

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)]

IV Semester

S.No.	Course Code	Course type	Course Title	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical			L	T	P	
				End Sem	Mid Sem. Exam.	Quiz/Assignment	End Sem	Term work Lab Work & Sessional					
1.	MA03	BSC	Probability & Statistics	60	25	15	–	–	100	2	1	–	3
2.	IO05	PCC	Computer Network	60	25	15	–	–	100	2	1	–	3
3.	IO06	PCC	Sensors and Actuators	60	25	15	–	–	100	2	1	–	3
4.	IO07	PCC	Data Base Management System	60	25	15	–	–	100	3	1	–	4
5.	HS04	HSMC	Entrepreneurship and Principles of Management	60	25	15	–	–	100	1	–	–	1
6.	IFC	AL01	Interdisciplinary Foundation Course-I	60	25	15	–	–	100	2	–	–	2
7.	IO05(P)	LC	Computer Network Lab	–	–	–	60	40	100	–	–	2	1
8.	IO06(P)	LC	Sensors and Actuators Lab	–	–	–	60	40	100	–	–	4	2
9.	IO07(P)	LC	Data Base Management System Lab	–	–	–	60	40	100	–	–	2	1
10.	IO01(P)	SBC	IoT Workshop	–	–	–	60	40	100	–	–	4	2
11.	MLC(02)	MLC	Constitution of India	100	–	–	–	–	–	1	–	–	0
Total				360	150	90	240	160	1000	13	4	12	22

IoT Workshop –SBC-IO01

Platform Tool- Raspberry Pi/ Arduino

Interdisciplinary Foundation Course-I (IFC –AL 01)

Foundation of AIML

<u>1HrLecture</u>	<u>1HrTutorial</u>	<u>2HrPractical</u>
1 Credit	1 Credit	1 Credit

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)]

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	IO05	Computer Network	2	1	–	3
3	PCC	IO06	Sensors and Actuators	2	1	–	3
4	PCC	IO07	Data Base Management System	3	1	–	4
5	HSMC	HS04	Entrepreneurship and Principles of Management	1	–	–	1
6	IFC	AL01	Interdisciplinary Foundation Course-I	2	–	–	2
7	LC	IO05(P)	Computer Network Lab	–	–	2	1
8	LC	IO06(P)	Sensors and Actuators Lab	–	–	4	2
9	LC	IO07(P)	Data Base Management System Lab	–	–	2	1
10	SBC	IO01(P)	IoT Workshop	–	–	4	2
11	MLC	MLC02	Constitution of India	1	–	–	0
Total Academic Engagement and Credits				13	4	12	22
				29			

Note:

- **IoT Workshop –SBC-IO01**
 - Platform Tool- Raspberry Pi/ Arduino
- **Interdisciplinary Foundation Course-I (IFC –AL 01)**
(Offered by CSE (AIML) Branch)
 - Foundation of AIML

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)]

IV Semester

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

Prerequisite: Nil

Course Objective:

The objective of this course is to 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.

Course Contents:

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: (8hrs.)

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.

Module 3: (8hrs.)

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, Wiley Publication, 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)]

IV Semester

IO05	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. Principles 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 study of IPv4 & 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).

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 Text Books/ Reference Books:

1. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks" Pearson New International Edition, 5 th Edition,2013.
2. Douglas E Comer, "Internetworking with Tcp/Ip Principles, Protocols, And Architecture Volume I" 6 th 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. Uyles 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", McGraw Hill, 5th Edition, 2013.
8. William Stallings, "Data and Computer Communication" 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)]

IV Semester

IO06	Sensors and Actuators	2L:1T:0P(3hrs.)	3credits
------	-----------------------	-----------------	----------

Prerequisite: Basic introduction to IoT

Course Objective:

The objective of this course is to recognize the importance of sensors and actuators, and gain knowledge of the physical principles behind each sensor.

Course Contents:

Module 1: (08hrs.)

