Proposed Scheme & Syllabus of UG Engineering Program

Bachelor of Technology (B.Tech.)

Computer Science & Engineering

2020-21

IPS ACADEMY
INSTITUTE OF ENGINEERING & SCIENCE, INDORE

(A UGC Autonomous Institute affiliated to RGPV)

New Scheme of Examination as per AICTE Flexible Curricula

VII Semester Bachelor of Technology (B.Tech.) Computer Science and Engineering/ *(w.e.f. July,2020)*
Computer Engineering/Computer Science & Technology]

S.No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem.	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1.	CS 701	DC	Big Data and Hadoop	70	20	10	30	20	150	2	1	2	4
2.	CS 702	DE	Departmental Elective	70	20	10	-	-	100	3	1	-	4
3.	CS 703	OE	Open Elective	70	20	10	-	-	100	3	0	0	3
4.	CS 704	D Lab	Departmental Elective Lab	-	--	-	30	20	50	-	-	6	3
5.	CS 705	O/E lab	Open Elective Lab	-	-	-	30	20	50	-	-	6	3
6.	CS 706	P	Major Project-I	-	-	-	100	50	150	-	-	8	4
7.	CS 707		Evaluation of Internship -III	-	-	-	-	100	100	-	-	6	3
8.	Additional Credits[#]	*[#]Additional credits can be earned through successful completion of credit based MOOC's Courses available on SWAYAM platform (MHRD) at respective UG level.*											
			Total	210	60	30	190	210	700	8	2	28	24

Departmental Electives	Open Electives
702(A) Internet of Things	703(A) Data Mining and Warehousing
702 (B) Computational Intelligence	703(B) Cryptography & Information Security
702 (C) Deep & Reinforcement Learning	703(C) Embedded System
702 (D) Wireless & Mobile Computing	703 (D) Disaster Management

Open Electives can be offered to students of all branches **including CSE branch.** However, they can be offered to students of Non-CSE branches only if they have not taken any similar courses previously and have sufficient knowledge of pre-requisite courses (if any) of respective open electives subject.

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

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Based On AICTE Flexible Curricula
Computer Science and Engineering, VII-Semester
CS 701 Big Data & Hadoop

Objectives:

1. Understand the various parts of Hadoop condition, for instance, Hadoop 2.7, Impala, Yarn, MapReduce, Pig, Hive, HBase, Sqoop, Flume, and Apache Spark.
2. Learn Hadoop Distributed File System (HDFS) and YARN building, and make sense of how to function with them for limit and resource organization.
3. Understand MapReduce and its qualities and retain advanced MapReduce thoughts
4. Ingest data using Sqoop and Flume.
5. Get a working learning of Pig and its parts.

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

1. Explain the statistics of Big Data
2. Identify Hadoop EcoSystem
3. Understand HDFS and Mapreduce algorithm
4. Articulate innovative insights of Hive
5. Identify and utilise various Hadoop tools

UNIT I

Introduction to BigData Platform, Traits of Big data, Challenges of Conventional Systems, Web Data, Evolution of Analytic Scalability, Analysis vs Reporting, Statistical Concepts: Sampling Distributions, Re-Sampling, Statistical Inference, Prediction Error.

UNIT II

Need of Hadoop, Data centers and Hadoop Cluster overview, Overview of Hadoop Daemons, Hadoop Cluster and Racks, Learning Linux required for Hadoop, Hadoop ecosystem tools overview, Big data Hadoop opportUNITies

UNIT III

HDFS Daemons – Namenode, Datanode, Secondary Namenode, Hadoop FS and Processing Environment's UIs, Fault Tolerant, High Availability, Block Replication, Hadoop Processing Framework: YARN Daemons – Resource Manager, NodeManager, Job assignment & Execution flow, MapReduce Architecture, MapReduce life cycle, Word Count Example(or) Election Vote Count

UNIT IV

Introducing Hadoop Hive, Detailed architecture of Hive, Comparing Hive with Pig and RDBMS, Working with Hive Query Language, Creation of a database, table, group by and other clauses, Various types of Hive tables, HCatalog, Storing the Hive Results, Hive partitioning, and Buckets

