


Samrat Ashok Technological Institute (Engg. College), Vidisha (M.P.)
(An autonomous Institute Affiliated to RGPV, Bhopal)
Computer Science Engineering Department

VI-SEM B.Tech.	Subject Code	Subject Name / Title	Maximum Marks Allotted						Contract Hrs.			Total Credits
			Theory			Practical			L	T	P	
			End Sem	Mid Sem Exam	Quiz Assign ment	End Sem	Lab Work & Sessional	Total Marks				
	CS-1861	Computer Networks	70	20	10	30	20	150	3	-	2	4

Prerequisite: Student having fundamental knowledge analogue and digital communication, operating system and data structure

Course Objectives: Upon completing the course, the student will:

1. Have fundamental knowledge of the various aspects of computer networking and enables students to appreciate recent developments in the area.
2. Be familiar with various types of computer networks.
3. Understand the concepts of Network Layer, Transport Layer, Application Layer

UNIT I: Computer Network: Definitions, goals, components, structure, Architecture, Classifications & types, Growth, Complexity and applications etc. Layered Architecture: Protocol hierarchy, Connection Oriented & Connectionless Services, Service primitive Design issues & its functionality. ISO-OSI Reference Model: Principle, Model, Descriptions of various layers and its comparison with TCP/IP. Network standardization. Examples of Networks: Telecommunication Network, Corporate Networks, Connection oriented network i.e., X.25, Frame relay & ATM etc.

UNIT II : Data and Signal: Define data, signal. Time domain and frequency domain representation of signal, bandwidth of a signal and medium, Sources of impairment, Attenuation, distortion, noise, data rate Limits and Nyquist bit rate, between Bit Rate and Baud Rate, Sources of noise. FDM and TDM, synchronous and asynchronous TDM .Transmission Media: Various Transmission Media - guided and unguided media, characteristics of the popular guided transmission media: Twisted-pair, Coaxial cable, Optical fiber, Sources of transmission impairment, Shannon Capacity. Network Topology- what is network topology, characteristics of the following topologies: Mesh, Bus, Star, Ring, Tree, etc. Physical Layer: Introduction, Interface, Standards, EIA-232-D, RJ-45, RJ-11, BNC connector & EIA-449 digital Interface: Connection, specifications & configuration. Standards Connecting Devices: Active and Passive Hubs, Repeaters, Bridges, Two & Three layer switches & Gateway.

UNIT III : Data Link Layer: Need, Services Provided, Framing & its methods, Flow Control, Error control. DLL Protocol: Elementary & Sliding Window. Piggybacking & Pipelining. Protocol verification: Finite State Machine Models & Petri net models. Example in Data Link Layers: HDLC & Internet. Comparison of BISYNC and HDLC Features. MAC Sub layer: Static & Dynamic channel allocation, Media access control for LAN & WAN. Classification of MAC Sub layer protocol, Study of various collision, Collision free & limited contention protocol i.e., ALOHA : pure, slotted, CSMA, CSMA/CD, CSMA/CA, Bit Map, Binary count down, BRAP, MLMA, Adaptive tree walk & urn protocol etc. IEEE 802 standards for LAN & MAN & their comparison.

UNIT IV :Network Layer: Need, Services Provided, Design issues, Routing algorithms: Least Cost Routing algorithm, Dijkstra's algorithm, Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing Strategies, Congestion Control Algorithms: General Principles of Congestion control, Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram subnets. IP protocol, IP Addresses, Comparative study of IPv4 & IPv6, Mobile IP.

