UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Principles of Management
Course Code: HU601
L-T Scheme: 2-1 **Course Credits: 2**

Introduction:

This course deals with the principles of Management within workplace. Students understand the intricacies of management that operates to extract work from the employees. Students dig into topics like:

- Basic concepts of Management
- Functions of Management
- Structure of Management
- How management and society are interlinked
- People Management
- Leadership concepts
- Quantitative methods
- Customer relations

Objectives:

This course briefs students on the mode of operandi for the employees and the mechanism tool for job at a workplace. Furthermore the handling of customers is an integral part of the course. This subject deals with the growth of an individual as an employee.

Learning Outcomes:

Knowledge:

1. Learning the various modes of operations for the management.
2. Customer handling and taking care of their needs and requirements keeping in mind the basic infrastructure of the company.
3. Managing people and their mode of work.
4. Understanding leadership skills that leads to growth of an individual.
5. Understanding the link between society and management and how to maintain a balance between the two.
6. Company's responsibility towards the society through CSR.
7. Quantitative Methods.

Course Contents:

Unit 1: Basic conceptsof Management: Definition, essence, Functions, Roles, Level. Functions of Management Planning : Concept, Nature, Types, Analysis, Management, objectives Structure : Concept, Structure, Principles, Centralization, Decentralization, Spn of Management, Organizational Effectiveness

Unit 2: Management and Society: Concept, external environment, CSR, Corporate Governance, Ethical Standards. People Management: Overview, Job design, Recruitment and Selection, Stress Management Managerial competencies: Communication, Motivation, Team Effectiveness, Conflict Management, Creativity, And Entrepreneurship.

Unit 3: Leadership concept: Nature, Styles, Decision Making, Process, Tools and Techniques. Economic, Financial and quantitative Analysis : Production Markets, National Income Accounting, Financial

Function, and goals, Financial statements, Ratio Analysis. Quantitative Methods : Statistical Interference, Forecasting, Regression Analysis, Statistical Quality Control

Unit 4: Customer Management: Market planning and research, Market Mix, Advertising and Brand Management. Operations and Technology Management: Production and Operations Management, Logistics, & supply chain Management. TQM, Kaizen and Six Sigma, MIS.

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Course Description

Title of Course: Digital Communications
Course Code: EC601
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

The course provides a basic understanding of the analysis and design of digital communication systems, building on various ideas from probability theory, stochastic processes, linear algebra and Fourier analysis. The Topics to be covered include:

- Random process, stochastic process and ergodic process
- Signal vector representation and Grahm schimdt orthogonalization procedure
- Receiver design and sufficient statistics
- Controlling the spectrum and the Nyquist criterion
- Line coding, band pass communication
- Modulation techniques, Inter symbol Interference

Objectives:

Digital communication uses electrical signalling methods to transmit information over a physical channel separating a transmitter and receiver with the channel properties often time varying. This course presents the theory and practice of digital communication including signal design, modulation methods, demodulation methods, wireless channel basics and the application of this to the design of modern OFDM systems.

Learning Outcomes:

Knowledge:

1. Understand the basic concepts of digital communication systems
2. Apply different modulation schemes to baseband signals
3. Analyze the BER characteristics of Baseband Modulated signals.
4. Analyze the BER characteristics of Band pass Modulated signals.

Course Contents:

Unit 1: Probability Theory and Random Processes: Conditional probability, communication example, joint probability, statistical independence, random variable-continuous and discrete, cumulative distribution function, probability density function – Gaussian, Rayleigh and Rician, mean, variance, random process, stationary and ergodic processes, correlation coefficient, covariance, auto correlation function and its properties, random binary wave, power spectral density.

Unit 2: Signal Vector Representation: Analogy between signal and vector, distinguish ability of signal, orthogonality and ortho-normality, basis function, orthogonal signal space, message point, signal constellation, geometric interpretation of signals, likely hood functions, Schwartz inequality, Gram-Schmidt orthogonalization procedure, response of the noisy signal at the receiver, maximum likelihood decision rule, decision boundary, optimum correlation receiver; probability of error, error function, complementary error function, Type-I and Type-II errors.

Unit 3: Digital Data Transmission: Concept of sampling, Pulse Amplitude Modulation(PAM) ,interlacing and multiplexing of samples, Pulse Code Modulation(PCM), quantization, uniform and non-uniform quantization, quantization noise, binary encoding, A-Law and μ-law companding, differential PCM, delta modulation and Adaptive delta modulation. Digital transmission components, source, multiplexer, line coder, regenerative repeater, concept of line coding – polar/unipolar/bipolar NRZ and RZ, Manchester, differential encoding and their PSDs, pulse shaping, Inter Symbol Interference (ISI), Eye pattern, Nyquist criterion for zero ISI, equalizer, zero forcing equalizer, timing extraction

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Course Description

Unit 4: Digital Modulation Techniques: Types of Digital Modulation, coherent and non-coherent Binary Modulation Techniques, basic digital carrier modulation techniques: ASK, FSK and PSK, CoherentBinaryPhaseShiftKeying(BPSK),geometricalrepresentationofBPSKsignal;errorprobabilityofBPSK,generationanddetectionofBPSKSignal, power spectrumofBPSK.ConceptofM-aryCommunication,M-aryphaseshiftkeying,theaverageprobabilityofsymbolerrorforcoherentM-aryPSK,powerspectraofMPSK, Quadrature Phase Shift Keying (QPSK), error probability of QPSK signal, generation and detection of QPSK signals, power spectra of QPSK signals, Offset Quadrature Phase shift Keying (OQPSK),Coherent Frequency Shift Keying(FSK), Binary FSK, error probability of BFSK signals, generation and detection of Coherent Binary FSK signals, power spectra of BFSK signal, Minimum Shift Keying(MSK), signal constellation of MSK waveforms, error probability of MSK signal, Gaussian Minimum Shift Keying: GMSK, basic concept of OFDM, constellation diagram, Some performance issues for different digital modulation techniques-Error Vector Magnitude (EVM), Eye Pattern and Relative Constellation Error (RCE), Conceptual idea for Vector Signa lAnalyzer (VSA).

Text Books

1. DigitalCommunications,S.Haykin,Wiley India.
2. Principlesof CommunicationSystems,H.Taub and D.L.Schilling,TMH PublishingCo.
3. ModernDigitalandAnalog CommunicationSystems,B.P.LathiandZ.Ding, OxfordUniversityPress

References

1. DigitalCommunications, J.G.Proakis,TMHPublishing Co.
2. DigitalCommunication,A.Bhattacharya,TMH PublishingCo.

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Course Description

Title of Course: Digital Signal Processing
Course Code: EC602
L-T-P Scheme: 3-0-0 **Course Credits: 3**

Introduction:

Digital Signal Processors (DSP) take real-world signals like voice, audio, video, temperature, pressure, or position that has been digitized and then mathematically manipulates them. A DSP is designed for performing mathematical functions like "add", "subtract", "multiply" and "divide" very quickly.

Signals need to be processed so that the information that they contain can be displayed, analyzed, or converted to another type of signal that may be of use. In the real-world, analog products detect signals such as sound, light, temperature or pressure and manipulate them. Converters such as an Analog-to-Digital converter then take the real-world signal and turn it into the digital format of 1's and 0's. From here, the DSP takes over by capturing the digitized information and processing it. It then feeds the digitized information back for use in the real world. It does this in one of two ways, either digitally or in an analog format by going through a Digital-to-Analog converter. All of this occurs at very high speeds.

