NOTIFICATION

No. 119/2023 Date :17/08/2023

Subject: Implementation of new Syllabus of Semester III & IV of B.E. (Industrial IoT) (CBCS) as per AICTE Model Curriculum.

It is notified for general information of all concerned that the authorities of the University have accepted to implement new Syllabus of Semester III & IV of B.E. (Industrial IoT) (CBCS) as per AICTE Model Curriculum to be implemented from the academic session 2023-2024 onwards as given below:

Sd/-
(Dr.T.R.Deshmukh)
Registrar

SYLLABUS PRESCRIBED FOR SEMESTER III & IV OF B.E. (INDUSTRIAL IOT) (CBCS)

SEMESTER III

3IIOT01 ENGINEERING MATHEMATICS - III Max. Marks: 80

Course Requisite: 1. (1A1) Engineering Mathematics-I
1. (1B1) Engineering Mathematics-II

Course Objectives:

1. To deal with linear differential and difference equations with constant coefficients.
2. Understand the Laplace transform of basic functions using the definition and properties.
3. To deal with partial differential equation.
4. Understand the computational details by certain numerical methods.
5. To equip students with necessary knowledge and skills to enable them to handle mathematical operation of complex analysis.
6. Compute and interpret the correlation coefficient.

Course Outcomes:

After successfully completing the course, students will be able to-

1. Demonstrate the knowledge of differential equations applied to engineering systems.
2. Apply Laplace transform to solve differential equations.
3. Identify and solve certain forms of difference equations as applied to discrete systems and demonstrate the use of Partial Differential Equations.
4. Apply numerical methods to obtain approximate solutions to equations.
5. Apply the knowledge of Complex Analysis.
6. Demonstrate the basic concepts of probability and statistics.

	Subject: Engineering Mathematical -III	L
Unit-I	**Ordinary differential equations:** Complete solution, Operator D, Rules for finding complementary function, the inverse operator, Rules for finding the particular integral, Method of variation of parameters, Cauchy's and Legendre's linear differential equations.	08
Unit-II	**Laplace Transform**: Definition, standard forms, properties of Laplace transform, inverse Laplace transform, Initial and final value theorem, Convolution theorem, Laplace transform of impulse function, Unit step function, Laplace transforms of periodic function, Solution of Linear differential equations by Laplace transform method.	08
Unit-III	**a**) **Difference Equation:** Solution of difference equations of first order, solution of difference equations of higher order with constant coefficient. **b)Partial differential equation**: Partial differential equation of first order of following form: (i)f $(p,q)=0$; (ii) $f(p,q,z)=0$; (iii) $f(x,p)=g(y,q)$; (iv) $Pp+Qq=R$ (Lagranges Form); $(v)z=px+qy+f(p,q)$(Clairauts form).	08
Unit-IV	**Numerical Methods:** (i) Solution of algebraic and transcendental equations by Newton-Raphson method and by method of False Position. (ii) Solution of system of linear equations by Gauss-Seidal method and Relaxation Method. (iii) Numerical solution of differential equations by Picard's method, Taylor's series method, modified Euler's method and Runge-Kutta forth order method.	08

Unit-V	**Complex Analysis: -** Functions of complex variables, Analytic function, Cauchy- Riemann condition, Harmonic function, Harmonic conjugate function, Milne's Method, conformal mappings (Translation, Rotation and Magnification, Inversion and Bilinear Transformation), Expansion of function in Taylor's and Laurent's series.	08
Unit-VI	**a)Probability :** Probability distributions (Binomial, Poisson and Normal). **b) Statistics:** Curve fitting by method of least method square only for line and parabola, Coefficient of Correlation, line of regression.	08
	Total	**48**

Text Books:
1. Textbook of Applied Mathematics Vol. II by P. N. Wartikar and J. N. Wartikar. Poona Vidhyarthi Publisher.
2. Higher Engineering Mathematics by B.S.Grewal, Khanna publishers.
3. Introduction to method of Numerical Analysis - S. S. Shastry, 2nd edition, PHI Pvt. Ltd., New Delhi.

Reference Books:
1. A Mathematical Companion for Science and Engineering Students – Brettenbach, Oxford University Press, 2008 .
2. Advancing Engg. Mathematics, E.K.Kreyzig, John Wiley .
3. Numerical Method for Mathematics Science and Engineering, John H. Mathew, PHI
4. Numerical Methods - Principles, Analysis & Algorithms Pal, Oxford University Press, 2008.
5. Numerical Methods for Engineers and Scientists - Guha, Oxford University Press, 2008.