UNIT V: Processes to Processes Delivery – Transmission Control Protocol (TCP) – User Datagram Protocol, Data Traffic, Congestion Control and Quality of Service, Techniques to improve QOS, Integrated Services, and Differentiated Services. DNS,SMTP, FTP, HTTP, WWW, Virtual Terminal Protocol, VoIP: Basic IP Telephone System,

Reference Books:

1. Tanenbaum A. S, “Computer Networks”, Pearson Education , 4th Edition
2. William Stallings, “Data and Computer Communications”, PHI 6th Edition .
3. Douglas E. Comer ,”Computer Network & Internet”, Pearson Education, 6th Edition.
4. Behraj A Forouzan,”Data Communication & Networking”, McGraw-Hill,4th edition.
5. Natalia Olifar & Victor Olifer,”Computer Networks”, Willey Pub.
6. Prakash C. Gupta, “Data Communications and Computer Networks”, PHI,2nd edition.
7. Gallo,”Computer Communication & Networking Technologies”,Cengage Learning.1st edition.


Course Outcomes: The students would be able to-

- CO1:** Develop a fundamental understanding of network design principles and structure of computer network.
- CO2:** Explain the importance of data communications, how communication works in data networks and the internet, recognize the different internetworking devices and their functions.
- CO3:** Explain the role of protocols in networking, Analyze the role and services and features of the various layers of data networks.
- CO4:** Analyze the features and operations of various routing protocols such as Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multicast Routing.
- CO5:** Describe and examine working of Transport Layer and Application Layer protocol.

Mapping of CO and PO

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO-1	3	2											3	
CO-2	3	3			1		1			2			2	
CO-3	3	3	1		1		1			1		3		3
CO-4	3	3	2	1		1		1		1		1		3
CO-5	3	3							1		1	1	2	

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	CS-1862(A)	Advanced Computer Network	70	20	10	30	20	150	3	-	2	4

Prerequisite: Student having fundamental knowledge analogue and digital communication and Computer Network.

Course Objectives: Upon completing the course, the student will:

1. Have fundamental knowledge of the various aspects of high Performance Switching and Routing,
2. Be familiar with various types of Algorithms for IP address lookup and optimization.
3. Understand the concepts of Architectures for Information Centric Networking

UNIT-I: High Performance Switching and Routing: Introduction, performance considerations, IP address lookup, Overview of data communication model – Internet Multicasting, NAT, VPN – Routing Algorithms – BGP, RIP, OSPF – Differentiated and Integrated Services – SONET, ATM – MPLS -Next generation Internet architectures, Green Communication Networks, .


UNIT-II: Analysis of Network congestion Mechanism, Routing algorithms, ARQ protocols Multimedia Networking; Implementation of multi-threaded Web Server/Web Proxy with Caching/Filtering features, Sliding Window protocol implementation, performance study of various TCP/IP variants.

UNIT-III: Software Defined Network -Comparison between SDN and traditional networks - SDN controller, Switch design, SDN Controller-Switch Protocols, Open Flow Protocol, Control Overhead & Handoff algorithms. Network Function Virtualization -NFV Architecture, Use cases, NFV Orchestration and NFV for 5G.

UNIT-IV: Network Softwarization – Introduction Software Defined Networking (SDN) - Deep Dive (Northbound and Southbound interface) , Working with Mininet , Network Function Virtualization (NFV) - Architecture and Concepts Programmable Networks - Introduction to P4, SmartNICS and P4 switches.

UNIT-V: Data Center Networking (DCN) – Introduction DCN - Deep Dive (Network topologies, Container Network Interfaces) Content Distribution on the Internet, Architectures for Information Centric Networking Content Naming, Routing and Caching, Security in Named Data Networking.

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			End Sem	Mid Sem Exam	Quiz Assign ment	End Sem	Lab Work & Sessional	Total Marks				
	CS- 1862(B)	Microprocessor	70	20	10	30	20	150	3	-	2	4

Prerequisite: Knowledge of Computer System Organization.

Course Objective:

1. The objective of this course is to become familiar with the architecture and the instruction set of an Intel microprocessor.
2. Assembly language programming will be studied as well as the design of various types of digital and analog interfaces.
3. To introduce 8051 microcontrollers.

Course Contents:

UNIT I :Introduction: Evolution of microprocessor, architecture, instruction, Instruction sets, Arithmetic and Logic Instruction, Program control instruction, addressing modes, physical memory organization, general bus operation, I/O addressing capability, machine language, assembly language, high level language, programming microprocessor, program execution process.