Objectives:

This course covers the techniques of modern digital signal processing that are fundamental to a wide variety of application areas. Special emphasis is placed on the architectures and design techniques for digital filters.

Learning Outcomes:

Design and implement digital filters by hand and by using Matlab. Use computers and MATLAB to create, analyze and process signals, and to simulate and analyze systems sound and image synthesis and analysis, to plot and interpret magnitude and phase of LTI system frequency responses.

Application :

1. Filtering.
2. Speech synthesis in which white noise (all frequency components present to the same level) is filtered on a selective frequency basis in order to get an audio signal.
3. Speech compression and expansion for use in radio voice communication.
4. Speech recognition.
5. Signal analysis.
6. Image processing: filtering, edge effects, enhancement.
7. PCM used in telephone communication.
8. High speed MODEM data communication using pulse modulation systems such as FSK, QAM etc. MODEM transmits high speed (1200-19200 bits per second) over a band limited (3-4 KHz) analog telephone wire line.
9. Wave form generation.

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Course Description

Course Contents:

Unit 1:**Discrete-time signals:**
Concept of discrete-time signal, basic idea of sampling and reconstruction of signal, sampling theorem, sequences – periodic, energy, power, unit-sample, unit-step, unit-ramp, real & complex exponentials, arithmetic operations on sequences.

Unit 2:LTI Systems:
Definition, representation, impulse response, derivation for the output sequence, concept of convolution, graphical, analytical and overlap-add methods to compute convolution supported with examples and exercises, properties of convolution, interconnections of LTI systems with physical interpretations, stability and causality conditions, recursive and non-recursive systems.

Unit 3:Z-Transform:
Definition, mapping between s-plane and z-plane, unit circle, convergence and ROC, properties of Z-transform, Z-transform on sequences with examples and exercises, characteristic families of signals along with ROCs, convolution, correlation and multiplication using Z-transform, initial value theorem, Perseval's relation, inverse Z-transform by contour integration, power series & partial-fraction expansions with examples and exercises.

Unit 4:Discrete Fourier Transform:
Concept and relations for DFT/IDFT, Twiddle factors and their properties, computational burden on direct DFT, DFT/IDFT as linear transformations, DFT/IDFT matrices, computation of DFT/IDFT by matrix method, multiplication of DFTs, circular convolution, computation of circular convolution by graphical, DFT/IDFT and matrix methods, linear filtering using DFT, aliasing error, filtering of long data sequences – Overlap-Save and Overlap-Add methods with examples and exercises

Unit 5:Fast Fourier Transform:
Radix-2 algorithm, decimation-in-time, decimation-in-frequency algorithms, signal flow graphs, Butterflies, computations in one place, bit reversal, examples for DIT & DIF FFT Butterfly computations and exercises

Unit 6 :Filter Design:
Basic concepts of IIR and FIR filters, difference equations, design of Butterworth IIR analog filter using impulse invariant and bilinear transforms, design of linear phase FIR filters, no. of taps, rectangular, Hamming and Blackman windows.

Unit 7 :Digital Signal Processor:
Elementary idea about the architecture and important instruction sets of TMS320C 5416/6713 processor, writing of small programs in Assembly Language, FPGA:Architecture, different sub-systems, design flow for DSP system design, mapping of DSP algorithms onto FPGA

Text Books

1. Digital Signal Processing – Principles, Algorithms and Applications, J.G.Proakis& D.G.Manolakis, Pearson Ed.
2. Digital Signal processing – A Computer Based Approach, S.K.Mitra, TMH Publishing Co.
3. Digital Signal Processing Signals, Systems and Filters, A. Antoniou, TMH Publishing Co.
4. VLSI Digital Signal Processing Systems Design and Implementation, Wiley International Publication.
5. Digital Signal Processing with Field Programmable Gate Arrays, U.Meyer-Baese, Springer.

Reference Books:

1. Digital Signal Processing, P. Rameshbabu, Scitech Publications (India).
2. Digital Signal Processing, S.Salivahanan, A.Vallabraj& C. Gnanapriya, TMH Publishing Co.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Telecommunication System
Course Code: EC603
L-T Scheme: 3 **Course Credits: 3**

Introduction:

This course explains telecommunication system and digital switching. The Topics to be covered (tentatively) include:

- Introduction to Telephone Systems
- Telecommunication Transmission Lines
- Subscriber Loop Systems
- Switching System
- Digital Switching systems
- Stored Program Control
- Traffic Engineering
- IP Telephony

Objectives:

The Course Educational Objectives are:

1. To gain knowledge about advances in Telephone systems
2. To understand the essentials of cellular communication systems.
3. To gain knowledge about different multiplexing scheme
4. To have knowledge about different Transmission lines in telecommunication system

Learning Outcomes:

Once the student has successfully completed this course, he/she will be able to answer the following questions or perform following activities:

1. Describe the basic fundamentals of a telecom system
2. Describe the various types of connection links used by industry for telecommunication system worldwide.
3. Describe the common switching operations found in the telecommunications industry.
4. Describe the different types of broadcast systems commonly used by industry and government
5. Describe the different types of Transmission lines in telecommunication system
6. Describe the operating principles of satellite systems and its advantages and limitations

Course Contents:

1. Introduction to Telephone Systems: Evolution of Telecommunication; Components and Examples of Telecommunication systems; Pulse dialing & Tone dialing; Telephone Instruments - rotary dial and push button types. [3]
2. Telecommunication Transmission Lines:- Copper, Co-axial, and Fiber optic cables; Transmission Bridge-Hybrid circuit for 2-wire to 4-wire conversion and vice versa. PCM Carriers; American and European standards of carrier channels.[6]
3. Subscriber Loop Systems: BORSCHT Functions; Switching hierarchy & routing, signaling techniques-in channel & common channel signaling, SS7.[4]
4. Switching System: Electro-mechanical switching-Strowger& Crossbar; Circuit Switching & Packet Switching, [3]
5. Digital Switching systems - Time division Time switch, Time multiplexed Space switch, Time multiplexed Time switch, Hybrid switching, ; TS, ST, STS, TST systems; Architecture of 5ESS systems.[6]

6. Stored Program Control: Software architecture, Application software;. Electronic Exchanges, Introduction to cordless telephones and Digital PABX [4]
7. Traffic Engineering: Blocking network, blocking probability, grade of service, traffic load, Erlang-B and Congestion formulas-case studies Modems and Their Standards: RS 232C; DTE and DCE, Facsimile Transmission, Broad band transmission ISDN, DSL and ADSL, ISDN and B-ISDN [6]
8. IP Telephony: Voice over IP, Session initiation protocol, H.323 signaling, IP multimedia service [4]

Text Books

1. T. Viswanathan, " Telecommunications Switching Systems & Networks" PHI
2. J.E.Flood "Telecommunications Switching, Traffic and Networks" Pearson

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Antenna theory & Propagation
Course Code: EC604A
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

The Topics to be covered (tentatively) include:

1. Antennas
    - Overview of Transmission line parameters related to antenna design and performance.
    - Wave-guides and cavities.
    - Antenna fundamentals: (Types of antennas, Radiation mechanism). Overview of Plane and Solid angles, Near-field, Far-field regions, Polarization, RadiationPattern, Performance Antenna Parameters (Radiated Power, Directivity, Gain, Efficiency, Radiation Resistance and Input Impedance). Dipole, Monopole antennas, Loop antennas.
    - Broadband Antennas, Helical, Yagi-Uda, Log-periodic antennas.
    - Overview of Aperture antennas-Horn and dish reflector antennas.
    - Microstrip antennas, Rectangular, circular Microstrip patch antennas.
2. Terrestrial Propagation
    - Basic propagation modes, free space, ground reflection and diffraction.Ground wave propagation. Sky wave propagation.
    - Atmospheric effects on radio wave propagation.
    - Space (terrestrial) wave propagation.
    - Propagation models in mobile radio systems. Statistical models.
    - Basic diversity and Fading.