Historical development of sensors, classification of sensors, Sensor as a passive or active element, sensor as a part of a measurement system, sensor properties, Actuators in IoT,

Module 2: (08hrs.)

Physical Principles Of Sensing: - Electric Charges, Fields, and Potentials - Capacitance - Magnetism - Induction - Resistance - Piezoelectric Effect -Pyroelectric Effect - Hall Effect - Seebeck and Peltier Effects – Sound Waves - Temperature and Thermal Properties - Heat Transfer

Module 3: (10hrs.)

Acoustic Sensors: Microphone characteristics - Resistive Microphones - Condenser Microphones -Fiber-Optic Microphone - Piezoelectric Microphones - Electret Microphones –dynamic microphones Humidity and moisture sensors : Concept of Humidity - Capacitive Sensors - Resistive sensors - Thermal Conductivity Sensor - Optical Hygrometer Oscillating Hygrometer - Soil Moisture Temperature Sensors-Thermo-resistive Sensors - Resistance Temperature Detectors - Silicon Resistive Sensors - Thermistors -NTC Thermistors -Self Heating Effect in NTC Thermistors - PTC Thermistors - Thermoelectric Contact Sensors - Semiconductor P-N Junction Sensors - Optical Temperature Sensors - Acoustic Temperature Sensor - Piezoelectric Temperature Sensors.

Module 4: (08hrs.)

Pressure Sensors: Concepts of Pressure - Units of Pressure - Mercury Pressure Sensor -Bellows, Membranes, and Thin Plates - Piezoresistive Sensors - Capacitive Sensors - VRP Sensors- Optoelectronic Sensors –Indirect pressure sensors -Vacuum Sensors Flow Sensors - Basics of Flow Dynamics - Pressure Gradient Technique - Thermal Transport Sensors - Ultrasonic Sensors -Electromagnetic Sensors. - Microflow Sensors - Breeze Sensor - Coriolis Mass Flow Sensors - Drag Force Flow Sensors- Cantilever MEMS sensors – Dust and smoke detectors

Module 5:(08hrs.)

Light Detectors: Introduction -Photodiodes - Phototransistor –Photoresistors - Cooled Detectors - Imaging sensors -UV detectors -Thermal Radiation Detectors Importance of actuators, types: Pneumatic actuators, Hydraulic actuators, Electric actuators, Thermal actuators. Case studies of IoT system containing sensor devices and use of Actuators.

Course Outcome:

1. Describe the importance of sensors
2. Outline the physical principles behind each sensor.
3. Bring out the different types of temperature, acoustic, humidity & moisture sensors.
4. Identify different pressure and flow detectors for sensing
5. Introduce the concept of actuators and their features.

List of Text/Reference Books:

1. Jacob Fraden, “ Handbook of Modern Sensors – Physics, Designs and Applications” Springer fifth edition, 2016
2. John Vetelino and AravindReghu, “Introduction to Sensors” CRC Press, 1st Edition, 2010.
3. Ion Sinclair, ” Sensors and transducers” Newnws publisher, Third Edition, 2001

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)]

IV Semester

IO07	Data Base Management System	3L: 1T: 0P (4 hrs.)	4 credits
-------------	------------------------------------	----------------------------	------------------

Prerequisite: Nil

Course Objective:

The main objective of this course is to understand fundamentals of database management system.

Course Contents:

Module1: (06 hrs.)

DBMS Concepts and architecture Introduction, Database approach v/s Traditional file accessing approach, Advantages, of database systems, Data models, Schemas and instances, Data independence, Data Base Language and interfaces, Overall Database Structure, Functions of DBA and designer, ER data model: Entities and attributes, Entity types, Defining the ER diagram, Concept of Generalization, Aggregation and Specialization, Transforming ER diagram into the tables. Various other data models object- oriented data Model, Network data model, and Relational data model, Comparison between the three types of models.

Module2: (08 hrs.)

Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Relational Query languages: SQL-DDL, DML, integrity constraints, Complex queries, various joins, Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union. Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations.

Module3: (14 hrs.)

Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies. Query Optimization: Introduction, steps of optimization, various algorithms to implement select, project and join operations of relational algebra, optimization methods: heuristic based, cost estimation based.

Module4: (09 hrs.)

Transaction Processing Concept: Transaction system, Testing of Serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints deadlock handling. Concurrency Control Techniques: Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation-based protocol, multiple granularity. Multi version schemes, Recovery with concurrent transaction.

Module5: (08 hrs.)

Study of Relational Database Management Systems through Oracle/PL SQL/MySQL: Architecture, physical files, memory structures, background process. Concept of table spaces, segments, extents and block. Dedicated server, multi-threaded server. SQL queries, Data extraction from single, multiple tables equijoin, non equijoin, selfjoin, outer join. Usage of like, any, all, exists, in Special operators. Cursor management: nested and parameterized cursors, Oracle exception handling mechanism. Stored procedures, in, out, in out type parameters, usage of parameters in procedures. User defined functions their limitations. Triggers, mutating errors, instead of triggers.

Course Outcome:

1. Describe basic concepts of DBMS and Explain ER model.
2. Solve queries using Relational Algebra, Relational Calculus and SQL.
3. Explain database schema and discuss the Query optimization methods.
4. Describe transaction processing, concurrency control and recovery technique.
5. Analyze the Various DBMS software like Oracle, SQL/PL SQL etc.

List of Text/Reference Books:

1. Date C J, "An Introduction to Database System", Pearson Educations, 8th Edition,2003.
2. Korth, Silbertz,Sudarshan, "Fundamental of Database System", McGraw Hill,5th Edition,2006.
3. Peter Rob, " Data Base System:Design Implementation & Management", Cengage Learning 4 th Edition,2000.
4. Elmasri, Navathe, "Fundamentals of Database Systems", Pearson Educations,7th Edition 2017.
5. Atul Kahate ," Introduction to Database Management System", Pearson Educations,2004.
6. Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press, TMH.
7. Paneerselvam,"DataBase Management System", PHI Learning,3rd Edition,2018.
8. J. D. Ullman, "Principles of Database and Knowledge – Base Systems", Computer Science Press,2nd Edition 1988.
9. Serge Abiteboul, Richard Hull, Victor Vianu,"Foundations of Databases", Addison-Wesley,1995.

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)]

IV Semester

HS04	Entrepreneurship and Principles of Management	1L:0T:0P(1hrs.)	1credit
------	---	-----------------	---------

Prerequisite: Nil

Course Objective:

1. Explain Entrepreneurship and its importance
2. Describe the importance E-commerce
3. Explain the importance Digital Marketing in current scenario.
4. Describe the importance of planning and organization Structure.
5. Discuss the control process and its elements

Course Contents:

Module 1: (08 hrs.)

Entrepreneurship: Definition, requirements to be an entrepreneur, entrepreneur and intrapreneur, entrepreneur and manager, growth of entrepreneurship in India, Types of Enterprises and Ownership Structure.

Module 2: (10 hrs.)

E-commerce and its Technological Aspects: Overview of developments in Information Technology and Defining E-Commerce: The scope of E commerce, Benefits and limitations of E-commerce.

Module 3: (08 hrs.)

Introduction to Digital Marketing: Evolution of Digital Marketing from traditional to modern era, Role of Internet, Search Engine Advertising, Display marketing, Social Media Marketing

Module 4: (08 hrs.)

Business Management: Definition, Functions, Process, Scope and Significance of Management. Nature of Management, Managerial Roles, Managerial Skills and Activities, Proprietorship, Ltd., Pvt. Ltd., Company act registration, Startup India, DPIIT, Yukti Portal, Gumasta Lisences, Indian startup policy, MP startup policy, Closing a company, Leadership aspects.

Module 5:(10 hrs.)

Management Functions: Nature, Scope, Objective and Significance, Elements and Steps of Planning & organizing, Delegation and Decentralization. Formal and Informal Organizations

Directing: Effective Directing, Supervision, Different Theories of Motivation,

Controlling and Coordinating: Elements of Managerial Control, Control Systems, Management Control Techniques, Coordination Concept, Importance, Principles and Techniques of Coordination.