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3IIOT03 – OBJECT ORIENTED PROGRAMMING Max. Marks: 80

Course Requisite: Computer Programming

Course Objectives:
1. To learn object oriented concepts and build simple applications using C++.
2. To understand the basic concepts and techniques which form the object oriented programming paradigm.

Course Outcomes:
After successfully completing the course, students will be able to:
1. Justify the basics of object-oriented programming concepts such as data types, operators, control statements.
2. Understand and use various functions in C++.
3. Comprehend knowledge of classes and objects.
4. Understand different types of constructors and destructors with and without classes and Implement it on Arduino board.
5. Implementing different operators while overloading the class mechanism to supports encapsulation and information hiding.
6. Design and test the implementation of various types of Inheritance concepts.

	Subject: Object Oriented Programming	L
Unit-I	**Principles of object oriented Programming:** OOP'S paradigm, basic concept of OOP'S, benefits of OOP'S, structure of C++ programming, basic data types, user defined data type, derived data type, operator and control statement. Introduction to Arduino board as a programmable hardware platform.	07
Unit-II	**Functions in C++:** Functions, main function, Function prototyping, call by reference, return by reference, Inline function, default argument, Function over loading, Friend Functions.	07
Unit-III	**Classes and Object in C++:** Specifying a classes, defining member function, C++ program with Class, Nesting of member function, privet member function. Array within a class, memory allocation for object, static data member and static member function and friendly function.	07

Unit-IV	**Constructor and Destructor:** Basic constructor, parameterized constructor, multiple constructor in a class, constructor with default arguments, copy constructor and destructor. Implement OOP Concept on Arduino board.	07
Unit-V	**Operator overloading:** Defining operator overloading, overloading unary and binary operator, overloading binary operator using friends. String manipulation using operators.	07
Unit-VI	**Inheritance in C++:** Defining derived class, single inheritance, making private member inheritable, (multilevel, multiple, hierarchical, hybrid) inheritance, constructor in derived class.	07
	Total	**42**

Text Books:

1. E Balagurusamy, "Object Oriented Programming Using C++" ,Tata McGraw-Hill.
2. Bjarne Stroustrup, "C++ Programming Language", Pearson Education.
3. Arduino Cookbook by Michael Margorlis, O'reilly publication

References:

1. Robert Lafore, "Object-Oriented Programming in C++ ",Pearson Education India , (4 th Edition).
2. C Programming for Arduino by Julien Bayle, Packt Publishing
3. Yeshwant Kanetkar "Let us C++", BPB Publications.

3IIOT08 – OBJECT ORIENTED PROGRAMMING - LAB

Course Requisite: 1. Computer Programming

2. Object Oriented Programming (3IIOT03)

Course Objectives:

1. Design, implement, test, and debug simple programs in an object-oriented programming language.
2. Design and test the implementation of C++ programming concepts.

Course Outcomes:

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

1. Justify the basics of object-oriented design and the concepts of class, object, encapsulation, abstraction, inheritance, and polymorphism.
2. Design, test, and debug simple programs in an object-oriented programming language and Implementation on Arduino Board.
3. Handle raised exception while implementing and writing the various OOPs programs.

List of Experiments :

Minimum 08-10 experiments should be conducted based on **3IIOT03 – Object Oriented Programming** Syllabus.

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3IIOT04 – COMMUNICATION SYSTEMS

Max. Marks: 80

Course Objectives:

1. To understand different modulation and demodulation techniques in analog and Digital communication.
2. To study various pulse modulation and demodulation techniques used in transmission of analog signal.
3. Analyze the functional processes like samling, quantization and binary encoding of PCM technique.
4. To study basic building blocks of digital communication system.
5. To learn information theory and theoretical bounds on the data rates of digital communication.