Objectives:

In this course we will study the basic components of Wave-guides and cavities; Radiation and antennas; Antenna parameters; dipoles and loop antennas; traveling wave antennas; Aperture and patch antennas; Linear and planar antenna arrays; Basic propagation modes; Free-space propagation; Ground wave propagation; Sky wave propagation; Space (terrestrial) wave propagation; Introduction to Propagation models in mobile radio systems

- To review the fundamentals of antenna theory.
- To expose students to examples of applications and various antenna types including linear and planar microstrip configuration.
- Introduce students to the various types and models of Radio wave propagation affecting Communication Systems. Introduction to Diversity principles.
- To improve the design and problem solving skills

Learning Outcomes:

Knowledge:

- Understand the function of antennas Understand the different types of antennas and the radiation mechanism.
- Evaluate the fundamental parameters of antennas and arrays operating at various frequencies from LF to Microwave applications.
- Ability to design various types of linear and planar antennas.
- Identify the atmospheric and terrestrial effects on radio wave propagation.
- Evaluate basic propagation models in mobile radio systems.

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Course Description

Application:

1. To develop and implement different antennas with help of different calculation, plotting and visualizing radiation patterns and various antenna parameters.
2. Students are introduced to the design of practical antenna systems used for communications, radar and other applications.
3. Students learn and analyze design issues and the necessary trade-offs that are required in complex systems with antenna design as a significant aspect of the overall system design and development

Course Contents:

Unit 1: Review of Maxwell's Equation; Radiation of em waves and introducing Antenna; Vector Potential and Retarded Vector Potential; Radiation fields of a Hertzian dipole(electric); Duality Principle, Radiation fields due to short magnetic dipole. Antenna Characteristics: Radiation Pattern, Beam Width; Radiation Resistance and efficiency; Directivity and Gain; Impedance, VSWR, Polarization; Effective height and Receive Aperture; Noise Temperature of Antenna.

Antenna Theory: Analysis & Design, Constantine A. Balanis; Willey, 3rd Edition (Chapter-2)

Unit 2: Characteristics of λ/2dipole; discussion on λ/4 monopole antenna; Current distribution and Radiation patterns of center-fed dipoles of length λ, 3λ/2and2λ.Horizontal and Vertical antennas over a plane ground Antenna Arrays: electric Field due to 2 element arrays, 3 element Arrays; Pattern Multiplication; Uniform Linear Array: End fire and Broadside; Phased array

Antenna Theory: Analysis & Design, Constantine A. Balanis; Willey, 3rdEdition (Chapter-4,9)

Unit 3: Characteristics and properties of: Travelling Wave Antenna,Helical Antenna, Folded Dipole, Yagi-Uda Array, Loop Antenna, Electrically Short Antennas, Broad Band Antenna (Log periodic Antenna), Microstrip Patch Antenna. Radiation roman aperture: Sectoral and Pyramidal Horn Antennas, Design of Optimum Horn Antenna; Parabolic and Corner Reflectors and feed systems

Antenna Theory: Analysis& Design, Constantine A. Balanis; Willey, 3rdEdition (Chapter-5,6,10,14)

Unit 4: Methods of Propagation: Ground Wave Propagation, Components of ground wave, Field strength dependence on physical factors. Skywave Propagation; Ionospheric Layers; Virtual Height, Critical Frequency, MUF, Skip distance, poradic Reflections.Space wave propagation: Tropospheric Scatter, Ducting Super refraction, Sub refraction. Friss Transmission Formula, SNR of a Radio Link. Physical (Medium) effects on Radio wave Propagation: Absorption, Refraction and Radio Horizon, Diffraction, Multipath Propagation and fading, Noise, Doppler effect.

Antenna &Wave Propagation, K.D Prasad; Satya Prakashan, New Delhi, 3rd Edition(chapter-10,11)
Elements of Electromagnetics; Mathew N.O.Sadiku, Oxford University Press, 5thEdition(2010)(Chapter-10)

Text Books

1. Antenna(for allapplication),JohnD. Kraus and RonaldJ. Marhcfka;Tata-MacGrawHill,3rdEdition
2. Antenna&Wave Propagation,K.D Prasad;SatyaPrakashan,NewDelhi, 3rdEdition
3. AntennaTheory:Analysis&Design,ConstantineA. Balanis;Willey, 3rdEdition

References

1. Elementsof Electromagnetics;MathewN.O.Sadiku,OxfordUniversityPress, 5thEdition(2010)
2. ElectromagneticWaves&RadiatingSystems,E .CJordan&K.G. Balmain, PearsonEducation, 2ndEdition(2009)
3. MicrostripAntennaDesign Handbook- RameshGarg;ArtechHouse (2001)

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Optical Communication & N/W
Course Code: EC604B
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

This course aims to initiate and expose the students to exciting area of optical communication. Technical concepts which are at the core of design, implementation and research will be discussed during this course in order that is conductive to understanding general concepts as well as latest development. Following points will be elaborated in this course:

- Optical fibers
- Optical Transmitter
- Optical Receiver
- Optical Link
- Optical networks

Objectives:

The objective of the course is to provide a comprehensive understanding of optical communication systems and networks. The course starts with basics of light waves and their propagation, and single/multimode optical fibers. Then move to broadband (light emitting diode) and narrowband (laser diodes) optical sources and their modulation; PIN and Avalanche photo detectors and other elements of optical systems. We will study basic optical networks then using a design approach to point-to-point fiber links, star, bus and ring topologies. Multiple access techniques such as WDM (Wavelength Division Multiplexing) and SCM (Sub Carrier Multiplexing) also will be covered. Synchronous Optical Networks (SONET) will be covered to good extend. Passive Optical Networks (PON) widely used in fiber-to-the-home (FTTH) schemes and emerging radio over fiber (ROF) networks that bridge the optical and wireless networks will also be covered.

Learning Outcomes:

Knowledge:

1. To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
2. To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors. Design optimization of SM fibers, RI profile and cut-off wave length.
3. To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers.
4. To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration.
5. To learn fiber slicing and connectors, noise effects on system performance, operational principles WDM and solutions.

Course Contents:

Unit 1: Introduction to communication systems: Principles, components; Different forms of communications in brief, advantages of optical fiber communication, spectral characteristics.

Unit 2: Optical Fiber wave guide: Structure, Single and Multimode operation; Attenuation, Material and wave guide dispersion.