UNIT V

Introduction to Hadoop Framework: Spark and Scala, Apache Pig: Advantage of Pig over MapReduce, Pig vs Hive Use case, Introduction to HBASE, Fundamentals of HBase, SQL vs. NOSQL, Application of Sqoop, Flume, Oozie

Recommended Books:

1. Bart Baesens, “Analytics in a Big Data World: The Essential Guide to data Science and its Applications”, Wiley publications
2. RadhaShankarmani, M. Vijaylakshmi, " Big Data Analytics", Wiley, Secondedition
3. Seema Acharya, SubhashiniChellappan, " Big Data and Analytics", Wiley, Firstedition

List of Experiments

1. Installation of Single Node and Cluster in Hadoop
2. Write a Word Count program in MapReduce and Yarn?
3. Database CURD operation in Hive.
4. Hands-on with Visual Data Analysis tools

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Based On AICTE Flexible Curricula
Computer Science & Engineering, VII-Semester
Departmental Electives CS 702(A) Internet of Things

Objectives:

1. To understand the concepts of Internet of Things.
2. To build IoT applications.
3. To learn the mechanism of Machine to Machine (M2M) communication.
4. To understand IoT ecosystem, industrial internet, and IoT on cloud.

Course Outcomes: At the end of this course, students would be able to:

1. Understand the key components that make up an IoT system.
2. Appreciate the role of big data, cloud computing and data analytics in a typical IoT system.
3. Understand where the IoT concept fits within the broader ICT industry and possible future trends.
4. Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.
5. Apply the knowledge and skills acquired during the course to build and test a complete, working IoT system involving prototyping, programming and data analysis

UNIT 1

Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view, Physical design of IOT, Logical design of IOT, Application of IOT.

UNIT 2

Machine-to-machine (M2M), SDN (software defined networking) and NFV(network function virtualization) for IOT, data storage in IOT, IOT Cloud Based Services.

UNIT 3

Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based communication, IP addressing in IOT, Media Access control.

UNIT 4

Sensor Technology , Participatory Sensing, Industrial IOT and Automotive IOT , Actuator, Sensor data Communication Protocols ,Radio Frequency Identification Technology, Wireless Sensor Network Technology.

UNIT 5

IOT Design methodology: Specification -Requirement, process, model, service, functional & operational view.IOT Privacy and security solutions, Raspberry Pi & arduino devices. IOT Case studies: smart city streetlights control & monitoring.

Recommended Books:

1. Rajkamal,"Internet of Things", Tata McGraw Hill publication
2. Vijay Madisetti and Arshdeep Bahga, "Internet of things (A-Hand-on-Approach)" 1st Edition ,Universal Press
3. Hakima Chaouchi "The Internet of Things: Connecting Objects", Wiley publication.
4. Charless Bell "MySQL for the Internet of things", Apress publications.
5. Francis dacosta "Rethinking the Internet of things:A scalable Approach to connecting everything", 1st edition, Apress publications 2013.
6. Donald Norris"The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black", McGraw Hill publication.

List of Experiments:

1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
3. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
5. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
6. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
8. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
9. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thingspeak cloud.
10. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.
11. To install MySQL database on Raspberry Pi and perform basic SQL queries.
12. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
13. Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.
14. Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
15. Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.

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Based On AICTE Flexible Curricula
Computer Science & Engineering, VII-Semester
Departmental Electives – CS702 (B) Computational Intelligence

Course Objectives:

1. To provide a strong foundation on fundamental concepts in Computational Intelligence.
2. To apply these techniques in applications which involve perception, reasoning and learning.
3. To learn about the general concept and features of GAs, different types of GAs, different strategies of using GA features, and applications of GA algorithms in real world.
4. To Introduce approximations of concepts, rough sets and mathematical tools to discover patterns hidden in data.
5. To learn about the general concept and features of swarm optimization, different types of swarm optimization algorithms and their concepts/features, and applications of swarm optimization algorithms in real world

Course Outcomes:

1. Describe in-depth about theories, methods, and algorithms in computation Intelligence.
2. Compare and contrast traditional algorithms with nature inspired algorithms.
3. Examine the nature of a problem at hand and determine whether a computation intelligent technique/algorithm can solve it efficiently enough.
4. Design and implement Computation Intelligence algorithms and approaches for solving real-life problems.