UNIT II: 8086 architecture: ALU, Timing and control Unit, Registers, data and Address bus, instructions format, addressing modes, stack structure, interrupts, and interrupts service routines; interrupt cycle, maskable and non maskable interrupts, maximum mode, minimum mode, timing and delays.

UNIT III : 8086 Programming: Machine level program, machine coding of the program, instructions set, Assembly language programming, assembler directives operators.

UNIT IV : Peripherals and interfacing: memory interfacing, I/O ports, I/O ports interfacing, I/O ports Addressing, PIO 8255, 8253 interval timer, 8259A Programmable Interrupt Controller, 8257 DMA Controller, DMA transfers and operations, memory unit, different semiconductor technologies for memory, cache memory, addressing of the memory, addressing capacity of the CPU.

UNIT V :80286/80386/80486/Pentium: salient features, internal architecture, addressing modes, Data types, virtualmode, numeric coprocessor, MMX, MMX architecture, MMX data types, Microcontroller 8051, architecture, register set, Instruction set, Interrupts of 8051, Intel's Family of 8-bit and 16-bit microcontroller.

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	CS- 1862(C)	Soft Computing	70	20	10	30	20	150	3	-	2	4

Prerequisite: Nil

Course Objectives: To introduce the concepts in Soft Computing such as Artificial Neural Networks, Fuzzy logic-based systems, genetic algorithm-based systems and their hybrids.

Unit-I : Introduction to Soft Computing Artificial neural networks - biological neurons, Basic models of artificial neural networks – Connections, Learning, Activation Functions, McCulloch and Pitts Neuron, Hebb network.

Unit-II : Perceptron networks – Learning rule – Training and testing algorithm, Adaptive Linear Neuron, Back propagation Network – Architecture, Training algorithm.

Unit-III : Fuzzy logic - fuzzy sets - properties - operations on fuzzy sets, fuzzy relations - operations on fuzzy relations. Fuzzy membership functions, fuzzification, Methods of membership value assignments – intuition – inference – rank ordering, Lambda –cuts for fuzzy sets, Defuzzification methods.

Unit-IV : Truth values and Tables in Fuzzy Logic, Fuzzy propositions, Formation of fuzzy rules - Decomposition of rules – Aggregation of rules, Fuzzy Inference Systems - Mamdani and Sugeno

Unit-V : Introduction to genetic algorithm, operators in genetic algorithm -coding - selection - crossover – mutation, Stopping condition for genetic algorithm flow.

Text Books

1. S. N. Sivanandam and S. N. Deepa, Principles of soft computing – John Wiley & Sons, 2007.
2. Timothy J. Ross, Fuzzy Logic with engineering applications , John Wiley & Sons, 2016.

References

1. N. K. Sinha and M. M. Gupta, Soft Computing & Intelligent Systems: Theory & Applications-Academic Press /Elsevier. 2009.
2. Simon Haykin, Neural Network- A Comprehensive Foundation- Prentice Hall International, Inc.1998

3. R. Eberhart and Y. Shi, **Computational Intelligence: Concepts to Implementation**, Morgan Kaufman/Elsevier, 2007.
4. Driankov D., Hellendoorn H. and Reinfrank M., **An Introduction to Fuzzy Control-** Narosa Pub., 2001.
5. Bart Kosko, **Neural Network and Fuzzy Systems-** Prentice Hall, Inc., Englewood Cliffs, 1992
6. Goldberg D.E., **Genetic Algorithms in Search, Optimization, and Machine Learning-** Addison Wesley, 1989.


Course Outcomes: The students would be able to-

- CO-1: Learn soft computing techniques and their applications.
- CO-2: Analyze various neural network architectures.
- CO-3: Define the fuzzy systems.
- CO-4: Understand the genetic algorithm concepts and their applications..
- CO-5: Identify and select a suitable Soft Computing technology to solve the problem.