Unit 3: Optical Sources: Light Emitting Diode; principle, structures, power and efficiency, coupling to fibers. Laser diodes: principle, double heterostructure, gain and index guiding, distributed lasers.

Course Description

Quantum Well Lasers: Modes and narrow linewidth lasers. Modulation; Bandwidth for modulation, Optical transmitters: components.

Unit 4: Optical Detectors: Device types, optical detection principles, efficiency, responsivity, bandwidth. Preamplifiers: noise sources, signal to noise ratio.

Unit 5: Point-to-point link and Wavelength Division Multiplexing: Building blocks; Multiplexing; Intensity Modulation/Direct Detection system; Principle of Regeneration; WDM link, Optical amplifiers; EDFA, SOA, Raman amplifier, Fabry-Perot filters. Dispersion compensation and management, Link analysis and Bit-Error-Rate calculation.

Unit 6: Optical Network: LAN, MAN, WAN; Topologies: bus, star, ring; Ethernet; FDDI; Telecom networking: SDH/SONET. Different forms of access networks: Telephony; ISDN; Cable TV; Broadcast and Switched Networks; HFC networks; FTTC and FTTH networks; All optical networks.

Text Books

1. Optical Fibre Communication: John M. Senior (Pearson).
2. Optical Fibre Communication : Gerd Kaiser (TMH).

References

1. Optical Networks–A practical perspective:RajivRamaswami, K.N.Sivarajan,Galen H.Sasaki (Morgan-Kaufman).
2. Optical Communication Systems : John Gawar (PHI).

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Computer Networks
Course Code: EC604C
L-T Scheme: 3-0 **Course Credits:3**

Introduction:

This course is to provide students with an overview of the concepts and fundamentals of data communication and computer networks. Topics to be covered include: data communication concepts and techniques in a layered network architecture, communications switching and routing, types of communication, network congestion, network topologies, network configuration and management, network model components, layered network models (OSI reference model, TCP/IP networking architecture) and their protocols, various types of networks (LAN, MAN, WAN and Wireless networks) and their protocols. The courses supplemented by a practical component covered in CS692 concurrently.

Objectives:

At the end of the course, the students will be able to:
1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:
1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
5. Identify the different types of network devices and their functions within a network
6. Understand and building the skills of subnetting and routing mechanisms.
7. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
8. Analyze the features and operations of various application layer protocols such as Http, DNS, and SMTP.

Application:

1. To configure and implement network topology.
2. To configure and implement local area network.
3. To design network and assign IP address
4. Connect Remote computers
5. Analyze the network.

Course Contents:

Unit-1:

Introduction; Data communications: components, data representation (ASCII,ISO etc.),direction of data flow(simplex, half duplex, full duplex); Networks: distributed processing, network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN,WAN);Internet: brief

history, internet today; Protocols andstandards; Reference models: OSI reference model, TCP/IP reference model, their comparative study.

Physical layer:
Overview of data(analog & digital), signal(analog &digital), transmission (analog & digital)& transmission media (guided & non-guided); TDM, FDM, WDM; Circuit switching: time division & space division switch, TDM bus; Telephone network;

Unit-2:
Data link layer:
Types of errors, framing(character and bit stuffing), error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC;

Medium access sub layer:
Point to point protocol, LCP, NCP, FDDI, token bus,token ring; Reservation, polling, concentration; Multiple access protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA; Traditional Ethernet, fast Ethernet;

Unit-3:
Network layer:
Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing : Internet address, classful address, subnetting; Routing : techniques,static vs. dynamic routing , routing table for classful address; Routing algorithms: shortest path algorithm, flooding, distance vector routing, link state routing; Protocols: ARP, RARP, IP, ICMP, IPV6; Unicast and multicast routing protocols.

Transport layer:
Process to process delivery; UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve QoS.

Unit-4:
Application layer:
DNS; SMTP, SNMP, FTP, HTTP & WWW; Security: Cryptography, user authentication, security protocols in internet, Firewalls.

Modern topics:
ISDN services & ATM ; DSL technology, Cable modem, SONET. Wireless LAN: IEEE 802.11; Introduction to blue-tooth, VLAN's, Cellular telephony & Satellite network.

Text Books:
1. B. A. Forouzan – "Data Communications and Networking (3rd Ed.) " – TMH
2. A. S. Tanenbaum – "Computer Networks (4th Ed.)" – Pearson Education/PHI
3. W. Stallings – "Data and Computer Communications (5th Ed.)" – PHI/ Pearson Education
4. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP
5. Black, Data & Computer Communication, PHI
6. Miller, data Communication & Network, Vikas

Reference Books:
1. Kurose and Rose – " Computer Networking -A top down approach featuring the internet" – Pearson Education
2. Leon, Garica, Widjaja – "Communication Networks" – TMH

3. Walrand – "Communication Networks" – TMH.
4. Comer – "Internetworking with TCP/IP, vol. 1, 2, 3(4th Ed.)" – Pearson Education/PHI

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: FPGA & Reconfigurable Computing
Course Code: EC604D
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

This course examines reconfigurable computer designing concepts, FPGA based HDL programming and RC mapping algorithms, and systems programming basics. The Topics to be covered (tentatively) include:

- Introduction to Reconfigurable Computing (RC)
- Reconfigurable Logic Devices
- Hardware Description Language for RC
- RC Configuration
- RC Implementation
- RC applications:

Objectives:

In this course, we will study the basic components of areconfigurable computer and FPGA, their functions, mechanisms, policies and techniques used in their implementation and examples from popular FPGA. The way different modules in the reconfigurable computer interact and work together to provide the basic services of a reconfigurable computing and FPGA.

Learning Outcomes:

Knowing that reconfigurable computing aims at the development of reconfigurable processors or coprocessors, and to highlight the applied aspects of our course, we entitled it "FPGA and reconfigurable computing". In the style of constructive alignment, we formulate the learning outcomes of our course as follows:

1. Define a reconfigurable computing and explain its main features.
2. Compare reconfigurable processors with other processor types.
3. Design a reconfigurable processor based on modern FPGAs.
4. Identify fine-grain and coarse grain reconfigurable resources.
5. Explain some applications of reconfigurable processors.

Application:

1. To develop and implement various circuit on FPGA.
2. To develop and implement various reconfigurable system
3. To develop any real-life system using DSP processor

Course Contents:

Unit 1: **Introduction to Reconfigurable Computing (RC):**

History, State-of-the-Art and Future Trends, Computing requirements as Power, Area and VLSI scaling, Mapping of Algorithmanalysis and speed-up, RC architectures- Fine Grain and Coarse Grain, Hybrid and Embedded Architectures, Supercomputers.

Unit 2:Reconfigurable Logic Devices:

FPGA and its internal architecture, computing elements, LUT, BRAM, interconnects, I/O Blocks, programming of FPGA andinterfacing case study, ALU design, designing with embedded processors, introduction to Power PC and ARM processors.

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Course Description

Unit 3:Hardware Description Language for RC:
Design cycle, algorithms, Hardware Description Language, VHDL, different design styles: data flow, structural and behavioral andpractical logic circuit implementation example on FPGA, debugging, writing test bench, High level synthesis and Low levelsynthesis.

Unit 4: RC Configuration:
Application segmentation and Resource partitioning, spatial and temporal configuration, systolic architectures and algorithms, Bitserial, on the fly, multiplexing vs. run-time reconfiguration.