UNIT I

Introduction to Computational Intelligence; types of Computational Intelligence, components of Computational Intelligence. Concept of Learning/ Training model. Parametric Models, Nonparametric Models. Multilayer Networks: Feed Forward network, Feedback network.

UNIT II

Fuzzy Systems: Fuzzy set theory: Fuzzy sets and operations, Membership Functions, Concept of Fuzzy relations and their composition, Concept of Fuzzy Measures; Fuzzy Logic: Fuzzy Rules, Inferencing; Fuzzy Control - Selection of Membership Functions, Fuzzyfication, Rule Based Design & Inferencing, Defuzzyfication.

UNIT III

Genetic Algorithms: Basic Genetics, Concepts, Working Principle, Creation of Offsprings, Encoding, Fitness Function, Selection Functions, Genetic Operators-Reproduction, Crossover, Mutation; Genetic Modeling, Benefits.

UNIT IV

Rough Set Theory - Introduction, Fundamental Concepts, Set approximation, Rough membership, Attributes, Optimization. Hidden Markov Models, Decision tree model.

UNIT V:

Introduction to Swarm Intelligence, Swarm Intelligence Techniques: Ant Colony Optimization, Particle Swarm Optimization, Bee Colony Optimization etc. Applications of Computational Intelligence.

Recommended Books:

1. Russell C. Eberhart and Yuhui Shi, Computational Intelligence: Concepts to Implementations, Morgan Kaufmann Publishers.
2. Andries P. Engelbrecht, Computational Intelligence: An Introduction, Wiley Publishing.
3. Simon Haykin, Neural Networks: A Comprehensive Foundation, Prentice Hall.
4. David E. Goldberg, Genetic Algorithm in Search Optimization and Machine Learning, Pearson Education.
5. Jagdish Chand Bansal, Pramod Kumar Singh, Nikhil R. Pal, Evolutionary and Swarm Intelligence Algorithms, Springer Publishing, 2019.
6. S. Rajeskaran, G.A. Vijaylakshmi Pai, "Neural Networks, Fuzzy Logic, Genetic Algorithms Synthesis and Applications".
7. J.S. Roger Jang, C.T.Sun, E. Mizutani, "Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning & Machine Intelligence", PHI, 2002.

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Based On AICTE Flexible Curricula
Computer Science & Engineering, VII-Semester
Departmental Electives – CS702 (C) Deep & Reinforcement Learning

Pre-Requisite: Machine Learning

Course Outcomes: After completing the course student should be able to:

1. Describe in-depth about theories, models and algorithms in machine learning.
2. Compare and contrast different learning algorithms with parameters.
3. Examine the nature of a problem at hand and find the appropriate learning algorithms and it's parameters that can solve it efficiently enough.
4. Design and implement of deep and reinforcement learning approaches for solving real-life problems.
5. Learning Recent Trends in Deep Learnings

UNIT 1

History of Deep Learning, McCulloch Pitts Neuron, Thresholding Logic, Activation functions, Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, AdaGrad, RMSProp, Adam, Eigenvalue Decomposition. Recurrent Neural Networks, Backpropagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs, Encoder Decoder Models, Attention Mechanism, Attention overimages.

UNIT 2

Autoencoders and relation to PCA, Regularization in autoencoders, Denoisingautoencoders, Sparse autoencoders, Contractive autoencoders, Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Parameter sharing and tying, Injecting noise at input, Ensemble methods, Dropout, Batch Normalization, Instance Normalization, Group Normalization.

UNIT 3

Greedy Layerwise Pre-training, Better activation functions, Better weight initialization methods, Learning Vectorial Representations Of Words, Convolutional Neural Networks, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, Visualizing Convolutional Neural Networks, Guided Backpropagation, Deep Dream, Deep Art, Recent Trends in Deep Learning Architectures.

