model, BJT Noise Model, temperature Dependence of BJT, Designing of MOS Transistor on Simulator.

Assessment: Internal viva, Continuous evolution of experiments, Journal write-up, Quiz and End semester exam.

Course outcome:

Students earning credits will develop ability to:

1. Explain the basic structure and principle of MOS and the working of various modes of MOS, VI characteristics & power dissipation.
2. Explain IC fabrication unit processes and production process constrains.
3. Explain about CMOS fabrication techniques & latchup problem & prevention
4. Analyze the models of MOS in high frequency & small signals.
5. Formulate value of drain current with maximum accuracy using successive models.

Text/References Books:

1. Geiger, Allen and Strader, "VLSI Design Techniques for Analog and Digital Circuits", International Edition, TMH Publication, 1990.
2. Sorab Gandhi, "VLSI Fabrication Principles", 2nd Edition, Wiley-Interscience Publication, 1994.
3. Weste and Eshraghian, "Principles of CMOS VLSI design", 2nd Edition, Pearson Education, 1993.
4. Weste, Harris and Banerjee, "CMOS VLSI Design", 3rd Edition, Pearson Education, 2007.
5. Pucknell and Eshraghian, "Basic VLSI Design", 3rd Edition, PHI Learning, 1995.
6. R. Jacob Baker, "CMOS Circuit Design, Layout, and Simulation" 2nd Edition, Wiley India, 2011.
7. S. M. Sze, "VLSI Technology", 2nd Edition, TMH Publication, 2017.

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Subject Code	Name of the Subject	L: T: P (Hrs.)	Credits
EC603 (C)	Satellite Communication	4:0:0 (40 Hrs.)	4

Prerequisite: - Electromagnetic fields, Antenna and wave propagation and Analog & Digital Communication.

Course Objective: Course Objective: Objective of the subject is to have understanding of Mobile Communication and its applications.

THEORY:

Module 1 **(8 Hrs.)**

Overview of satellite systems: Introduction, Frequency allocations for satellite systems.
Orbits and launching methods: Kepler's three laws of planetary motion, terms used for earth orbiting satellites, orbital elements, apogee and perigee heights, orbit perturbations, inclined orbits, local mean solar point and sun-synchronous orbits, standard time.

Module 2 **(8 Hrs.)**

The Geostationary orbit: Introduction, antenna look angles, polar mount antenna, limits of visibility, near geostationary orbits, earth eclipse of satellite, sun transit outage, launching orbits.**Polarization:** antenna polarization, polarization of satellite signals, cross polarization discrimination.**Depolarization:** ionospheric, rain, ice.

Module 3 **(8 Hrs.)**

The Space segment: introduction, power supply, attitude control, station keeping, thermal control, TT&C subsystem, transponders, antenna subsystem, Morelos and Satmex 5, Anik-satellites, Advanced Tiros-N spacecraft.
The Earth segment: introduction, receive-only home TV systems, master antenna TV system, CommModuley antenna TV system, transmit-receive earth station.

Module 4 **(8 Hrs.)**

The space link: Introduction, Equivalent isotropic radiated power (EIPR), transmission losses, the link power budget equation, system noise, carrier-to-noise ratio (C/N), the uplink, the downlink, effects of rain, combined uplink and downlink C/N ratio, inter modulation noise, inter-satellite links, interference between satellite circuits.

Module 5 **(8 Hrs.)**

Satellite services: VSAT (very small aperture terminal) systems: overview, network architecture, access control protocols, basic techniques, VSAT earth station, calculation of link margins for a VSAT star network. Direct broadcast satellite (DBS) Television and radio: digital DBS TV, BDS TV system design and link budget, error control in digital DBS-TV, installation of DBS-TV antennas, satellite radio broadcasting.

Assessment: Mid-term test, Assignment, Tutorial, Quiz and End semester exam.

Course outcome:

1. Understand communication process in satellite and about the satellite orbit element. Also, we learn about various terms used to develop the satellite.
2. Understand the geostationary orbit and various methods of polarization, depolarization and to know about azimuth angle and antenna look.
3. Understand T&C system and also understand various space and earth segments as well as transponders.
4. Develop EIPR equation and to know about types of errors and noise occurs in the satellite circuit.
5. Understand the various Satellite services and RADAR system.

Text/References Book:

1. Roddy: Satellite Communications, TMH.
2. Timothy Prattt: Satellite Communications, Wiley India.
3. Pritchard, Suyderhoud and Nelson: Satellite Communication Systems Engineering, Pearson Education.
4. Agarwal: Satellite Communications, Khanna Publishers.
5. Gangliardi: Satellite Communications, CBS Publishers.
6. Chartrand: Satellite Communication, Cengage Learning.
7. Raja Rao: Fundamentals of Satellite communications, PHI Learning.
8. Monojit Mitra: Satellite Communication: PHI Learning.

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Subject Code	Name of the Subject	L: T: P (Hrs.)	Credits
EC604 (A)	OOPS(C++)	4: 0: 0 (40 Hrs.)	4

Recommended Prerequisite: C Language

Course Objective: The objective of the subject is to explore the principles of Object Oriented Programming (OOP) & understand object-oriented concepts & programming.