Unit 5:RC Implementation:
Virtual Hardware Components (VHC) design process, high level synthesis of VHC and optimization, VHC data-path and control unitdesign, simulation and verification of VHC, determination of reconfigurable scheme and associated loading mechanisms (temporaland spatial partitioning) for RC.

Unit 6:RC applications:
RC for DSP, DSP application building blocks, RC for Image processing, Bioinformatics and Network Security.

Text Books
1. M. Gokhale and P. Graham; Reconfigurable Computing: Accelerating Computation with FPGAs, Springer, 2005
2. C. Maxfield ; The design Warrior's Guide to FPGAs: Devices, Tools and Flows, Newnes, 2004
3. C. Bobda, Introduction to Reconfigurable Computing: Architectures, Algorithm and Applications, Springer, 2005

References
1. W. Wolf, FPGA Based Systems Design, PHI, 2004
2. P. Lysagt and W. Rosenstiel, New Algorithms, Architectures and Applications for Reconfigurable Computing, Springer,2005.

UNIVERSITY OF ENGINEERING AND MANAGEMENT, JAIPUR

Course Description

Title of Course: Object Oriented Programming Using Java
Course Code: EC605A
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

This course presents a conceptual and practical introduction to imperative and object oriented programming, exemplified by Java. As well as providing grounding in the use of Java, the course will cover general principles of programming in imperative and object oriented frameworks. The course should enable you to develop programs that support experimentation, simulation and exploration in other parts of the computer science curriculum (e.g. the capacity to implement, test and observe a particular algorithm).

Objectives:

In this course we will study the basic components of an operating system, their functions, mechanisms, policies and techniques used in their implementation and examples from popular operating systems. The way different modules in the operating system interact and work together to provide the basic services of an operating system.

Learning Outcomes:
Knowledge:
At the conclusion of the course, following learning objectives are expected to be achieved:

1. Explain what constitutes an object-oriented approach to programming and identify potential benefits of Object-oriented programming over other approaches.
2. Analyze and decompose problem specifications from Object Oriented Perspectives and represent the solution, using UML notation.
3. Explain the benefits of object oriented design and the types of systems in which it is an appropriate methodology.
4. Apply an object-oriented approach to developing applications of varying complexities.
5. Augment a class definition using constructors, destructors, member functions, helper functions and custom input/output operators to add functionality to a programming solution.
6. Manage an object's resources using dynamic memory allocation and de-allocation to access data stored outside the object's memory.
7. Read from and write to files using objects from the standard input output library and custom file operators for future restoration.
8. Model specialization using single inheritance and abstract base classes to minimize code duplication.
9. Model polymorphic behavior using coercion, overloading, virtual functions and function templates to amplify reusability of code

Application:

1. The lab work and homework portions of the course are intended to help you apply your understanding.
2. Basic programming techniques.
3. Design object oriented solutions for small systems involving multiple objects.
4. Apply good programming style and understand the impact of style on developing and maintaining programs.
5. Be able to justify programming style choices.
6. Explain the steps in creating an executable program for a computer, including the intermediate representations and their purpose.
7. Trace the execution of program code to debug an application

UNIVERSITY OF ENGINEERING AND MANAGEMENT, JAIPUR

Course Description

Course Contents:

Unit 1: Concepts of object oriented programming language, Major and minor elements, Object, Class, relationships among objects, aggregation, links, relationships among classes-association, aggregation, using, instantiation, meta-class, grouping constructs.

Unit 2: Difference between OOP and other conventional programming – advantages and disadvantages. Class, object, message passing, inheritance, encapsulation, polymorphism.

Unit 3: Basic concepts of java programming – advantages of java, byte-code & JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes, basic string handling concepts- String (discuss charAt() , compareTo(), equals(), equalsIgnoreCase(), indexOf(), length() , substring(), toCharArray() , toLowerCase(), toString(), toUpperCase() , trim() , valueOf() methods) & StringBuffer classes (discuss append(), capacity(), charAt(), delete(), deleteCharAt(), ensureCapacity(), getChars(), indexOf(), insert(), length(), setCharAt(), setLength(), substring(), toString() methods), concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.

Unit 4: Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super() method, dynamic method dispatch, use of abstract classes & methods, interfaces. Creation of packages, importing packages, member access for packages.

Unit 5: Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes. Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, inter-thread communication, deadlocks for threads, suspending & resuming threads.

Unit 6: Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint(), getDocumentBase(), getCodeBase() methods, layout manager (basic concept), creation of buttons (JButton class only) & text fields.

Text Books

1. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed. – , Tata Mc Graw Hill.
2. Herbert Schildt, Java: The Complete Reference (Tata Mcgraw Hill Education Private , 7th Ed).

References

1. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India.
2. Ali Bahrami – "Object Oriented System Development" – Mc Graw Hill.
3. Deitel and Deitel – "Java How to Program" – 6th Ed. – Pearson.

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Course Description

Title of Course: Programming Language
Course Code: EC605B
L-T-P Scheme: 3-0-0 **Course Credit: 3**

Introduction:
The course presents advanced C++ programming including: C++ environment, exception handling, conception of different file handling, template, STL etc.

Objectives:
After completion of the course the students will:

- Be able to program using more advanced C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.
- Be able to build class template, function template and also they will able to know how STL are works.
- Be able to understand different string operations and different file operations, like text file, binary file.

Learning Outcomes:

- Be able to develop simple computer programs.
- Understand exception handling mechanism.
- Be able to do different file(text, binary) operations.
- Understand template-class template & function template.
- Understand the usage of STL.
- Be able to do different operations on string in C++ programming.

Course Contents:

Module-I: Introduction
Basics of OOP, Features; Structure of C++ program; Class and object; Concept of Constructor& destructor; Abstraction and Encapsulation; Inheritance; Static and dynamic binding; Polymorphism.

Module II: Exception Handling
Exception handling mechanism; throwing, catching, rethrowing mechanism; Multiple catch statement; Nested try-catch block; exception in constructor & destructor; exceptions in operator overloaded functions.

Module III: Template
Class template; Member function inclusion; Class template with different parameter; Function template; Function template with multiple parameters; Overloading of template function; member function template.

Module IV: Console I/O operations
C++ streams; C++ stream classes; Unformatted I/O operations; Formatted I/O operations; Managing output with Manipulators.

Module V: Working with Files

Data File Handling: Need for a data file, Types of data files – Text file and Binary file; Text File: Basic file operations on text file: Creating/Writing text into file, reading and manipulation of text from an already existing text File (accessing sequentially).Binary File: Creation of file, Writing data into file, Searching for required data from file, Appending data to a file, Insertion of data in sorted file, Deletion of data from file, Modification of data in a file; opening and closing files; classes for file stream operations; Error handling during file operations; command line arguments.

Module VI: Standard Template Library

Components of STL; Containers, Iterator; Applications of container classes.

Standard Functions Library

C-based I/O functions (fflush, fgetc, ferror, fscanf, fprintf etc.); Time, Date, Localization functions (asctime, clock, ctime, difftime, localtime mktime, strftime etc.); Dynamic memory allocation functions (calloc, malloc, realloc, free).

Module VII: String Manipulation

The String class; Creating String object; Manipulating strings; Relational operations on strings; String comparison characteristics, swapping; Accessing characters in strings.

