IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

Sr. No.	Course Type	Course Code	Course Title	Scheme			Credits
				L	T	P	
1	BSC	MA03	Probability & Statistics	2	1	–	3
2	PCC	CB05	Computer Network	2	1	–	3
3	PCC	CB06	Microprocessor and Microcontroller	2	1	–	3
4	PCC	CB07	Operating Systems	3	1	–	4
5	HSMC	HS04	Entrepreneurship and Principles of Management	1	–	–	1
6	IFC	DS01	Interdisciplinary Foundation Course-I	2	–	–	2
7	LC	CB05(P)	Computer Network Lab	–	–	2	1
8	LC	CB06(P)	Microprocessor and Microcontroller Lab	–	–	4	2
9	LC	CB07(P)	Operating Systems Lab	–	–	2	1
10	SBC	CB 01(P)	Programming in Python	–	–	4	2
11	LLC	LLC-02	Liberal Learning Course–II (NCC/NSO/NCA)	–	–	2	1
12	MLC	MLC02	Constitution of India	1	–	–	*Audit
Total Academic Engagement and Credits				**13**	**4**	**14**	**23**
				31			

- **Interdisciplinary Foundation Course-I (IFC–DS01)**
  (Offered by CSE (Data Science) Branch)
  - Foundation of Data Science

Note:
Liberal Learning Course-II,
(Any One Course from NCC/NSO/NCA)

NCC
NSO
- Any one Sports at State Level

NCA
- Music Dance
- Photography
- Cinematography
- RJ and Podcasting
- Theatre
- Western dance
- Interior Designing
- Western Guitar Course
- Indian Folk Music Vocal
- Film Making, etc.

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

MA-03	Probability & Statistics	2L:1T:0P(3hrs.)	3credits

Prerequisite: Nil

Course Contents:

Course Objective: The objective of this course is two familiarize the students with statistical techniques, develop statistical skills and increase student's thinking power. It aims to equip the students with standard concepts and tools at an intermediate to advance level that will serve them well towards tackling various problems in the discipline.

Module 1: **(10hrs.)**

Data Collection Analysis: Introduction and importance of Statistics, Types of Data, Methods of Collecting Primary Data, Methods of Sampling, Merits and Limitations of Sampling, Types of Classification, Formation of Frequency Distribution, Tabulation of Data, Frequency Distribution, Types of graphs and diagrams, Histogram, Bar diagram, Frequency Polygon, Frequency curve, Ogive, Pie diagram, Pictogram.

Module 2:
(08hrs.)

Statistical Measures: Measures of central Tendency, Arithmetic Mean, Median, Mode, Geometric Mean and Harmonic Mean, Measures of Absolute Dispersion, Range, Quartile Deviation, Average Deviation, Standard Deviation, Skewness & Kurtosis.

Module3: **(08hrs.)**

Correlation & Regression Analysis: Introduction, Significance, Types, Scatter Diagram, Karl Pearson's Correlation Coefficient, Coefficient of correlation, Rank Correlation Coefficient, Regression Lines, Regression Equations, Standard Error of Estimate.

Module 4:
(08hrs.)

Probability Theory: Definition of probability, Mutually exclusive events, Additive Law of Probability, Compound Events, Dependence and Independence events, Multiplicative law of Probability, Conditional probability, Total probability, Baye's theorem, Random variables and

random variables properties, Probability mass function, Probability density function.

Module 5: **(10hrs.)**
Discrete and Continuous Probability Distributions: Introduction, Discrete distribution: Binomial and Poisson's distribution, Continuous distribution: Normal distribution, Exponential distribution, Gamma & Beta Distribution.

Course Outcome:

1. The goal of a statistical analysis is to find the distribution behind data.
2. The basic ideas of statistics including measures of Central tendency.
3. To explain and apply the concepts of correlation and regression.
4. To define the principal concepts about probability and its features.
5. To explain and apply the concepts of probability distribution in evaluation of engineering problems. Express the features of discrete and continuous random variables.