Course Outcomes:

After successfully completing the course, students will be able to-

1. Understand the necessity of modulation and identify the various components of analog and Digital communicationsystems.
2. Understand different modulation and demodulation schemes in analog communication systems.
3. Analyze the performance of various pulse modulation scheme
4. Understand basic building blocks of digital communication system, formatting of digital signal
5. Understand concepts of information theory, calculate entropy and information rate and analyze information transmission over communication channel.
6. Analyze performance of different digital modulation techniques

	Subject: Communication Systems	L
Unit-I	**AM Transmitters and Receivers:** Modulation, need of modulation, AM Modulation (Mathematical expression and related numerical), Principles of DSB-FC, DSBSC, SSB-SC modulation and their comparison. Superheterodyne receiver: Need of AGC, Receiver Characteristics: Selectivity, Sensitivity & Fidelity.	07
Unit-II	**FM Transmitters and Receivers:** FM Modulation, direct FM generation using Varactor Diode, Pre-emphasis and Deemphasis. FM Receiver block diagram.FM Discriminator: Balanced slope detector and Ratio detectors. Comparison of AM & FM systems.	07
Unit-III	**Pulse Modulation:** Sampling Theorem in time domain, Nyquist criteria, Types of sampling- ideal, natural, flat top, Aliasing & Aperture effect. Analog pulse modulation techniques: PAM, PWM & PPM	07
Unit-IV	**Pulse Code Modulation:** Digital representation of Analog signal, PCM Generation: Uniform quantization(mid rise and mid tread), Quantization Noise, Companding, Differential Pulse Code Modulation, Delta Modulation, Adaptive Delta Modulation.	07
Unit-V	**Introduction to Digital Communication System:** Functional Blocks of Digital Communication System, Line Coding: Need for Line coding, Types of Line Coding. Information Theory: Measure of Information, Entropy and Information Rate Introduction of Binary Symmetric Channel.	07
Unit-VI	**Digital Modulation:** BPSK and BFSK generation and reception, Introduction to Probability of Error, QPSK and MSK Transmitter and Receiver, ASK systems, ISI, Need for equalization , 3-stage tap equalization.	07
	Total	**42**

Text Books:

1. Kennedy G. “Electronic Communication System” Tata Mc-Graw Hill Co., New Delhi (Third Ed).
2. Taub and Schilling D.L., “Principles of Communication Systems”, Mc-Graw Hill Co., New Delhi (2nd Ed.).
3. Shanmugam K.S., “Digital & Analog Communication Systems”, John Wiley & Sons, NewYork, 1996.
4. Lathi B. P., “Modern Digital and Communication Systems”, Holt Rinchart and Winston Inc.,New York, 1993.
5. Simon Haykin, “Digital Communication”, John Wiley and Sons,Pvt. Ltd., Singapore.
6. T L Singal., “Digital Communication”, MC Graw Hill Education (India) Private Limited, New Delhi.

References:

1. Proakis J. K., “Digital Communication”, Mc-Graw Hill Book Co., London (Second Edition).
2. Glover and Grant, “Digital Communication”, Prentice Hall Publication
3. Collins Dennis, Collins John, “Electronic Communications” PHI.
4. Wayne Tomasi, “Electronic Communication Systems” Pearson Education, (Fifth Edition).
5. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering",John Wiley, 1965.

3IIOT09 – COMMUNICATION SYSTEMS - LAB

Course Requisite: 1. 3IIOT04 – Communication Systems

Course Objectives:
1. To demonstrate the performance of different modulation and demodulation techniques on the basis of various performance parameters.
2. To verify the performance of different analog communication systems
3. To understand various Pulse communication systems for transmission of analog signals.
4. To enable the students to understand different line coding used for representation of digital waveforms.
5. To understand operation of Scrambler and Unscrambler.
6. To understand Bandpass Modulation and Demodulation techniques.

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

1. Understand the concepts of modulation and demodulation in communication system.
2. Analyze performance characteristics of AM/FM receiver
3. Describe various line codes used for representation of digital waveforms.
4. Demonstrate different working blocks of digital communication system.
5. Analyze the performance of digital communication system.
6. Apply various MATLAB functions for digital Communication Systems.

List of Experiments :

Minimum 08-10 experiments should be conducted based on **3IIOT04 – Communication System** Syllabus.

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3IIOT05 INTRODUCTION TO IOT Max. Marks: 80

Course Requisite:

Course Objectives:
1. Understand the basics of Internet of things and protocols.
2. Introduces some of the application areas where Internet of Things can be applied.
3. Students will learn about the middle ware for Internet of Things.
4. To understand the concepts of Web of Things

Course Outcomes:
After successfully completing the course, students will be able to:

1. Understand use of Internet of Things and its importance.
2. Understand various protocols used in IoT.
3. Understand devices used for IoT along with its Architecute.
4. Understand Web of Things and compare it with Internet of Things.
5. Understand of Various IoT applications.
6. Understands various security issues related ot Internet of Things.