Text Books:

- Schildt, H., The Complete Reference C++, Tata McGraw Hill Education Pvt. Ltd.
- E.Balagurusamy; Object Oriented programming with C++; Tata McGraw Hill Education Pvt. Ltd.

References:

- Debasish Jana, C++ object oriented programming paradigm, PHI.
- D. Ravichandran, Programming with C++, Tata McGraw Hill Education Pvt. Ltd.
- Y.I. Shah and M.H. Thaker, Programming In C++, ISTE/EXCEL BOOKS.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Electronic Measurement & Instrumentation
Course Code: EC605C
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

This course gives fundamentals of different measuring techniques, working principle of instrument transformer, concept of CRO, Knowledge of sensors and transducers. The Topics to be covered (tentatively) include:

- Measurement methods
- Analog meters
- Instrument transformer
- Measurement of Power, Energy, resistance
- Potentiometer
- Cathode ray oscilloscope (CRO)
- Sensors &Transducers

Objectives:

The objective of the course is to to introduce the student fundamentals of Electronics Instruments and Measurement, providing an in-depth understanding of analog and digital meters, to learn the role of sensors and transducers in real life applications.

Knowledge:

1. Providing an in-depth understanding of Measurement errors.
1. Learning the necessity of measuring devices and also proper selection of the
2. Effects of the internal impedances of meters while measuring
3. Working principle of different types of analog instruments.
4. Operating principle and practical use of current transformer and potential transformer
5. Knowledge of using bridges to measure inductance capacitance resistances
6. Learning the application of ac and dc potentiometer to measure unknown emf
7. Understand the fundamental concepts of CRO and its use to measure electrical parameters
8. Knowledge of sensors and transducers and their real time application

Application:

1. Analog and digital meters are used for measuring different electrical quantities.
2. No other instrument in electronic industry is as versatile as a CRO for measuring and recording purpose
3. Transducers are used in electronic communications systems to convert signals of various physical forms to electronic signals, and vice versa.

Course Contents:

Unit 1:

Measurements: Method of measurement, Measurement system, Classification of instruments, Definition of accuracy, Precision, Resolution, Speed of response, Error in measurement, Classification of errors, loading effect due to shunt and series connected instruments.

Analog meters: General features, Construction, Principle of operation and torque equation of Moving coil, Moving iron, Electrodynamometer, Induction instruments

Principle of operation of the Electrostatic, Thermoelectric, Rectifier type instruments, Extension of instrument ranges and multipliers.

Unit 2:

Instrument transformer: Disadvantage of shunt and multipliers, Advantage of Instrument transformers, Principle of operation of current & Potential transformer, errors.

Measurement of Power: Principle of operation of Electrodynamic & Induction type wattmeter. Wattmeter errors.

Course Description

Measurement of resistance:
Measurement of medium, low and high resistances, Megger.

Unit 3:

Measurement of Energy:
Construction, theory and application of AC energy meter, testing of energy meters.

Potentiometer:
Principle of operation and application of Crompton's DC potentiometer, Polar and Co-ordinate type AC potentiometer. Application.

AC Bridges:
Measurement of Inductance, Capacitance and frequency by AC bridges.

Unit 4:

Cathode ray oscilloscope (CRO):
Measurement of voltage, current, frequency & phase by oscilloscope, Frequency limitation of CRO, Sampling and storage oscilloscope, Double beam CRO.

Electronic Instruments:
Advantages of digital meter over analog meters, Digital voltmeter, Resolution and sensitivity of digital meters, Digital multimeter, Digital frequency meter, Signal generator.

Sensors &Transducers:
Introduction to sensors &Transducers, Strain gauge, LVDT, Temperature transducers, Flow measurement using magnetic flow measurement.

Text Books

1. A.K.Sawhney, A course in Electrical & Electronic Measurements & Instrumentation, Dhanpat Rai and sons

References

1. H.S.Kalsi, Electronic Instrumentation, Tata McGraw hill

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Digital Communications Lab
Course Code: EC691
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:
Digital communication uses electrical signaling methods to transmit information over a physical channel separating a transmitter and receiver with the channel properties often time varying. This course presents the theory and practice of digital communication including signal design, modulation methods, demodulation methods, wireless channel basics and the application of this to the design of modern OFDM systems.

Learning Outcomes:
Upon successful completion of this course, the students will be able to;
1. Understand the basic concepts of digital communication systems.
2. Apply different modulation schemes to baseband signals
3. Analyze the BER characteristics of Baseband Modulated signals

Course Contents:
Exercises that must be done in this course are listed below:

1. To study different types of signal sampling and its reconstruction.
2. To study Pulse Position Modulation
3. To generate the pulse width modulated and demodulated signals**.**
4. Study of Time Division Multiplexing System.
5. To study delta modulation & demodulation and observe the effect of slope overload
6. To study the operation of Amplitude Shift Keying modulation and demodulation with the help of circuit connections.
7. To study the operation of Frequency Shift Keying modulation and demodulation with the help of kit.
8. To generate Pulse shift key (PSK) With Wave forms.
9. To study Quadri Phase Shift Keying (QPSK).
10. To study Differential Phase Shift Keying (DPSK).

Text Book:
1. J. D. Proakis and M. Salehi (2008), Digital Communication,
2. McGraw HilDavid Silage (2009), Digital Communication

Recommended Kits and Equipment Requirements:
1. Digital communication,Advance Digital communication kits
2. DSO, FG, Probes

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Course Description

Title of Course: Digital Signal Processing lab
Course Code: EC692
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:
The main objective of this course is to introduce the architecture ofDSP processor for developing real-time applications. In this coursestudents will learn about the computational building blocks and thebasic architectural features of DSP.They will learn about programmabledigital signal processors and implementation details of DSP algorithmslike digital filters, including basic adaptive filters and FfTs. They will alsobe introduced to CODEC programming and interfacing codec and DSP as well as several real-world applications of DSP processors.

Learning Outcomes:
1. Understand the architecture and building blocks of digital signalprocessor.
2. Analyze and process signals using DSP Processor.
3. Implementing FIR, IIR and basic adaptive filters to suit specificrequirements for specific applications.
4. Learn codec programming and interfacing it with DSP.
5. Understand the applications of DSP processors
6. Designing and implementing a small application using DSPprocessor

Course Contents:
Exercises that must be done in this course are listed below:
Experiment 1: - Generate continuous and Discrete signal
Experiment 2: - Graphical representation of unit step signal
Experiment 3: - Graphical representation of unit sample signal
Experiment 4: - Graphical representation of unit ramp signal
Experiment 5: - Graphical representation of exponential signal
Experiment 6: - Graphical representation of exponential increasing- decreasing signal
Experiment 7: - Graphical representation of even signal
Experiment 8: - Graphical representation of odd signal
Experiment 9:- Determine whether given signal is periodic or not
Experiment 10: - Convolution of given sequences
Experiment 11: - Cross correlation of given sequences
Experiment 12: - Plot Magnitude and Phase Response
Experiment 13: - Impulse Response of a given System
Experiment 14: -Z Transform of the Sequence a given sequence
Experiment 15: - Inverse Z Transform of the Sequence a given sequence
Experiment 16: - DFT and IDFT of a Sequence
Experiment 17: - 8- point DFT of the Sequence
Experiment 18: - Circular convolution of following sequences

Text Book:

1. J. G. Proakis and D. G. Manolakis, "Digital Signal Processing", Prentice Hall India, 3rd edition, 1997, ISBN: 81-203-1129-9

Recommended Systems/Software Requirements:
1. SCILAB

UNIVERSITY OF ENGINEERING AND MANAGEMENT, JAIPUR

Course Description

Title of Course: Object Oriented Programming Using Java
Course Code: EC695A
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. To strengthen their problem solving ability by applying the characteristics of an object oriented approach.
2. To introduce object oriented concepts in Java.