List of Text/Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2018.
2. B. V. Ramanna, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 2017.
3. Chandrika Prasad & Reena Garg, Advanced Engineering Mathematics, Khanna Book Publishing Co.(P) Ltd., Delhi, 2018.
4. D. C. Montgomery and G. C. Runjer, Applied Statistics & Probability for Engineers, WileyPublication, 6th Edition.
5. T.T. Soong, Fundamental of Probability Statistics for Engineers, John Wiley & Sons Ltd, 2004.

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

CB05	Computer Network	2L:1T:0P(3hrs.)	3credits

Prerequisite: - Data Communication

Course Objective: This course provides foundation to understand computer networks using layered architectures.

Course Contents:

Module 1: **(08 Hrs.)**
Introduction to computer networks: Network – Component and Categories – Topologies Reference Models: ISO/OSI Model and TCP/IP Protocol suite. Principals of physical layer: Transmission Media, Bandwidth, Multiplexing, Switching, X.25, ISDN.

Module 2: **(08 Hrs.)**
Data Link Layer: Need, Services Provided, Framing, Flow Control, Error control. Data Link Layer Protocol: Elementary & Sliding Window protocol: 1-bit, Go-Back-N, Selective Repeat, Hybrid ARQ. Protocol verification: Finite State Machine Models & Petrinet models. HDLC,ARP/RARP, error detection & correction technique.

Module 3: **(08 Hrs.)**
MAC Sublayer: MAC Addressing, Binary Exponential Back-off (BEB) Algorithm, Distributed Random Access Schemes/Contention Schemes: for Data Services (ALOHA and Slotted- ALOHA), for Local-Area Networks (CSMA, CSMA/CD, CSMA/CA), Collision Free Protocols: Basic Bit Map, Binary Count Down, Adaptive Tree Walk, Performance Measuring Metrics. IEEE Standards 802 series & their variant.

Module 4: **(08 Hrs.)**
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. IP Addresses, Header format, Packet forwarding, Fragmentation and reassembly, ICMP, Comparative studyofIPv4 & IPv6.

Module 5: **(08 Hrs.)**
Transport Layer: Design Issues, UDP: Header Format, Per-Segment Checksum, Carrying Unicast/Multicast Real-Time Traffic, TCP: Connection Management, Reliability of Data Transfers, TCP Flow Control, TCP Congestion Control, TCP Header Format, TCP Timer Management. Application Layer: WWW and HTTP, FTP, SSH, Email (SMTP, MIME, IMAP), DNS, Network Management (SNMP).

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

Course Outcomes:

1. Describe basics of computer network, network architecture, TCP/IP protocol suite, OSI reference models & fundamentals of physical layer.
2. Classify data link protocol like flow control, error control, bit-oriented protocol.
3. Paraphrase multi-channel access protocol, IEEE 802 standards & use Ethernet standards.
4. Explain routing & congestion algorithm. State IP protocol, addressing & subnet.
5. Distinguish various transport & application layer protocols.

List of Textbooks/ Reference Books:

1. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks" Pearson New International Edition, 5th edition, 2013.
2. Douglas E Comer, "Internetworking with TCP/IP Principles, Protocols, And Architecture Volume I" 6th Edition, Prentice Hall of India.
3. Dimitri Bertsekas, Robert Gallager, "Data Networks", PHI Publication, Second Edition.
4. Kaveh Pahlavan, Prashant Krishnamurthy, "Networking Fundamentals", Wiley Publication. First Edition,2009
5. Uyless Black, "Computer Networks", PHI Publication, Second Edition.
6. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", McGrawHill.2011.
7. Behrouz A. Forouzan, "Data Communication and Networking", McGrawHill, 5th Edition, 2013.
8. WilliamStallings, "Data and ComputerCommunication" 8th Edition, 2007. 9. W. Richard Stevens. "TCP/IP Illustrated, Volume 1", Addison-Wesley, United States of America.

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

CB06	Microprocessor and Microcontroller	2L:1T:0P(3hrs.)	3credits

Prerequisite: Fundamentals of Digital Electronics and programming.

Course Objective: The objective of this course is that students can learn fundamental concepts of embedded system design and robotics and advanced microcontrollers like PIC, AVR and ARM.

Course Contents:

Module 1:
(08hrs.)
Microprocessor 8086 Architecture - BIU and EU, Registers, Pin Diagram, Memory Addressing, Clock Generator 8284, Buffers and Latches, Maximum and Minimum Modes.