Mapping of COs and POs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12 ₁₂	PSO1	PSO2
CO1	2		2	2										
CO2	1		2	2	1								2	2
CO3	2	2	2	2	2								2	2
CO4		1	2	2	1								2	2
CO5	2	2	2	2	1						1		2	2

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	CS- 1863(A)	Mobile Computing	70	20	10	30	20	150	3	-	2	4

Prerequisite:

Student should have knowledge of Computer Networks and basic subjects of Computer Science and Engineering.

Course OBJECTIVES:

- Understand the basic concepts of mobile computing
- Be familiar with the network protocol stack
- Learn the basics of mobile telecommunication system
- Be exposed to Ad-Hoc networks
- Gain knowledge about different mobile platforms and application development

UNIT I

Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.

UNIT II

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.

UNIT III

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).


UNIT IV

Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols – Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.

UNIT V

Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – MCommerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

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	CS- 1864(A)	Web Engineering	70	20	10	-	-	100	3	1	-	4

Prerequisite: Student should have the knowledge of Computer Networking, Software Engineering and Java Programming .

COURSE OBJECTIVES: Understand the characteristics of web applications

- Learn to Model web applications
- Be aware of Systematic methods
- Be familiar with the testing techniques for web applications

UNIT-I : INTRODUCTION TO WEB ENGINEERING AND REQUIREMENTS ENGINEERING,

Motivation, Categories of Web Applications, Characteristics of Web Applications, Product-related Characteristics, Usage related Characteristics, Development-related Characteristic, Evolution of web engineering – Requirements Engineering Activities RE Specifics in Web Engineering, Principles for RE of Web Applications, Adapting RE Methods to Web Application Development, Requirement Types, Notations, Tools

UNIT-II: WEB APPLICATION ARCHITECTURES & MODELLING WEB APPLICATIONS

Introduction- Categorizing Architectures, Specifics of Web Application Architectures, Components of a Generic Web Application Architecture, Layered Architectures, 2-Layer Architectures, N-Layer Architectures Data-aspect Architectures, Database-centric Architectures, Architectures for Web Document Management, Architectures for Multimedia Data Modeling Specifics in Web Engineering, Levels, Aspects, Phases Customization, Modeling Requirements, Hypertext Modeling, Hypertext Structure Modeling Concepts,

UNIT-III :WEB APPLICATION DESIGN

Introduction, Web Design from an Evolutionary Perspective, Information Design, Software Design: A Programming Activity, Merging Information Design and Software Design, Problems and Restrictions in Integrated Web Design, A Proposed Structural Approach, Presentation Design, Presentation of Nodes and Meshes, Device-independent Development, Approaches, Inter action Design, User Interaction User Interface Organization, Navigation Design, Designing a Link Representation, Designing Link Internals, Navigation and Orientation, Structured Dialog for Complex Activities, Interplay with Technology and Architecture, Functional Design.

UNIT-IV : TESTING WEB APPLICATIONS

Introduction, Fundamentals, Terminology, Quality Characteristics, Test Objectives, Test Levels, Role of the Tester, Test Specifics in Web Engineering, Test Approaches, Conventional Approaches, Agile Approaches, Test Scheme, Three Test Dimensions, Applying the Scheme to Web Applications, Test Methods and Techniques, Link Testing, Browser Testing, Usability Testing, Load, Stress, and Continuous Testing, Testing Security, Test-driven Development, Test Automation, Benefits and Drawbacks of Automated Test, Test Tools.

UNIT-V :WEB PROJECT MANAGEMENT

Understanding Scope, Refining Framework Activities, Building a Web Team, Managing Risk, Developing a Schedule, Managing Quality, Managing Change, Tracking the Project. Introduction to node JS – web sockets.

REFERENCE BOOKS:

- 1.Gerti Kappel, Birgit Proll, “Web Engineering”, John Wiley and Sons Ltd, 2006.
- 2.Roger S. Pressman, David Lowe, “Web Engineering”, Tata McGraw Hill Publication, 2007.
- 3.Guy W. Lecky-Thompson, “Web Programming”, Cengage Learning, 2008.
- 4.Chris Bates, “Web Programming: Building Internet Applications”, Third Edition, Wiley India Edition, 2007
- 5.John Paul Mueller, “Web Development with Microsoft Visual Studio 2005”, Wiley Dream tech, 2006.