	Subject: Introduction to IoT.	L
Unit-I	**IOT :** Basics of IoT and its Importance, Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.	07
Unit-II	**IOT PROTOCOLS:** Protocol Standardization for IoT, M2M and WSN Protocols, SCADA and RFID Protocols, Protocols – IEEE802.15.4, BACNet Protocol, Modbus.	07

Unit-III	**IOT ARCHITECTURE**: IoT Open source architecture (OIC) and Design principles, IoT Devices and deployment models, IoTivity : An Open source IoT stack, Overview IoTivity stack architecture, Resource model and Abstraction.	07
Unit-IV	**WEB OF THINGS:** Web of Things versus Internet of Things , Two Pillars of the Web, Architecture Standardization for WoT Platform, Middle ware for WoT, Unified Multitier WoT , Introduction to WoT Portals and Business Intelligence.	07
Unit-V	**IOT APPLICATIONS:** IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, Introduction to furture platforms:- IoT- A and Hydra.	07
Unit-VI	**Security Issues:** Overview of Security Issues, Data security, Infrastructure Security, Definition of IoT Security, IoT Security Challenges. IoT Security Requirements.	07
	Total	**42**

Text Books:

1. Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press,2012.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet ofThings”, Springer, 2011.
3. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applicationsand Protocols”, Wiley, 2012.

Reference Books:

1. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-on-Approach)”,1st Edition, VPT, 2014
2. CunoPfister, Getting Started with the Internet of Things, O˝Reilly Media, 2011, ISBN: 978-1- 4493-9357-1

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SEMESTER IV

4IIOT01 TRANSDUCERS AND DATA ACQUISITION SYSTEM Max. Marks: 80

Course Requisite: Analog and Digital Electronics (3IIOT02)
Skill Development-1(3IIOT10)

Course Objectives:

1. Understand the various measurement instruments.
2. Understand various basic and advance sensors.
3. Understand fundamental principle of Data Acquisition System.

Course Outcomes:

After successfully completing the course, students will be able to-

1. Understand the importance of signal conditioning, comprehend the knowledge of different DC & AC bridges used for measurement and techniques for measuring Common Mode voltages
2. Understand the working principle of basic Sensors and transducers and measure their output signal.
3. Understand the working principle of Advanced Sensors and transducers and measure their output signal.
4. Comprehend the knowledge of various Analog to digital converter techniques and commonly used A/D Integrated Circuits.
5. Understand Sampling theory, multiplexing and principles of data acquisition system along with sample examples
6. Apply the knowledge of Data Acquisition System for various applications

	Subject: Transducers And Data Acquisition System	L
Unit-I	**Electrical measurements :** Basic signal conditioning circuits(Instrumentation Amplifier), DC bridges (Wheatstone bridge, Kelvin Bridge), AC Bridges (Maxwell Bridge , Schering bridge), Choice of single-ended and differential-input, Technique for High Common-Mode Voltage Measurements	07
Unit-II	**Basic Sensors and transducer:** Temperature measurement: thermocouple and its types, thermistor, Light Sensors : LDR, Photo-diode, Photo-transistor, Displacement and position measurement: potentiometer transducer, Linear Variable Differential Transformers, Magnetostrictive Position Sensor, Pressure Transducer:- Strain Gauge, Piezoelectric	07
Unit-III	**Advance Sensors and transducer:** IC based temperature sensor (LM35, DS18B20). IC Based light sensor OPT101, Proximity sensors: inductive and capacitive, IR based proximity sensor. Hall effect sensor, Linear encoders, MEMS sensor. Gas sensors (CO2, CO, SO2).	07
Unit-IV	**Analog-to-Digital Converters:** Flash ADCs, Voltage-to-Frequency ADCs, Integrating ADCs: Dual Slope, Sigma-Delta. Accuracy and Resolution of ADCs. Effective Number of Bits. Introduction to ADC0808 and ADC ADS1115	07
Unit-V	**Data Acquisition System:** Need for Data Acquisition System, Principles of Data Acquisition Systems, Basic Components of a Data Acquisition System, Transmission/Signal Conditioners, Data Acquisition Hardware considerations, Study of 4 to 20mA current loop data acquisition system.	07
Unit-VI	**Application of Data Acquisition:-** Design Considerations and Measurement Integrity, Semiconductor CVD Application, Process Monitoring in a Nuclear Power Plant, Tensile Test Stand Application.	07
	Total	**42**