UNIT 4

Introduction to reinforcement learning(RL), Bandit algorithms – UCB, PAC,Median Elimination, Policy Gradient, Full RL & MDPs, Bellman Optimality, Dynamic Programming - Value iteration, Policy iteration, and Q-learning & Temporal Difference Methods, Temporal-Difference Learning, Eligibility Traces, Function Approximation, Least Squares Methods

UNIT 5

Fitted Q, Deep Q-Learning , Advanced Q-learning algorithms , Learning policies by imitating optimal controllers , DQN & Policy Gradient, Policy Gradient Algorithms for Full RL, Hierarchical RL,POMDPs, Actor-Critic Method, Inverse reinforcement learning, Maximum Entropy Deep Inverse Reinforcement Learning, Generative Adversarial Imitation Learning, Recent Trends in RL Architectures.

Recommended Books:

1. Deep Learning, An MIT Press book, Ian Goodfellow and YoshuaBengio and Aaron Courville
2. Pattern Classification- Richard O. Duda, Peter E. Hart, David G. Stork, John Wiley & Sons Inc.
3. Reinforcement Learning: An Introduction, Sutton and Barto, 2nd Edition.
4. Reinforcement Learning: State-of-the-Art, Marco Wiering and Martijn van Otterlo, Eds

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Based On AICTE Flexible Curricula
Computer Science & Engineering, VII-Semester
Departmental Electives – CS702 (D) Wireless & Mobile Computing

Course Objectives:

1. To provide an overview of Wireless Communication networks area and its applications
2. To understand various traditional Routing & Transport protocol used in wireless communication.
3. To understand the working of Wireless LAN, Mobile IP and Ad-hoc Network routing in Mobile computing.
4. To understand transport layers of Mobile Communication.
5. To understand various Mobile Device Operating Systems, its applications in payment system & its security issues.

Course Outcomes:

1. Design and create traditional networks
2. Understand the different issues in MAC and routing issues in multi hop wireless and ad-hoc networks and existing solutions for the same.
3. Evaluate the transport layer issues in wireless networks due to error's and mobility of nodes and understand existing solutions for the same.
4. Explain the architecture of GSM.
5. Discuss the services, emerging issues and future trends in M-Commerce.

UNIT I

Review of traditional networks: Review of LAN, MAN, WAN, Intranet, Internet, and interconnectivity devices: bridges, Routers etc. Review of TCP/IP Protocol Architecture: ARP/RARP, IP addressing, IP Datagram format and its Delivery, Routing table format, ICMP Messages, Subnetting, Supernetting and CIDR, DNS. NAT: Private addressing and NAT, SNAT, DNAT, NAT and firewalls, VLANS: Concepts, Comparison with Real LANS, Type of VLAN, Tagging, IPV6: address structure, address space and header.

UNIT II

Study of traditional routing and transport: Routing Protocols: BGP- Concept of hidden network and autonomous system, An Exterior gateway protocol, Different messages of BGP. Interior Gateway protocol: RIP, OSPF. Multiplexing and ports, TCP: Segment format, Sockets, Synchronization, Three Way Hand Shaking, Variable window size and Flow control, Timeout and Retransmission algorithms, Connection Control, Silly window Syndrome. Example of TCP: Taho, Reno, Sack etc. UDP: Message Encapsulation, Format and Pseudo header.

UNIT III

Wireless LAN: Transmission Medium For WLANs, MAC problems, Hidden and Exposed terminals, Near and Far terminals, Infrastructure and Ad hoc Networks, IEEE 802.11- System arch, Protocol arch, Physical layer, Concept of spread spectrum, MAC and its management, Power management, Security. Mobile IP: unsuitability of Traditional IP; Goals, Terminology, Agent advertisement and discovery, Registration, Tunneling techniques. Ad hoc network routing: Ad hoc Network routing v/s Traditional IP routing, types of routing protocols, Examples: OADV, DSDV, DSR, ZRP etc.

UNIT IV

Mobile transport layer: unsuitability of Traditional TCP; I-TCP, S-TCP, M-TCP. Wireless Cellular networks: Cellular system, Cellular networks v/s WLAN, GSM – Services, system architecture, Localization and calling, handover and Roaming.