Course Outcome: After completion of the course student will be able to:

1. Understanding of basic concepts, principles and practices entrepreneurship.
2. Understanding of basic concepts & Importance of e-commerce.
3. Understanding of basic concepts of digital marketing
4. Understanding the planning and organizing & organization Structures.
5. Importance of Management Control Techniques

Text Books:

- 1 Chhabra T.N., Principles and Practice of Management. 10th ed Year 2018.
- 2 Murton- Gulab, Management Today. 3th ed.1998
- 3 KoontzH. and O'DonnelH., Essential of Management, 8th ed., McGraw-Hill, New Delhi, 2009.
- 4 Robbins, S. Fundamentals of Management. 5th ed., Pearson Education,Canada, 2008.
- 5 Mohanty SK; Fundamental of Entrepreneurship; PHI, 2005.

Reference Book:

- 1 Prasad L M, Principles and Practices of Management, S. Chand and Sons, New Delhi ,2018
- 2 Terry & Francklin, Principles of Management, Richard– Erwin.18th Ed. 1982

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)]

IV Semester

IFC-AL01	Foundation of AIML	2L:0T:0P(2hrs.)	2credits
-----------------	---------------------------	------------------------	-----------------

Prerequisite:

Course Objective

The objective of this course is to understand fundamentals of artificial intelligence and machine learning.

Course Contents:

Module 1: (04hrs.)

Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies. Knowledge representation issues, Propositional and predicate logic, monotonic and on monotonic reasoning, forward Reasoning, backward reasoning.

Module 2: (05hrs.)

Introduction: Basic definitions, types of learning, hypothesis space and inductive bias, evaluation, cross validation, Linear regression, Decision trees, over fitting.

Module 3: (05hrs.)

Logistic Regression, Support Vector Machine, Kernel function and Kernel SVM. Neural network: Perceptron, multilayer network, back-propagation, introduction to deep neural network. Convolution neural network, flattening, sub sampling, padding, stride, convolution layer, pooling layer, loss layer, dense layer 1x1 convolution, inception network, input channels, transfer learning, one shot learning, dimension reductions, implementation of CNN like tensor flow, keras etc.

Module 4: (04hrs.)

Ensemble learning, clustering: k-means, adaptive hierarchical clustering, and Gaussian mixture model. Application of machine learning in computer vision, speech processing, natural language processing etc, Case Study: Image Net Competition

Module 5:(04 hrs.)

Instance based learning, Feature reduction, Collaborative filtering based recommendation. Probability and Bayes learning.

Course Outcome:

1. State the overview of the Artificial intelligence.
2. Explain the types of learning, linear regression and decision tree.
3. Discuss the various classification techniques and convolution neural network.
4. Explain the Ensemble learning and clustering techniques.
5. Discuss the recommendation system and Bayes learning.

List of Text/Reference Books:

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
2. Introduction to AI & Expert System: Dan W. Patterson, PHI.
3. The Hundred-Page Machine Learning Book: Andriy Burkov
4. Rich E and Knight K, "Artificial Intelligence", The McGraw- Hill,.3rdEdition,2008
5. Tom Mitchell, "Machine Learning", McGraw- Hill, First Edition, 1997.
- 6.. Ethem Alpaydin, "Introduction to Machine Learning Edition"2, MIT Press, Third Edition,2014.

Perspectives:

1. Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems.
2. AI is to enable computers to perform intellectual tasks as decision making, problem solving, perception, understanding human communication (in any language, and translate among them
3. Machine Learning is an Application of AI & gives devices the ability to learn from their experiences without doing any coding.

Recommendations:

Students pursuing a concentration in AI & ML must also take the following concentration Requirements and electives:

1. Deep & Reinforcement Learning
2. Robotics
3. Embedded System
4. Soft Computing
5. Computational Intelligence
6. Pattern Recognition
7. Data Visualization
8. Web & Information Retrieval
9. Data Science

Studying artificial intelligence & Machine Learning opens a world of opportunities.