Learning Outcomes:

1. Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
2. Apply an object-oriented approach to developing applications of varying complexities.

Course Contents:
Exercises that must be done in this course are listed below:
Exercise No. 1: Class creation with main method and steps of source code compilation and execution.
Exercise No. 2: Design a stack and a queue.
Exercise No. 3: Design different types of linked lists for different operations.
Exercise No. 4: Methods of String.
Exercise No. 5: Implement different types of polymorphism: overloading and overriding.
Exercise No. 6: Implement different types of inheritance.
Exercise No. 7: Use of package with access specifier.
Exercise No. 8: Write a program using static keyword.
Exercise No. 9: Write a program to use this, this(), super, super().
Exercise No. 10: Exception handling.
Exercise No. 11: Threading.
Exercise No. 12: Applet programming and Action Event.
Exercise No. 13: Swing programming and Layout.

Text Book:

1. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed. – Tata Mc Graw Hill.
2. Herbert Schildt, Java: The Complete Reference (Tata Mcgraw Hill Education Private , 7th Ed).

Recommended Systems/Software Requirements:

1. Java Development Kit and Java Runtime Environment, preferable latest version.

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Course Description

Title of Course: Programming Language Lab
Course Code: EC695B
L-T-P Scheme: 0-0-3 **Course Credit: 2**

Objectives:

The course presents C++ programming including: advanced C++ environment, exception handling, conception of different file handling, template, STL that aims to:

- Be able to code using more advanced C++ features such as class, objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, exception handling, etc.
- Be able to build class template, function template and also they will able to know how practically STL are works.
- Be able to understand practically different string operations and different file operations, like text file, binary file.

Learning Outcomes:

- Be able to develop different types of computer programs using C++.
- Understand exception handling mechanism anddifferent file(text, binary) operations.
- Understand the usage of template: class template & function template and STL.
- Be able to do different operations on string in C++ programming.

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1: Introduction, Basics of C++, Inline function, friend function, function and overloading, inheritance

Exercise No. 2: Exception Handing: throwing, catching, rethrowing mechanism; Multiple catch statement

Exercise No. 3: Template: Class template, Function template

Exercise No. 4: Console I/O operations: C++ streams; C++ stream classes; Unformatted I/O operations; Formatted I/O operations; Managing output with Manipulators.

Exercise No. 5: Working with Files: Text File: Basic file operations on text file: Creating/Writing text into file; Binary File: Creation of file, writing data into file, searching.

Exercise No. 6: Standard Template Library: Components of STL; Containers, Iterator; Applications of container classes.

Exercise No. 7: String Manipulation: The String class; Creating String object; Manipulating strings; Relational operations on strings; String comparison characteristics.

Text Books:

- Schildt, H., The Complete Reference C++, Tata McGraw Hill Education Pvt. Ltd.
- E.Balagurusamy; Object Oriented programming with C++; Tata McGraw Hill Education Pvt. Ltd.

References:

- Debasish Jana, C++ object oriented programming paradigm, PHI.
- D. Ravichandran, Programming with C++, Tata McGraw Hill Education Pvt. Ltd.
- Y.I. Shah and M.H. Thaker, Programming In C++, ISTE/EXCEL BOOKS.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Electronic Measurement & Instrumentation Lab
Course Code: EC695C
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:
1. To introduce the student fundamentals of Electronics Instruments and Measurement
2. To understand how measuring instruments work for measurement of electrical and non electrical quantity.
3. Providing practical ideas and an in-depth understanding of Measurement procedures.

Learning Outcomes: The students will have a detailed knowledge of the concepts of different measuring methods and the devices that has to be used for the purpose. Upon the completion of Operating Systems practical course, the student will be able to:

- **Understand** necessity of measuring devices and also proper selection of the devices
- **Use** proper instruments for measuring electrical and non electrical quantities**.**
- **Understand** effects of the internal impedances of meteres while measuring.
- **Analyze** General features of analog meteres
- **Learn** the application of ac and dc potentiometer to measure unknown emf
- **Understand** the fundamental concepts of CRO and it's use to measure electrical parameters

Course Contents:
Exercises that must be done in this course are listed below:
Exercise No. 1: Measure a resistance using Kelvin's Double Bridge
Exercise No. 2: Measure unknown capacitance using Schering Bridge
Exercise No. 3: Measure self inductance using Anderson's Bridge.
Exercise No. 4: Measure unknown value of capacitance using De Sauty Bridge
Exercise No. 5: Measure Unknown frequency using Wein's Bridge
Exercise No. 6: Measure three phase power and power factor
Exercise No. 7: Study the operation of CRO

Text Book:
1. A.K. Sawhney, A course in Electrical & Electronic Measurements & Instrumentation, Dhanpat Rai and sons

Recommended Systems/Apparatus Requirements:
1. Laboratory Kits, Multimeters, CRO, Connecting wires.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Antenna Theory & Propagation Lab
Course Code: EC-694A
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. To introduce the fundamental principles of antenna theory and various types of antennas.
2. Applying the principles of antennas to the analysis, design, and measurements of antennas.
3. To know the applications of some basic and practical configurations such as dipoles, loops, and broadband, aperture type and horn antennas.

Learning Outcomes: Through lecture, and out-of-class assignments, students are provided learning experiences that enable them to:

- Understand the basic principles of all types of antennas and Analyze different types of antennas designed for various frequency ranges.
- Become proficient with analytical skills for understanding practical antennas.
- Design some practical antennas such as dipole, Yagi - uda, and horn antennas.
- Determine the radiation patterns (in principal planes) of antennas through measurement setups. Develop technical & writing skills important for effective communication.
- Acquire team-work skills for working effectively in groups

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1: Study Yagi-Uda Antenna radiation pattern characteristics

Exercise No.2: To compare the effects of the number of element to the radiation pattern characteristics.

Exercise No. 3: The Slotted Line(waveguide hardware, measurement of SWR, λg, impedance)

Exercise No. 4: Impedance Matching and Tuning((stub tuner, $\lambda/4$ transformer, network analyzer)

Exercise No. 5: To understand the basic principles of a given antenna (here Dielectric antenna) and practically measure the following characteristics of this antenna

1. The Radiation pattern (Azimuth XY-plane plot)
2. Antenna Beam width
3. Antenna Front-to-Back ratio
4. The Gain using standard reference antenna

Exercise No. 6: Study Horn Antenna Radiation pattern characteristics

Exercise No. 7: To understand the basic principles of a given antenna (here Half-Wave Simple Dipole antenna) and practically measure the following characteristics of this antenna

1. The Radiation pattern (Azimuth XY-plane plot)
2. Antenna Beam width
3. Antenna Front-to-Back ratio
4. The Gain using standard reference antenna

Exercise No. 8: To measure the low, medium and high VSWR of the given loads and determine the reflection coefficient.