UNIT V

Mobile Device Operating Systems: Special Constraints & Requirements, Commercial Mobile Operating Systems. Software Development Kit: iOS, Android etc.MCommerce : Structure , Pros &Cons, Mobile Payment System ,Security Issues

Recommended Books:

1. Comer, "Internetworking with TCP/ IP Vol-I", 5th edition, Addison Wesley, 2006.
2. Jochen Schiller "Mobile communication", 2nd edition, Pearson education, 2008
3. W. Richard Stevens, "TCP/IP Illustrated Vol-I", Addison-Wesley.
4. C.K.Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education.
5. Uwe Hansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer

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Based On AICTE Flexible Curricula
Computer Science and Engineering, VII-Semester
Open Electives CS- 703 (A) Data Mining and Warehousing

Objective:

1. Student should understand the value of Historical data and data mining in solving real-world problems.
2. Student should become affluent with the basic Supervised and unsupervised learning algorithms commonly used in data mining .
3. Student develops the skill in using data mining for solving real-world problems.

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

1. Understand the need of designing Enterprise data warehouses and will be enabled to approach business problems analytically by identifying opportUNITies to derive business.
2. Compare and contrast, various methods for storing & retrieving data from different data sources/repository.
3. Ascertain the application of data mining in various areas and Preprocess the given data and visualize it for a given application or data exploration/mining task
4. Apply supervised learning methods to given data sets such as classification and its various types. CO5. Apply Unsupervised learning methods to given data sets such as clustering and its various types. Also apply Association rule Mining to various domains.

UNIT-I

Data Warehousing: Introduction, Delivery Process, Data warehouse Architecture, Data Preprocessing: Data cleaning, Data Integration and transformation, Data reduction. Data warehouse Design: Data warehouse schema, Partitioning strategy Data warehouse Implementation, Data Marts, Meta Data, Example of a Multidimensional Data model. Introduction to Pattern Warehousing.

UNIT-II

OLAP Systems: Basic concepts, OLAP queries, Types of OLAP servers, OLAP operations etc. Data Warehouse Hardware and Operational Design: Security, Backup And Recovery,

UNIT-III

Introduction to Data& Data Mining :Data Types, Quality of data, Data Preprocessing, Similarity measures, Summary statistics, Data distributions, Basic data mining tasks, Data Mining V/s knowledge discovery in databases. Issues in Data mining. Introduction to Fuzzy sets and fuzzy logic.

UNIT-IV

Supervised Learning: Classification: Statistical-based algorithms, Distance-based algorithms, Decision tree-based algorithms, Neural network-based algorithms, Rule-based algorithms, Probabilistic Classifiers

UNIT-V

Clustering & Association Rule mining : Hierarchical algorithms, Partitional algorithms, Clustering large databases – BIRCH, DBSCAN, CURE algorithms. Association rules : Parallel and distributed algorithms such as Apriori and FP growth algorithms.

Recommended Books:

1. Pang – ningTan , Steinbach & Kumar, "Introduction to Data Mining", Pearson Edu, 2019.
2. Jaiwei Han, Micheline Kamber, "Data Mining : Concepts and Techniques", Morgan Kaufmann Publishers.
3. Margaret H. Dunham, "Data Mining : Introductory and Advanced topics", Pearson Edu., 2009.
4. Anahory& Murray, "Data Warehousing in the Real World", Pearson Edu., 2009.

List of Experiments(All Experiments Performed on WEKA Tool)

1. Create an Employee Table with the help of Data Mining Tool WEKA.
2. Create a Weather Table with the help of Data Mining Tool WEKA.
3. Apply Pre-Processing techniques to the training data set of Weather Table
4. Apply Pre-Processing techniques to the training data set of Employee Table
5. Normalize Weather Table data using Knowledge Flow.
6. Normalize Employee Table data using Knowledge Flow.
7. Finding Association Rules for Buying data.
8. Finding Association Rules for Banking data.
9. Finding Association Rules for Employee data.
10. To Construct Decision Tree for Weather data and classify it.