Module2:
(08hrs.)
Addressing Modes, Instruction set of 8086, Assembly Language Programming, Assemblers, Procedures, Macros, Interrupts, 8086 Based Multiprocessor Systems - Coprocessors (8087 NDP), Closely and Loosely Coupled Multiprocessor Systems (8089 IOP).

Module3:
(08hrs.)
Interfacing Chips-8251A (USART), 8255A (Programmable Peripheral Interface), 8253/8254 (Programmable Interval Timer/Counter), 8257 (DMA Controller), 8259A (Programmable Interrupt Controller).

Module4:
(08hrs.)
Microcontrollers - Microcontroller 8051- Architecture, Pin Diagram, I/O Ports, Internal RAM and Registers, Interrupts, Addressing Modes, Memory Organization and External Addressing, Instruction Set, Assembly Language Programming, Real Time Applications of Microcontroller- Interfacing with LCD, ADC, DAC, Stepper Motor, Key Board and Sensors.

IPS Academy, Institute of Engineering & Science

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

Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

Module5: **(08hrs.)**

Embedded Systems-Introduction, Classification, Processors architecture, Hardware Units, Software Embedded into System, Applications and Products of Embedded Systems, Structural Units in Processor, Memory Devices, I/O Devices, Buses, Interfacing of Processor Memory and I/O Devices, Case Study of an Embedded System for a Smart Card.

Course Outcome:

1. Understand the fundamentals and history of embedded system design.
2. Define different types of Actuators used in Robotics and illustrate concepts about their working.
3. Classify types of Robots in different applications and define various concepts related to their movements.
4. Understand PIC & AVR microcontroller architectures and programming in Robotics and embedded systems.
5. Design automated embedded systems by interfacing different Modules with advance controllers. Illustrate overview of ARM microcontroller architectures.

List of Text/Reference Books:

1. B. B. Brey: The Intel Microprocessors, Architecture, Programming and Interfacing, Pearson Education.
2. Liu Gibson: Microcomputer Systems: The 8086/8088 Family- Architecture, Programming and Design PHI
3. D. V. Hall: Microprocessors and Interfacing, TMH.
4. Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson Education.
5. Ayala Kenneth:- The 8051 microcontroller, Third Edition, Cengage Learning
6. V. Deshmukh: Microcontroller (Theory and Application), TMH.
7. Raj Kamal: Embedded Systems- Architecture , Programming and Design, TMH, New Delhi.
8. V. Udayashankara and M. S. Mallikarjunaswamy: 8051 Microcontroller, TMH, New Delhi.

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

CB07	Operating Systems	3L: 1T: 0P (4 hrs.)	4 credits

Prerequisite: Computer Organization & Architecture

Course Objective: The objective of this course is to focus on process, memory & file system.

Course Contents:

Module 1: **(06hrs.)**
Introduction to Operating Systems: Function, Evolution, Different Types, Desirable Characteristics and features of an O/S, Operating Systems Services: Types of Services, Different ways of providing these Services – Utility Programs, System Calls, Operating System Structure, and Spooling & Buffering.

Module 2:
(11hrs.)
CPU Scheduling: Process Concept, Scheduling Concepts, Types of Schedulers, Scheduling Criteria, Process State Diagram, Scheduling Algorithms, Operation on Process, Algorithms Evaluation, System calls for Process Management; Multiple Processor Scheduling; Concept of Threads. Concurrent Processes: Real and Virtual Concurrency, Mutual Exclusion, Synchronization, Inter-Process Communication, Critical Section Problem, Solution to Critical Section Problem: Semaphores – Binary and Counting Semaphores, WAIT & SIGNAL Operations and their implementation. Deadlocks: Deadlock Problems, Characterization, Prevention, Avoidance, Recovery.

Module 3: **(6hrs.)**
Memory Management: Different Memory Management Techniques – Partitioning, Swapping, Segmentation, Paging, Paged Segmentation, Comparison of these techniques, Techniques for supporting the execution of large programs: Overlay, Dynamic Linking and Loading, Virtual Memory – Concept, Implementation by Demand Paging etc., Page replacement algorithms.