THEORY:

Module 1 **(8 Hrs.)**

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.

Module 2 **(8 Hrs.)**

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.

Module 3 **(9 Hrs.)**

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.

Module 4 **(8 Hrs.)**

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.

Module 5 **(7 Hrs.)**

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.

Assessment: Mid-term test, Assignment, Quiz and End semester exam.

PRACTICALS

Experiments List:- Write a program

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

Assessment: Internal viva, Continuous evolution of experiments, Journal write-up, Quiz and End semester exam.

Course Outcomes:

Students earning credits will develop ability to:

1. Understand the advantage of object oriented programming over procedure oriented programming.
2. Help 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.
3. Develop understanding of pointers and memory management.
4. Able to develop understanding of file input/output and templates.
5. Implement algorithms of complex problems.

Test /Reference Books:

1. E. Balaguruswami,"Object Oriented Programming in C++", 7th edition, TMH. 2017.
2. Robert Lafore, "Object Oriented Programming in C++", 4th edition, Pearson, 2001.
3. M.T. Somashekare, D.S. Guru, "Object-Oriented Programming with C++", 2nd edition PHI, 2012.
4. Herbert Shildt, "The Complete Reference C++", 4th edition, TMH, 2017.
5. Yashavant Kanetkar, "Let.Us C++", 3rd edition, BPB Publications, 2019

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Subject Code	Name of the Subject	L: T: P (Hrs.)	Credits
EC604 (B)	Microcontroller & Embedded System	4:0:0 (40 Hrs.)	4

Course Objective: The objective of this course is to make students learn fundamentals of basic 8 bit microcontroller, 8051 and its programming and interfacing. Also, to make them understand about embedded systems and various types of embedded systems processor architectures along with introduction to PIC and ARM.

THEORY:

Module 1 **(8 Hrs.)**

8051 Interfacing, Applications and serial communication 8051 interfacing to ADC and DAC, Stepper motor interfacing, Timer/ counter functions, 8051 based data acquisition system 8051 connections to RS-232, 8051 Serial communication, Serial communication modes, Serial communication programming, Serial port programming in C.

Module 2 **(8 Hrs.)**

Microcontroller 8096 Introduction to 16-bit Microcontroller, functional block-diagram, memory status, complete 8096 instruction set, classification of instruction set, addressing modes, programming examples using 8096, hardware features of 8096,parallel ports, control &status Registers, Introduction to 16/32 bit PIC microcontrollers and DSPIC.

Module 3 **(9 Hrs.)**

Introduction to Embedded Systems: Definition of embedded system, embedded systems vs. general computing systems, history of embedded systems, classification, major application areas, purpose of embedded systems, characteristics and quality attributes of embedded systems, common design metrics, and processor technology: general purpose processor, application specific processor, single purpose processor.

Module 4 **(8 Hrs.)**

Embedded System Architecture: Von Neumann v/s Harvard architecture, instruction set architecture, CISC and RISC instructions set architecture, basic embedded processor, microcontroller architecture, CISC & RISC examples: 8051, ARM, DSP processors,

Module 5 **(7 Hrs.)**

Input Output and Peripheral Devices Timers and counters, watchdog timers, interrupt controllers, PWM, keyboard controller, analog to digital converters, real time clock.

Assessment: Internal viva, Continuous evolution of experiments, Journal write-up, Quiz and End semester exam.

Course Outcomes:

1. Students will be able to apply their fundamental knowledge about 8051 Interfacing, Serial Communication, Timer/Counter operations for its programming and applications.
2. Students will be able to understand 16-bit microcontroller 8096, its architecture, addressing modes, instructions and programming.
3. Students will be able to comprehend basics of embedded system, its history, classification, applications, purpose, characteristics and quality attributes, common design metrics, and processor technology they use
4. Students will be able to differentiate between Von Neumann v/s Harvard architecture, CISC v/s RISC instructions set architecture, and other basic embedded processors like ARM, DSP.**)**
5. Students will be able to learn the fundamentals of Input Output and Peripheral Devices used in Embedded System Design.

Text/References Books:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson education, 2005.
2. Kenneth J. Ayala, The 8051 Microcontroller Architecture, III edition, CENGAGE Learning.
3. V. Udayashankara and M.S. Mallikarjunaswamy, 8051 Microcontroller: Hardware, Software & Applications, Tata McGraw - Hill, 2009.
4. McKinlay, The 8051 Microcontroller and Embedded Systems - using assembly and C, PHI, 2006 / Pearson, 2006.
5. Tim Wilmshurst, Designing embedded system with PIC microcontrollers Principles and applications. 2nd ed. 2011 Bsp books pvt ltd.
6. Shibu K V, “Introduction to Embedded System”, TMH.
7. David E Simon, “An Embedded Software Primer”, Pearson education Asia, 2001.
8. Steven F. Barett, Daniel J. Pack, “Embedded Systems” Pearson education, First Impression2008.