Text Books:

1. Data Acquisition Systems From Fundamentals to Applied Design by Maurizio Di Paolo Emilio
2. Sensors and Transducers by Ian R. Sinclair

Reference Books:

1. Data Acquisition Handbook
2. Data Acquisition and Control Handbook by www.keithley.com

4IIOT07 – TRANSDUCERS AND DATA ACQUISITION SYSTEM – LAB

Course Requisite: 4IIOT01 – Transducers and Data Acquisition System

Course Objectives:

1. Analyze various measurement instruments.
2. Analyze various basic and advance sensors.

Course Outcomes:

After successful completion of this course, students will be able to

1. Analyze various measurement instruments .
2. Analyze various basic and advance sensors .

List of Experiments :

Minimum 08-10 experiments should be conducted based on **4IIOT01 Transducers and Data Acquisition system**. Syllabus.

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4IIOT02 – INTRODUCTION TO SIGNAL PROCESSING Max. Marks: 80

Course Requisite: Engineering Mathematics-III (3IIOT01)

Course Objectives:

1. Understand the fundamental characteristics of signals and systems.
2. Understand signals and systems in terms of both the time and transform domains.
3. Develop the mathematical skills to solve problems involving convolution and sampling.

Course Outcomes:

After successfully completing the course, students will be able to-

1. Understand the continuous time signals and systems mathematically and their classification along with the mathematical operations that can be performed on them.
2. Understand the spectral characteristics of continuous-time periodic signals using Fourier series.
3. Analyze the spectral characteristics of continuous-time aperiodic signals and systems using Fourier Transform.
4. Understand the Discrete Time signals and systems mathematically and understand their classification along with the mathematical operations that can be performed on them.
5. Analyze the spectral characteristics of Discrete Time signals and systems using Discrete Time Fourier Transform.
6. Compute the Z-transform of a sequence, identify its region of convergence and compute the inverse Z-transform

	Subject: Introduction to Signal Processing	L
Unit-I	**Continuous time signals and systems**: Signal Classification, Energy and Power Signal, Even and Odd functions, Signal Operations, Convolution, System Classification.	07
Unit-II	**Continuous-Time Signal Analysis -The Fourier Series:** Periodic Signal Representation by Trigonometric Fourier Series, Existence and Convergence of Fourier Series, Exponential Fourier series.	07
Unit-III	**Continuous-Time Signal Analysis-The Fourier Transform:** Aperiodic Signal Representation by Fourier Integral, Properties of Fourier Transform, Inverse Fourier Transform, Fourier Spectrum.	07
Unit-IV	**Sampling and Reconstruction:** Sampling theorem, signal reconstruction. **Discrete-Time Signals & Systems:** Signal Operations, Classification of Discrete-Time Systems.	07
Unit-V	**Discrete-Time Fourier Transform:** Discrete-Time Fourier Transform (DTFT), Properties of DTFT, Relationship between DTFT & CTFT.	07
Unit-VI	**Z-Transform:** Definition and Properties of Z-Transform, Concept of Region of Convergence [ROC], Inverse Z-transform using long division method, PFE method and residue method.	07
	Total	**42**

Text Books:

1. Lathi B. P., “Principles of Linear Systems and Signals” Second Edition (International Version) Oxford University Press.
2. Alan V. Oppenheim & Alan S. Willsky with S. Hamid Nawab, “Signals & Systems” PHI Publication, Second Edition.

Reference Books:

1. Ambardar A., “Analog And Digital Signal Processing”, Thomson Learning-2005.
2. Simon Haykin, Barry Van Veen, “Signals & Systems”, IInd Edition, Wiley Pub.
3. Michael J. Roberts, “Signals and Systems Analysis Using Transform Methods and MATLAB”, Mc Hill Publication.

4IIOT08 – SIGNALS PROCESSING - LAB

Course Requisite: 4IIOT02 – Introduction to Signal Processing

Course Objectives:

1. To use software to visualize analysis of Signals and System.
2. To manipulate the time signals and identify the type of given system.

Course Outcomes:

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

1. Generate different plots and explore results to draw valid conclusions and inferences in Signal Processing.
2. Enable on how to approach for requirement of signal processing and system design using simulation tools.
3. Familiarize with the concepts of sampling.

List of Experiments :

Minimum 08-10 experiments should be conducted based on the syllabus of **4IIOT02 – Introduction to Signal Processing**.