Module 4: **(11hrs.)**
File Systems: File Concept, User's and System Programmer's view of File System, Disk Organization, Tape Organization, Different Modules of a File System, Disk Space Allocation Methods – Contiguous, Linked and Indexed. Directory Structures, File Protection, System Calls for File Management, Disk Scheduling Algorithms.

Module 5: **(06hrs.)**
Introduction to Network, Distributed and Multiprocessor Operating Systems. Case Studies: Unix/Linux, WINDOWS and other Contemporary Operating Systems.

IPS Academy, Institute of Engineering & Science

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

Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

Course Outcome:

1. State the core concepts of operating system, evolution and types of operating system.
2. Illustrate various input output concepts, inter process communication and deadlock
3. Illustrate process scheduling and memory management techniques.
4. Describe the concept of file and disk management.
5. State the core concepts of network, distributed and multiprocessor operating system.

List of Text / Reference Books:

1. Avi Silberschatz, Peter Galvin, Greg Gagne, "Operating System Concepts Essentials", Wiley
2. Asia Student Edition, 10th Edition, 2018.
3. William Stallings, "Operating Systems: Internals and Design Principles", Prentice Hall of India, 5th Edition, 2005.
4. Charles Crowley, "Operating System: A Design-oriented Approach", Irwin Publishing, 1st Edition.
5. Gary J. Nutt, "Operating Systems: A Modern Perspective", Addison-Wesley, 2nd Edition.
6. Maurice Bach, "Design of the Unix Operating Systems", Prentice-Hall of India, 8th Edition.
7. Daniel P. Bovet, Marco Cesati, "Understanding the Linux Kernel", O'Reilly and Associates, 3rd Edition.
8. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall, 3 rdEdition, 2007.
9. Bovet & Cesati, "Understanding the Linux Kernel", O'Reily, 3rd Edition.

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

IFC-DS01	**Foundation of Data Science**	**2L:0T:0P(2hrs.)**	**2credits**

Prerequisite:
Course Objective: This course provides a concise introduction to the fundamental concepts of Data Science

Course Contents:

Module 1: **(05hrs.)**
Introduction: What is Data Science? Big Data and Data Science – Datafication – Current landscape of perspectives - Skill sets needed; Matrices - Matrices to represent relations between data, and necessary linear algebraic operations on matrices Statistics: Descriptive Statistics: distributions and probability.

Module 2: **(05hrs.)**
Data preprocessing: Data cleaning - data integration - Data Reduction Data Transformation and Data Discretization. Evaluation of classification methods –Exploratory Data Analysis – Basic tools (plots, graphs and summary statistics) of EDA

Module 3: **(05hrs.)**
Introduction to Machine Learning Concepts: Association Rule mining - Linear Regression Logistic Regression- Classifiers - k-Nearest Neighbors (k-NN), k-means -Decision tree

Module 4: **(05hrs.)**
Clustering: Choosing distance metrics - Different clustering approaches – hierarchical agglomerative clustering, k-means (Lloyd's algorithm), - DBSCAN - Relative merits of each method - clustering tendency and quality.

Module 5: **(05 hrs.)**
Case Studies/Projects related to data science.

IPS Academy, Institute of Engineering & Science

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

Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

Course Outcome:

1. State the overview of Data Science.
2. Explain the process of Data preprocessing.
3. Discuss the various Machine Learning Algorithms.
4. Explain the clustering techniques.
5. Discuss the usage of Data Science technologies.

List of Text/Reference Books:

1. Cathy O'Neil and Rachel Schutt, "Doing Data Science, Straight Talk From The Frontline", O'Reilly, 2014.
2. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining: Concepts and Techniques", Third Edition. ISBN 0123814790, 2011.
3. Mohammed J. Zaki and Wagner Miera Jr, "Data Mining and Analysis: Fundamental Concepts and Algorithms", Cambridge University Press, 2014.
4. Matt Harrison, "Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization, O'Reilly, 2016.
5. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 2015.
6. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly Media, 2012.
7. NPTEL Course Link: https://nptel.ac.in/courses/106/106/106106212/
8. NPTEL Course Link: https://nptel.ac.in/courses/106/106/106106179/

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

CB05(P)	Computer Network Lab	0L:0T:2P(2hrs.)	1credit

Prerequisite: Data Communication**.**

Course Objective:

The course is designed to provide Basic knowledge of Computer Network. Computer Networking is intended for Network engineers, Network designers and Network administrators who wish to aim for telecommunication domain. Learning Outcomes - Understanding of computer network, Network designing and troubleshooting.