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Based On AICTE Flexible Curricula
Computer Science and Engineering, VII-Semester
Open Elective – CS703 (B) Cryptography & Information Security

Objective:

1. To understand basics of Cryptography and Network Security.
2. To be able to secure a message over insecure channel by various means.
3. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
4. To understand various protocols for network security to protect against the threats in the networks.

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

1. Understanding of the basics of Cryptography and Network Security and working knowledge of Mathematics used in Cryptology.
2. Understanding of previous attacks on cryptosystems to prevent future attacks from securing a message over an insecure channel by various means.
3. Knowledge about how to maintain the Confidentiality, Integrity and Availability of a data.
4. Understanding of various protocols for network security to protect against the network threats.
5. Getting hands-on experience of various Information Security Tools.

UNIT I

Mathematical Background for Cryptography: Abstract Algebra, Number Theory, Modular Inverse, Extended Euclid Algorithm, Fermat's Little Theorem, Euler Phi-Function, Euler's theorem.Introduction to Cryptography: Principles of Cryptography, Classical Cryptosystem, Cryptanalysis on Substitution Cipher (Frequency Analysis), Play Fair Cipher, Block Cipher. Data Encryption Standard (DES), Triple DES, Modes of Operation, Stream Cipher.

UNIT II

Advanced Encryption Standard (AES), Introduction to Public Key Cryptosystem, Discrete Logarithmic Problem, Diffie-Hellman Key Exchange Computational & Decisional Diffie-Hellman Problem, RSA Assumptions & Cryptosystem,RSA Signatures & Schnorr Identification Schemes, Primarily Testing, Elliptic Curve over the Reals, Elliptic curve Modulo a Prime., Chinese Remainder Theorem.

UNIT III

Message Authentication, Digital Signature, Key Management, Key Exchange, Hash Function, Universal Hashing, Cryptographic Hash Function, MD, Secure Hash Algorithm (SHA), Digital Signature Standard (DSS), Cryptanalysis: Time-Memory Trade-off Attack, Differential Cryptanalysis.Secure channel and authentication system like Kerberos.

UNIT IV

Information Security: Threats in Networks, Network Security Controls–Architecture, Wireless Security, Honey pots, Traffic Flow Security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security: Services Security for Email Attacks Through Emails, Privacy-Authentication of Source Message, Pretty Good Privacy(PGP), S-MIME. IP Security: Overview of IPSec, IP& IP version 6 Authentication, Encapsulation Security Payload ESP, Internet Key Exchange IKE, Web Security: SSL/TLS, Basic protocols of security. Encoding –Secure Electronic Transaction SET.

UNIT V

Cryptography and Information Security Tools: Spoofing tools:like Arping etc., Foot printing Tools(ex-nslookup, dig, Whois,etc..), Vulnerabilities Scanning Tools(i.e. Angry IP, HPing2, IP Scanner, Global Network Inventory Scanner, Net Tools Suite Pack.), NetBIOS Enumeration Using NetView Tool, Steganography Merge Streams, Image Hide, Stealth Files, Blindsideusing:STools, Steghide, Steganos.Stegdetect, Steganalysis - Stego Watch- Stego Detection Tool, StegSpy.Trojans Detection Tools(i.e. Netstat, fPort, TCPView, CurrPorts Tool,Process Viewer), Lan Scanner Tools (i.e.look@LAN, Wireshark, Tcpdump). DoS Attack Understanding Tools- Jolt2, Bubonic.c, Land and LaTierra, Targa, Nemesy Blast, Panther2, Crazy Pinger, Some Trouble, UDP Flood, FSMax.

Recommended Books:

1.Cryptography and Network Security Principles and Practice Fourth Edition,William Stallings, Pearson Education.

2.Network Security Essentials: Applications and Standards, by William Stallings.Prentice Hall.

3.Behrouz A Ferouzan, “Cryptography and NetworkSecurity” Tata Mc Graw Hills, 2007

4.Charles PPfleeger, Shari Lawrence Pfleeger “Security in Computing”, 4thEdition Prentice Hall of India, 2006.