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4IIOT03 – GNU-Linux OPERATING SYSTEM Max. Marks: 80

Course Requisite: Object Oriented Programming (3IIOT03)

Course Objectives:

1. Understand the standard Operating System.
2. Understand shell, file system and different editors.
3. Understand and use Basic linux commands.

Course Outcomes:

After successfully completing the course, students will be able to:

1. Understand the concepts of Unix and GNU Linux Operating System.
2. Comprehend and work with the files system of Linux.
3. Understand and use of various Editors for multiple file handling.
4. Ability to write shell programming using LINUX commands.
5. Understand the Conditional statement and Looping using shell scripting.
6. Ability to design and write arguments, commands and statements using LINUX.

	Subject: GNU-Linux Operating System	L
Unit-I	**Introduction to Unix, GNU/Linux:** The Kernel and Grub in Operating System, Unix OS, Fundamental Blocks of Computer system, Linux and GNU, Multiuser Multitasking system, Basic Commands : Man, echo, printf, uname, who, date, stty.	07
Unit-II	**File System:** Study of GNU / Linux file structure. Creating files, indulging a file play, listening files and directories, Masking File permissions, removing a file.	07
Unit-III	**Editors:** Vi/ Vim, Emac Nano, Pico, gEdit. Vi/Vim in details: insert, Delete. Yank and pest, multiple file handling , command line instruction, search, find and replace.	07
Unit-IV	**The shell :** Study of various shells: RC shell, Bash shell, SH shell, C shell. Basic Shell Scripting using standard Linux commands Ex. cd, ls, echo, ls. cat, mv, rm, cp, top, ps, kill, ping.	07
Unit-V	**Conditional statement :** use of logical operators, If then fi statements, if then else fi statement the test command, file test, string test, nested if-elses, case control structure.	07
Unit-VI	**The Loop Control Structure:** For Loop, using for with command line arguments, while loop, Nesting of Loops, reading from a file, the Break statement, the continue statement.	07
	Total	**42**

Text Books:

1. Unix Shell Programming by Yashvant Kanetkar
2. Your Unix/Linux The Ultimate Guide By Sumitabha Das

References:

1. Linux Shell Scripting Cookbook By Shantanu Tushar and Sarath Lakshman
2. Beginning Linux Programming By Neil Matthew Richard Stones.

4IIOT09 – OPERATING SYSTEM - LAB

Course Requisite: 4IIOT03 – GNU-Linux Operating System

Course Objectives:

1. To use and understand the Linux Operating System.
2. To use basic commands and statements used in Linux.

Course Outcomes:

After successful completion of this course, students will be able to

1. Implementing simple commands in Linux.
2. Understands how file system works in Linux.
3. Use of various Editors in particular VI/VIM.

List of Experiments :

Minimum 08-10 experiments should be conducted based on **4IIOT03 – GNU-Linux Operating System.** Syllabus

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4IIOT04 – WIRELESS COMMUNICATION

Max. Marks: 80

Course Requisite: Communication System (3IIOT04)

Course Objectives:

1. To understand basic for wireless communication systems and Networks.
2. To understand the fundamentals of cellular mobile communication systems design, Coverage improvement techniques.
3. To study the Mobile Radio Propagation models and Multiple Access techniques.
4. To understand operation of GSM in detail.
5. To study various wireless data communication networks, Wi-Fi, WiMAX, WLAN.

Course Outcomes:

After successfully completing the course, students will be able to-

1. Illustrate the evolution of cellular mobile system and understand the working of wireless communication systems.
2. Understand the fundamentals of cellular radio system along with Handoff mechanisms, parameters affecting its performance and techniques to improve it.
3. Understand Large scale and small scale fading and its impact on performance of Cellular radios
4. Understand and compare basic Multiple Access Techniques and comprehend the knowledge of OFDM and CSMA protocols
5. Understand working of GSM and CDMA systems in terms of their architecture, frame structures, channels and security
6. Demonstrate concepts of different wireless data communication networks including their architectures.