Course Contents:

Module 1: (04hrs.)

Introduction to computer networks: Networking Devices, Network – Component and Categories, Local area networks and Wide area networks. Color coding standard of CAT 5,6,7 and crimping of cable in RJ-45, Principals of physical layer: Transmission Media, Bandwidth.

Module 2: (04hrs.)

Introduction to packet tracer simulator, Network topologies, Data Link Layer Protocol: Elementary; Sliding Window protocol: 1-bit, Go-Back-N, Selective Repeat, Error control, framing. ARP.

Module 3: (04hrs.)

Network Layer: Routing algorithms: Dijkstra algorithm, Bellman-ford algorithm, IP Addresses classful; classless addressing, IP routing, Subnetting and supernetting, ICMP.

Module 4: (04hrs.)

Transport Layer: TCP service protocols, UDP: Header Format, Per-Segment Checksum, Socket programming.

Module 5: (06hrs.)

Introduction to the various internetworking devices and their basic configuration, Study of various application layer protocols.

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

Course Outcome:

1. Demonstrate LAN configuration and discuss various types of transmission media and network equipments.
2. Implement various functionalities of data link layer and build network topology using packet tracer.
3. Analyze the requirements for a given organizational requirement and select the most appropriate networking architecture and technologies.
4. Implement socket programming and simulate TCP using wireshark.
5. Distinguish various internetworking devices and study of application layer protocols.

List of Text/Reference Books:

1. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks" Pearson New International Edition, 5th Edition, 2013.
2. Douglas E Comer, "Internetworking with Tcp/Ip Principles, Protocols, And Architecture Volume I" 6th Edition, Prentice Hall of India.
3. Dimitri Bertsekas, Robert Gallager, "Data Networks", PHI Publication, Second Edition.
4. Kaveh Pahlavan, Prashant Krishnamurthy, "Networking Fundamentals", Wiley Publication. First Edition,2009
5. Uyless Black, "Computer Networks", PHI Publication, Second Edition.
6. Ying-DarL in, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open-Source Approach", McGrawHill.2011.
7. Behrouz A. Forouzan, "Data Communication and Networking", McGraw Hill, 5th Edition, 2013.
8. William Stallings, "Data and Computer Communication"8thEdition, 2007.
9. W. Richard Stevens. "TCP/IP Illustrated, Volume 1", Addison-Wesley, United States of America.

List of Experiments:

1. Study of Different Type of LAN & Network Equipment.
2. Study and Verification of standard Network topologies i.e., Star, Bus, Ring etc.
3. LAN installations and Configurations.
4. Write a program to implement various types of error correcting techniques.
5. Write a program to implement various types of framing methods.
6. Study of Tool Command Language (TCL).
7. Study and Installation of Standard Network Simulator: N. S-2, N. S-3, OpNet, Qual Net etc.
8. Study & Installation of ONE (Opportunistic Network Environment) Simulator for High Mobility Networks.
9. Configure 802.11WLAN.
10. Implement & simulate various types of routing algorithm.
11. Study & Simulation of MAC Protocols like Aloha, CSMA, CSMA/CD and CSMA/CA using standard Network Simulators.
12. Study of Application layer protocols-DNS, HTTP, HTTPS, FTPS and Telnet.

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

CB06(P)	**Microprocessor and Microcontroller Lab**	**0L: 0T: 4P (4 hrs.)**	**2 credits**

Prerequisite: Fundamentals of Digital Electronics and programming.

Course Objective: The objective of this course is that students can learn fundamental concepts of embedded system design and robotics and advanced microcontrollers like PIC, AVR and ARM.

Course Contents:

Module 1: **(08Hrs.)**
Microprocessor 8086 Architecture - BIU and EU, Registers, Maximum and Minimum Modes.

Module 2: **(08Hrs.)**
Addressing Modes, Instruction set of 8086, Assembly Language Programming, Assemblers, Procedures,

Module 3: **(08Hrs.)**
Interfacing Chips-8255A (Programmable Peripheral Interface), 8253/8254 (Programmable Interval Timer/Counter), 8257 (DMA Controller).