Text Book:

1. E.C. Jordan and Balmain, "Electro Magnetic Waves and Radiating Systems", PHI, 1968, Reprint 2003.

Recommended Systems/Software Requirements:

1. Intel based desktop PC with minimum of 1 GHZ or faster processor with at least 2 GB RAM and 100 GB free disk space.
2. SciLAB, CST for Windows XP or Linux Operating System.

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Course Description

Title of Course: Optical Communication & N/W Lab
Course Code: EC694B
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives: This course aims to initiate and expose the students to exciting area of optical communication. Technical concepts which are at the core of design, implementation and research will be discussed during this course in order that is conductive to understanding general concepts as well as latest development Following points will be elaborated in this course:

- Optical fibers
- Optical Transmitter
- Optical Receiver
- Optical Link
- Optical networks

The objective of the course is to provide a comprehensive understanding of optical communication systems and networks. The course starts with basics of light waves and their propagation, and single/multimode optical fibers. Then move to broadband (light emitting diode) and narrowband (laser diodes) optical sources and their modulation; PIN and Avalanche photo detectors and other elements of optical systems. We will study basic optical networks then using a design approach to point-to-point fiber links, star, bus and ring topologies. Multiple access techniques such as WDM (Wavelength Division Multiplexing) and SCM (Sub Carrier Multiplexing) also will be covered. Synchronous Optical Networks (SONET) will be covered to good extend. Passive Optical Networks (PON) widely used in fiber-to-the-home (FTTH) schemes and emerging radio over fiber (ROF) networks that bridge the optical and wireless networks will also be covered.

Learning Outcomes:
Knowledge:

1. To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
2. To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors. Design optimization of SM fibers, RI profile and cut-off wave length.
3. To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers.
4. To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration.
5. To learn fiber slicing and connectors, noise effects on system performance, operational principles WDM and solutions.

Course Contents:

1. D. C. Characteristics of LED and PIN photo diode.
2. D. C. Characteristics of Laser diode.
3. Measurement of Numerical aperture, Propagation and Bending Loss in
4. fiber.Fiber Optic Analog Link.
5. Fiber Optic Digital Link

Text Book:

1. Maurice J. Bach, Design of the UNIX Operating System, PHI.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Computer Networks Lab
Course Code: CS692
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:
This practical course provides students with hands on training regarding the design, troubleshooting, modeling and evaluation of computer networks. In this course, students are going to experiment in a real and simulation based test-bed networking environment, and learn about network design and troubleshooting topics and tools such as: network addressing, Address Resolution Protocol, basic troubleshooting tools (like ping, ICMP), IP routing (e.g. RIP), TCP and UDP,DHCP,ACL and many others. Student will have the opportunity to build some simple networking models using the tool and perform simulations that will help them evaluate their design approaches and expected network performance.

Learning Outcomes: The students will have a detailed knowledge network topology, Local area network, IP addressing, familiarization with network simulator, idea about networking devices, network cable and connectors, different types routing protocols, concept of remote access and different types of application layer protocol. Upon the completion of Computer network practical course, the student will be able to:

- **Learn** various network commands.
- **Understand** and implement basic of Network and Network Topology.
- **To get** idea about IP addressing schemes.
- **Understand** the benefits of network.
- **Configure** and simulate various protocols.
- **Access** remote desktop.
- **Connect** to different computer using LAN.
- **Understand** the concepts of access control.

Course Contents:
Exercises that must be done in this course are listed below:
Exercise No.1: Study of different types of Network cables and practically implements the cross-wired cable and straight through cable using clamping tool.
Exercise No. 2: Familiarization with some network devices.
Exercise No. 3: Study of Network IP.
Exercise No. 4: Connect the computers in LAN.
Exercise No. 5: Introduction to Packet Tracer.
Exercise No. 6: Configure network topology using packet tracer.
Exercise No. 7: Configure network topology using packet tracer to find the routing path by IPRoute Command.
Exercise No. 8: Network Configuration using distance vector routing protocol.
Exercise No. 9: Configuration of DHCP Protocol
Exercise No. 10: Telnet Configuration.
Exercise No. 11: Configuration of Access Control List.

Text Book:
1. B. A. Forouzan – "Data Communications and Networking (3rd Ed.) " – TMH
Reference Book:
1. Authorized Self-Study Guide "Interconnecting Cisco Network Devices, Part 1(ICND1), 2nd Edition, January, 2008.

Recommended Systems/Software Requirements:
1. CAT-5/CAT-6 Cables, RJ 45, Cutter, Clamping Tool, Router , Switch and Hub.
2. Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100 MB free disk space.
3. Turbo C or TC3 complier in Windows XP or Linux Operating System.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: FPGA & Reconfigurable Computing
Course Code: EC694D
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives: The overall course objective is to teach electronics engineering students fundamental concepts of hardware description languages and advanced techniques in digital system design on FPGA. Specific objectives include the following:

1. Learn VHDL (Very high speed integrated circuit Hardware Description Language).
2. Utilize VHDL to design and analyse digital systems including arithmetic units and state machines.
3. Learn field programmable gate array (FPGA) technologies and utilize associated computer aided design (CAD) tools to synthesize and analyse digital systems.
4. Learn testing strategies and construct test-benches.
5. Conduct laboratory experiments using an FPGA based development board to prototype digital systems and to confirm the analysis done in class.
6. Prepare informative and organized lab reports that describe the methodologies employed, the results obtained, and the conclusions made in a laboratory experiment.

Learning Outcomes: The students will have a detailed knowledge of the concepts of IEEE and ANSI standard HDL. Upon the completion of Operating Systems practical course, the student will be able to:

- **Understand** and implement basic digital logic circuits on FPGA
- **Model** complex digital systems at several levels of abstractions; behavioural and structural, synthesis and rapid system prototyping.
- **Developand Si**mulate register-level models of hierarchical digital systems.
- **Designand model** complex digital system independently or in a team
- Carry out **implementations** of registers and counter**s.**
- **Simulate and synthesize** all type of digital logic circuits used on FPGA
- Finally **design** a CPU.

Course Contents:
Exercises that must be done in this course are listed below:
Exercise No.1: Design of basic Gates: AND, OR, NOT.
Exercise No. 2: Design of universal gates
Exercise No. 3: Design of XOR and XNOR gate.
Exercise No. 4: Design of 2:1 MUX.
Exercise No. 5: Design of 2 to 4 Decoder.
Exercise No. 6: Design of Half-Adder and Full Adder.
Exercise No. 7: Design of 8:3 Priority Encoder.
Exercise No. 8: Design of 4 Bit Binary to Grey Code Converter.
Exercise No. 9: Design of all Flip-Flops.
Exercise No. 10: Design of Shift register.
Exercise No. 11: Design of 8 bit ALU.

Text Book:
1. J. Bhaskar, A VHDL Primer, 3rd edition, Prentice Hall.

Recommended Systems/Software Requirements:

1. Intel based desktop PC with minimum of 1GHZ or faster processor with at least 1GB RAM and 8 GB free disk space.
2. Xilinx ISE14.2 software in Windows XP or Linux Operating System.
3. Xilinx Spartan – 3 Generation FPGA.