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Subject Code	Name of the Subject	L: T: P (Hrs.)	Credits
EC604 (C)	Biomedical Electronics	4:0:0 (40 Hrs.)	4

Prerequisite: Engineering Physics, Engineering Mathematics, Chemical Engineering.

THEORY:

Module 1 **(8 Hrs)**

Introduction to medical instruments: sources of biomedical signals, general constraints in design of medical instruments, signal conditioning and processing circuits for medical recording systems, recording system for biomedical signals. Electrodes tissue interface, skin contact impedance. Half-cell potential, skin electrode interface, bio-electrodes.

Module 2 **(8 Hrs)**

Bio amplifiers, carrier amplifier, isolation amplifier, differential amplifier, chopper amplifier, instrumentation amplifier, bioelectric signals (ECG, EMG, EEG, EOG & ERG) and their characteristics, Einthoven triangle, ECG machine, EMG machine, EEG machine, heart sound and characteristics, PCG.

Module 3 **(8 Hrs)**

Measurement of blood pressure – direct methods and indirect methods, temperature measurement, respiration rate, heart rate measurement, apnea detectors, oximetry- pulse oximeter, ear oximeter, computerized patient monitoring system, biotelemetry.

Module 4 **(8 Hrs)**

Cardiac output measuring techniques – Dye dilution method, Thermo dilution method, BP method, blood flow measuring techniques- electromagnetic, ultrasound blood flow meter, laser doppler blood flow meter, cardiac arrhythmias, plethysmography, cardiac pacemakers and defibrillator: AC, and DC types, heart lung machine (HLM), oxygenators.

Module 5 **(8 Hrs)**

Chemical fibro sensors, fluorescence sensors, glucose sensor, blood cell counters, coulter counter, electrical impedance method, optical method, colorimeter, spectro photometer, flame photometer, chromatography, mass spectrometer, electrical hazard – micro and macro- shock, patient safety procedures, pH meter, blood gas analyser.

Assessment: Mid-term test, Assignment, Tutorial, Quiz and End semester exam.

Course outcome:

Students earning credits will develop ability to:

1. Understand various sources of bioelectric signal & their processing.
2. Analyze and understanding of principles & design of monitoring instruments like ECG, EEG, EMG.
3. Illustrate various fundamentals of recording & diagnostic instruments.
4. Understand various body chemicals measuring instruments & their calibration.
5. Apply and design wearable therapeutic and diagnostic instruments.

Text/References Books:

1. John G. Webster, Medical Instrumentation: Application and design, 3rd ed., John Wiley, 2012.
2. Khandpur R.S, Hand-book of Biomedical Instrumentation, Tata McGraw Hill, 2nd Edition, 2003.
3. Stuart R, MacKay, Bio-Medical Telemetry: Sensing and Transmitting Biological Information from Animals and Man, 2nd ed., Wiley, 1998.
4. L. Cromwell, Fred J et al., Biomedical Instrumentation and Measurements, Prentice Hall, 1973.

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Scheme Based on AICTE Flexible Curriculum

Department of Electronics & Communication Engineering

Subject Code	Name of the Subject	L: T: P (Hrs.)	Credits
EC605	Java Lab	0:0:6	3

Prerequisite: Computer Programming

Course Objectives:

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2. Understand fundamentals of object-oriented programming in Java and be familiar of the important concepts like class, inheritance and multithreading, AWT and JDBC.
3. Students will able to use the Java SDK environment to create, debug and run simple Java programs.

PRACTICALS

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.
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.

Course Outcomes:

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

1. Understand concepts of Java programming

2. The basic terminology used in computer programming and write, compile and debug programs in JAVA language.
3. Analyze 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

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

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Subject Code	Name of the Subject	L: T: P (Hrs.)	Credits
EC606	OOPS(C++) Lab	0: 0: 6 (40 Hrs.)	6

Recommended Prerequisite: C Language

Course Objective: The objective of the subject is to explore the principles of Object Oriented Programming (OOP) & understand object-oriented concepts & programming.

PRACTICALS

Experiments List:

Write a program

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

Assessment: Internal viva, Continuous evolution of experiments, Journal write-up, Quiz and End semester exam.

Course Outcomes:

Students earning credits will develop ability to:

1. Understand the advantage of object oriented programming over procedure oriented programming.
2. Help 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.
3. Develop understanding of pointers and memory management.
4. Able to develop understanding of file input/output and templates.

5 Implement algorithms of complex problems.

Test /Reference Books:

1. E. Balaguruswami,"Object Oriented Programming in C++", 7th edition, TMH. 2017.
2. Robert Lafore, "Object Oriented Programming in C++", 4th edition, Pearson, 2001.
3. M.T. Somashekare, D.S. Guru, "Object-Oriented Programming with C++", 2nd edition PHI, 2012.
4. Herbert Shildt, "The Complete Reference C++", 4th edition, TMH, 2017.
5. Yashavant Kanetkar, "Let.Us C++", 3rd edition, BPB Publications, 2019