Module 4: **(08Hrs.)**
Microcontrollers - Microcontroller 8051- Architecture, Pin Diagram, Interfacing with LCD, ADC, DAC, Stepper Motor, Keyboard and Sensors.

Module 5: **(08Hrs.)**
Embedded Systems-Introduction, Classification, Processors architecture, Interfacing of Processor Memory and I/O Devices.

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

Course Outcome:

1. Understand the fundamentals and history of embedded system design.
2. Define different types of Actuators used in Robotics and illustrate concepts about their working.
3. Classify types of Robots in different applications and define various concepts related to their movements.
4. Understand PIC & AVR microcontroller architectures and programming in Robotics and embedded systems.
5. Design automated embedded systems by interfacing different Modules with advance controllers. Illustrate overview of ARM microcontroller architectures.

List of Text/Reference Books:

1. B. B. Brey: The Intel Microprocessors, Architecture, Programming and Interfacing, Pearson Education.
2. Liu Gibson: Microcomputer Systems: The 8086/8088 Family- Architecture, Programming and Design PHI
3. D. V. Hall: Microprocessors and Interfacing, TMH.
4. Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson Education.
5. Ayala Kenneth:- The 8051 microcontroller, Third Edition, Cengage Learning
6. V. Deshmukh: Microcontroller (Theory and Application), TMH.
7. Raj Kamal: Embedded Systems- Architecture, Programming and Design, TMH, New Delhi.
8. V. Udayashankara and M. S. Mallikarjuna swamy: 8051 Microcontroller, TMH, New Delhi.

List of Experiments:

1. Assembly Language Programs of Microprocessor 8086,
2. Assembly Language Programs of Microcontroller 8051.
3. Assembly Language Programs for Interfacing Chips.
4. Write a program in embedded C to read temperature from LM35 and display on LCD.
5. Write a program in embedded C to read data from keypad & display on LCD.
6. Write a program in embedded C to control speed of motor.
7. Write a program in embedded C to control servomotor.
8. Write a program in embedded C to control IR sensor.
9. Code a sequence in Robotic software to pick and place an object by Robotic hand.
10. Code a sequence in Robotic software to control hands of a humanoid Robot.
11. Code a sequence in Robotic software to control legs of a humanoid Robot.
12. Code a sequence in Robotic software to make a Robot walk.
13. Code a sequence in Robotic software to make a Robot dance.

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

CB07(P)	Operating Systems Lab	0L:0T:2P(2 hrs.)	1credit

Prerequisite: Computer system organization

Course objective: This Course provides a comprehensive introduction of Operating System, Process Management, Memory Management, File Management and I/O management.

Course Contents:

Module 1: **(06 Hrs.)**
Introduction to Operating Systems: Function, CPU Scheduling: Process Concept, Scheduling Concepts, Types of Schedulers, Scheduling Criteria, Process State Diagram, Scheduling Algorithms.

Module 2: **(04 Hrs.)**
Mutual Exclusion, Critical Section Problem, Solution to Critical Section Problem: Semaphores – Binary and Counting Semaphores, WAIT & SIGNAL Operations, and their implementation, Classical Problems of Synchronization.

Module 3: **(04 Hrs.)**
Deadlocks: Deadlock Problems, Characterization, Prevention, Avoidance, Recovery. Virtual Memory – Concept, Implementation by Demand Paging etc., Page replacement algorithms. Disk Scheduling Algorithms.

Module 4: **(06 Hrs.)**
File Systems: File Concept, User's and System Programmer's view of File System, Disk Organization, Tape Organization, Different Modules of a File System, DiskSpace Allocation Methods – Contiguous, Linked and Indexed. Directory Structures, File Protection, System Calls for File Management, Disk Scheduling Algorithms.

Module 5: **(04 Hrs.)**
Introduction to Network, Distributed and Multiprocessor Operating Systems. Case Studies: Unix/Linux, WINDOWS and other Contemporary Operating Systems.