	Subject: Wireless Communication	L
Unit-I	**Introduction to Wireless Communication System:** Evolution of Wireless communication systems, Introduction to Cellular systems: 1G, 2G, 3G, 4G and 5G. Basic cell fundamentals in cellular systems.	07

Unit-II	**Basic Cellular Concept:** Frequency Reuse, Channel & co-channel interference reduction factor, S/I ratio consideration and calculation for Minimum Co-channel and adjacent interference, Hand off Strategies, Types of Hand off, Cell capacity improvement techniques: Cell Sectoring, Cell Splitting, micro-cell zone concept.	07
Unit-III	**Mobile Radio Propagation Mechanism:** Basic Propagation Mechanism: Reflection, Diffraction and Scattering. Small Scale Fading and Multipath: Factors Influencing Small Scale Fading. Types of Small-Scale Fading: Fading Effect Due to Multipath Time Delay Spread, Fading Effect Due to Doppler Spread.	07
Unit-IV	**Multiple Access Techniques:** Basic concepts of TDMA, FDMA & CDMA and their Comparisons, Fundamentals of OFDM and CSMA Protocols.	07
Unit-V	**Global System for Mobile communication:** GSM Systems: GSM architecture, GSM Channels, Frame Structure, Authentication and security in GSM. CDMA Systems: Forward and reverse channel of CDMA.	07
Unit-VI	**Wireless Communication Network:** Introduction to WLAN, Wi-Fi, WiMAX, ZigBee Networks and Wireless Adhoc Network (Architecture not expected), Security issues and challenges in a Wireless network.	07
	Total	**42**

Text Books:

1. Theodore S. Rappaport, "Wireless Communications: Principles &Practice", Second edition, Pearson Education (2002).
2. K. Pahlavan and P. Krishnamurthy, "Principles of Wireless Networks", Pearson Education Asia Publication (2002).
3. T. L. Singal, "Wireless Communication". McGraw Hill Education.
4. A. F. Molisch, "Wireless Communications", Second Edition, Wiley Publication.

Reference Books:

1. Upena Dalal, "Wireless communication", Oxford University Press.
2. Wireless Communications-T.L.Singh-TMH
3. Adhoc Mobile Wireless network, C.K.Toh Pearson.

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4IIOT05: SOCIAL SCIENCE

Course Objective: The objective of the course is to make the students familiar with the basic concepts used to understand the social, cultural and political activities with context to Indian society.

Course Outcomes:

After successfully completing the course, students will be able to-

1) Understand the basic concepts in social science in the era of globalization
2) Create awareness about social problems and issues in the nation.
3) Gain the knowledge of society and importance of nation development with science and technology.
4) Understand the constitutional set-up, beaurocracy and current situation of India.
5) Comprehend the knowledge of major social problems in India

Course Contents:

Unit I: **Applied Humanities and Human Engineering**: (7 Hrs)

i. Meaning and Scope, General utility of social sciences to engineers.
ii. Society, Types of Society, Characteristics and Problems associated with society.

Unit II: **Fundamental concept in social science**: (7 Hrs)

i. Culture-Types, Characteristics, Merit, demerit and some related terms of culture.
ii. Social structure and social system.
iii. Socialization and social stratification.
iv. Family and marriage institutions in India.
v. Social control and social change

Unit III: **Industrialization and society**: (7 Hrs)

i. Industrial psychology and industrial democracy.
ii. Environment in industry with development of science and technology.
iii. Fatigue of workers.
iv. Motivation, selection and training of workers.

Unit IV: **The study of political orientation**: (7 Hrs)

i. Indian constitution and federal system.
ii. Fundamental rights and directive principles.
iii. Right to Information
iv. Beaurocracy in India.

UnitV: **Major social problems in India**: (7 Hrs)

i. Over population.
ii. Poverty.
iii. Slums.
iv. Family Disorganization (divorce)
v. Corruption.

Unit VI: **Human Society and Environment**: (7 Hrs)

i. Human values and professional ethics.
ii. General issues on environment ecology, bi-diversity and climate change.
iii. Economics and social sustainable development
iv. Human resource management, public health, law enforcement and good governance.

Text Books:

1. Social and Ethical Sciences for Engineers: Dr.G.N.Nimbarte, Mangesh Publication Nagpur
2. A New Look into Social Sciences: Sheikh Sabir, A.M.Shiekh and Jaya Dwadshiwar,Sage Publication New Delhi.
3. Ethical Science, Dr.G.N.Nimbarte, Dattson Publication, Nagpur
4. Social Problems in India, Ram Ahuja, Rawat Publication New Delhi.

Reference Books:

1. ‘Labour Problems and Social Welfare’: R.C.Saxsena, Prakashan Kendra, Lucknow.
2. ‘Introduction to Sociology’, Vidhyabhushan and Sachdeva, KitabMahal, New Delhi.

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