Course Outcomes: The students would be able to:

- CO-1: Understand and apply the characteristics of web applications by requirements engineering.
- CO-2: Categorizing web architecture and model web applications.
- CO-3: Design and development of web applications.
- CO-4: Applying various test on web applications.
- CO-5: Scope and utility of web project management.

Mapping of COs and POs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO ₁₁	PO ₁₂	PSO1	PSO2
CO-1	3	2	1	1	1	2	1				2	1	3	3
CO-2	3	2				2	1	2	2			1	1	3
CO-3	3	2	3	2	3	2	3	3	3	2	2	2	3	3
CO-4	3	2		3	3	2	2	3	2	2	2	2	3	3
CO-5	3	2				3	2	2	3	3	3	3	2	2

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	CS- 1865(C)	Cyber Security and Forensic	70	20	10	-	-	100	3	1	-	4

Prerequisite: Knowledge of basic subjects of Computer Science and Engineering .

Course Objective:

1. To provide an understanding Computer forensics fundamentals
2. To analyze various computer forensics technologies
3. To provide computer forensics systems
4. To identify methods for data recovery.
5. To apply the methods for preservation of digital evidence.

Unit I: Introduction to Cyber laws In indian Context- Information technology act 2000, Amendments made in the indian ITA 2000, Positive Aspects of ITA 2000, The Weak Areas of ITA 2000, Challenges in India Law and Cyber-crime scenario in india, consequences of Not Addressing the weakness in information technology act amendments to indian ITA 2008, Impact of IT act Amendments Impact Information Technology Organizations Cyber-crime and Punishments.

Unit II: Private ordering solutions, Regulation and Jurisdiction for global Cyber security, Copy Right-source of risks, Pirates, Internet Infringement, Fair Use, postings, criminal liability, First Amendments, Data Losing.

Unit III :Copy Right-Source of risks, Pirates, Internet Infringement, Fair Use, postings, Criminal Liability, First Amendments, Losing Data, Trademarks, Defamation, Privacy-Common Law Privacy, Constitutional law, Federal Statutes, Anonymity, Technology expanding privacy rights.

Unit IV:

Duty of Care, Criminal Liability, Procedural issues, Electronic Contracts & Digital Signatures, Misappropriation of information, Civil Rights, Tax, Evidence.


Unit V: Ethics, Legal Developments, Late 1990 to 2000,Cyber security in Society, Security in cyber laws case studies, General law and Cyber Law-a Swift Analysis.

Reference Books:

- 1.Law Relating to computer internet and E commerce by Nandan Kamath, 2nd Edition Universal Law Publishing Co. Pvt Limited.
- 2.Jonathan Rosenoer,“Cyber Law: The law of the Internet”, Springer-Verlag, 2297.
- 3.Mark F Grady, Fransesco Parisi, “The Law and Economics of Cyber Security”, Cambridge University Press.

Course Outcomes:

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	CS-1866	Minor Project –I	-	-	-	50	50	100	-	-	4	2

Course Contents:

Minor project may be carried out in one or more form of following: product preparations, working/non-working models, prototype development, fabrication of set-ups, laboratory experiment development, process modification/development, simulation, software development, integration of software and hardware, statistical data analysis, survey, creating awareness in society.

The student is required to submit a report based on the work. The evaluation of the project shall be on continuous basis. Guidelines: A project to be developed based on database management at the back end and any other application development at the front end.

Course Outcome: After successful completion of the course, students will be able to practice acquired knowledge within the chosen area of technology for project development

CO-1: Identify, discuss and justify the technical aspects of the chosen project with a comprehensive.

CO-2: systematic approach reproduce, improve and refine technical aspects for engineering projects.

CO-3: work as an individual or in a team in development of technical projects

CO-4: communicate and report effectively project related activities and findings.