5.Introduction to Modern Cryptography by Jonathan Katz and Yehuda Lindell, Chapman and Hall/C

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Based On AICTE Flexible Curricula
Computer Science and Engineering, VII-Semester
Open Electives CS 703 (C) Embedded Systems

Objective:

1.To introduce students with knowledge about the basic functions and applications of embedded systems
2.To introduce the architecture of embedded systems
3.To introduce the various communication protocols
4.To enable students to have knowledge of the memory types and supporting technologies of embedded systems.
5.To enable students to have knowledge about the development of embedded software

Course Outcomes: Completion of this course, students will be able to-

1. Explain the embedded system concepts and architecture of embedded systems
2. Describe the architecture of 8051 microcontroller and write embedded program for 8051 microcontroller
3. Select elements for an embedded systems tool.
4. Understand the memory types used in embedded systems
5. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

UNIT-I

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

UNIT-II

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

UNIT-III

Input Output and Peripheral Devices Timers and counters, watchdog timers, interrupt controllers, PWM, keyboard controller, analog to digital converters, real time clock. Introduction to communication protocols: basic terminologies, concepts, serial protocol: I2C, CAN, firewire, USB. Parallel protocols: PCI bus, IrDA, bluetooth, IEEE 802.11, wireless protocols.

UNIT-IV

Memory System Architecture Caches, virtual memory, MMU, address translation, memory and interfacing, memory write ability and storage performance. Memory types, composing memory – advance RAM interfacing, microprocessor interfacing I/O addressing, interrupts, direct memory access, arbitration multilevel bus architecture.

UNIT-V

Embedded System Supporting Technologies, Difference between normal OS and RTOS, scheduling algorithms, Case study: Tiny OS, VxWorks, QNX, Overview of VLSI technology, introduction to device drivers, Case studies: washing machine, air-conditioning, auto focus camera.

Recommended Books:

1. F Vahid, T Giogarvis, Embedded systems: A unified hardware/software approach, Wiley, 1999.
2. Raj Kamal, Embedded Systems Introduction, 2nd Ed., TMH publication, 2015.
3. David E Simons, An Embedded Software Primer, Pearson, 1999.

List of Experiments:

1. Write an Assembly Language Programme (ALP) to generate 10 kHz square wave.
2. Write a program to study and characteristics of the programmable gain amplifier (PGA).
3. Write a Program realization of low pass, high pass and band pass filters and their Characteristics
4. Write a program to interface ADC and DAC with PSOC
5. Write a program to verify Timer operation in different modes
6. To study implementation & interfacing of different motors like stepper motor, DC motor and servo motors.
7. Write a Program to interface stepper motor with PSOC
8. Write an ALP for temperature and pressure measurement.
9. Write a program to interface a graphical LCD with 89C51.
10. To study programming and transmission & reception of data through serial port & study of parallel printer port.

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Based On AICTE Flexible Curricula
Computer Science and Engineering, VII-Semester
Open Electives CS703 (D) Disaster Management

Objective:

1.To provide students an exposure to disasters, their significance and types.
2.To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
3.To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
4.To enhance awareness of institutional processes in the country and
5.To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity.

Course Outcomes:

1. Integrates the activities of all stakeholders to achieve a common purpose during a disaster.
2. Uses Knowledge of resources and capabilities to network functions in all phases of hazard response.
3.Capacity to manage the Public Health aspects of the disasters.
4.Reduces commUNITy vulnerability through hazard analysis and mitigation.
5.Uses risk management principles to identify hazards, and conduct analysis of risk and impact.

UNIT-I

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks– Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change-Dos and Don'ts during various types of Disasters.

UNIT-II

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness commUNITy based DRR, Structural- nonstructural measures, Roles and responsibilities of- commUNITy, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT-III

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT-IV

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation–Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT-V

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

Recommended Books:

1. Singhal J.P, Disaster Management, Laxmi Publications.
2. Tushar Bhattacharya, Disaster Science and Management, McGraw Hill India.
3. Govt. of India, Disaster Management, Government of India.

List of Experiments:

Case Study of different types of Disasters and its management using technology.