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

Course Outcome:

1. Describe basics of computer network, network architecture, TCP/IP protocol suite, OSI reference models & fundamentals of physical layer.
2. Classify data link protocol like flow control, error control, bit oriented protocol.
3. Paraphrase multi-channel access protocol, IEEE 802 standards & use Ethernet standards.
4. Explain routing & congestion algorithm. State IP protocol, addressing & subnet.
5. Distinguish various transport & application layer protocols

List of Text/Reference Books:

1. Avi Silberschatz, Peter Galvin, Greg Gagne, "Operating System Concepts Essentials", Wiley Asia Student Edition, 10th Edition, 2018.
2. William Stallings, "Operating Systems: Internals and Design Principles", Prentice Hall of India, 5th Edition, 2005.
3. Charles Crowley, "Operating System: A Design-oriented Approach", Irwin Publishing, 1st Edition.
4. Gary J. Nutt, "Operating Systems: A Modern Perspective", Addison-Wesley, 2nd Edition.
5. Maurice Bach, "Design of the Unix Operating Systems", Prentice-Hall of India, 8th Edition.
6. Daniel P. Bovet, Marco Cesati, "Understanding the Linux Kernel", O'Reilly and Associates, 3rd Edition.
7. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall, 3 rdEdition,2007.
8. Bovet & Cesati, "Understanding the Linux Kernel", O'Reily, 3rd Edition.

List of Experiments:

1. To implement FCFS CPU scheduling algorithm.
2. To implement SJF CPU scheduling algorithm.
3. To implement Priority CPU Scheduling algorithm.
4. To implement Round Robin CPU scheduling algorithm.
5. To compare various CPU Scheduling Algorithms over different Scheduling Criteria.
6. To implement classical inter process communication problem (producer consumer).
7. To implement classical inter process communication problem (Reader Writers).
8. To implement classical inter process communication problem (Dining Philosophers).
9. To implement & compare various page replacement algorithms.
10. To implement & Compare various Disk & Drum scheduling Algorithms
11. To implement Banker's algorithms.
12. To implement Remote Procedure Call (RPC).

IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)
Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

CB01(P)	Programming in Python	0L:0T:4P(4hrs.)	2credits

Prerequisite: C and C++ language

Course Objective:
The course is designed to provide Basic knowledge of Python. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language. Learning Outcomes: Problem solving and programming capability

Module 1: **(08hrs.)**
Introduction, History, Features, Python –Environment Setup Local Environment Setup, Getting Python, Installation of Python, Use of IDE

Module2: **(06hrs.)**
Python –Basic Syntax Python Identifiers, Reserved Words, Lines & Indentation, Multiline Statements, Quotation in Python, Comments & other useful constructs, Python –Variables Assigning Values to Variables, Multiple Assignment, Standard Data Types

Module 3: **(06hrs.)**
Python –Variables, Assigning Values to Variables, Multiple Assignment, Standard Data Types; Python Numbers, Python Strings, Python Lists, Python Tuples, Dictionary, Data Type Conversion

Module 4: **(06hrs.)**
Python –Basic Operators, Types of Operators, Arithmetic Operators, Comparison Operators, Assignment Operators, Bitwise Operators, Logical Operators, Operator Precedence, Python – Decision Making & Loops, Flowchart, If statement Syntax.

Module 5: **(08hrs.)**
Python-Functions, Syntax for defining a function, Calling a Function, Function Arguments, Anonymous Functions Python-Applications & Further Extensions, Data analysis packages.

IPS Academy, Institute of Engineering & Science

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

Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.)

[Computer Science & Engineering (IOT and Cyber Security Including Block Chain Technology)] (CSITCS)

IV Semester

Course Outcome:

1. Install Python and have knowledge of syntax of Python.
2. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python.
3. Express different decision-Making statements and Functions.
4. Develop code in Python using functions, loops etc.
5. Design GUI Applications in Python and evaluate different database operations.

List of Text/Reference Books:

1. Eric Matthes, “Python Crash Course: A Hands-On, Project-Based Introduction to Programming”, No Starch Press.
2. Zed A. Shaw, “Learn Python the Hard Way” (3rdEdition), Addison Wesley.
3. Paul Barry, “Head-First Python”, O‟Reilly.
4. John Zelle, Franklin,”Python Programming”, Beedle & Associates Inc.