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)]
IV Semester

IO05(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.

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 ,5thEdition,2013.
2. Douglas E Comer, "Internetworking with Tcp/Ip Principles, Protocols, And Architecture Volume I" 6thEdition, Prentice Hall of India.
3. Dimitri Bertsekas, Robert Gallager, "Data Networks", PHI Publication, Second Edition.
4. Kaveh Pahlavan, Prashant Krishnamurthy, "Networking Fundamentals", Wiley Publication. FirstEdition,2009
5. Uyles 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.

(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)]
IV Semester

IO06(P)	Sensors and Actuators Lab	0L:0T:4P(4hrs.)	2credits
----------------	----------------------------------	------------------------	-----------------

Prerequisite: Basic introduction to IoT

Course Objective:

The objective of this course is to recognize the importance of sensors and actuators, and gain knowledge of the physical principles behind each sensor.

Course Contents:

Module 1:

Sensor vs Sensor module, PIR and IR Sensor, PCB Mounted Active Buzzer Module, Servo motor, LCD, I2C module.

Module 2:

Ultrasonic Sensor, Stepper motor, RGB LEDs, LDR sensors

Module 3:

Gas and Dust Sensor, Flame Sensor, Temperature & Humidity Sensor, Water TDS, pH, Flow, Level and Pressure Sensor

Module 4:

RFID cards, Tags & Readers: working principle, frequency ranges: Low Frequency, High Frequency, and Ultra-High Frequency, Types: Active RFID, Passive RFID

Module 5:

Distance Sensor, Light/Color Sensor, Motor Driver, BO motor, sound sensor

Course Outcome:

1. Understand the importance of different IR sensors
2. Identify working of Ultrasonic and LDRs
3. Bring out the different types of temperature, acoustic, humidity & moisture sensors.
4. Outline the physical principles behind RFID
5. Bring out the different types of Distance, Sound sensors and motors

List of Text/Reference Books:

1. Jacob Fraden, "Handbook of Modern Sensors – Physics, Designs and Applications" Springer fifth edition, 2016
2. John Vetelino and Aravind Reghu, "Introduction to Sensors" CRC Press, 1st Edition, 2010.
3. Ion Sinclair, "Sensors and transducers" Newnws publisher, Third Edition, 2001

List of Experiments:

Creating the following mini project using required sensors and actuators

1. Car Parking System
2. Burglar Alarm with PIR Motion Sensor
3. Smart Street light system
4. Smart Dustbin
5. LPG detector and auto exhaust
6. Soil Moisture Detection
7. Water Pressure & Flow Control system
8. Smart toll tax system
9. Acoustic Sensors home automation
10. Line sensor car

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)]

IV Semester

IO07(P)	Data Base Management System Lab	0L:0T:2P(2 hrs.)	1credit
---------	--	-------------------------	----------------

Prerequisite: Nil

Course objective: The main objective of this course is to understand fundamentals of database management system.

Course Contents:

Module 1: (08 Hrs.)

DBMS Concepts and architecture Introduction, Database approach v/s Traditional file accessing approach, Advantages of database systems, Data models, Schemas and instances, Data independence, Data Base Language and interfaces, Overall Database Structure, Functions of DBA and designer, ER data model: Entities and attributes, Entity types, Defining the ER diagram, Concept of Generalization, Aggregation and Specialization, Transforming ER diagram into the tables.

Module 2:(08 Hrs.)

Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Relational Query languages: SQL-DDL, DML, integrity constraints, Complex queries, various joins, Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union. Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations.

Module 3:(08 Hrs.)

Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies. Query Optimization: Introduction, steps of optimization, various algorithms to implement select, project and join operations of relational algebra.

Module 4: (08 Hrs.)

Transaction Processing Concept: Transaction system, Testing of Serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints deadlock handling. Concurrency Control Techniques: Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation-based protocol, multiple granularity.

Module 5:(08 Hrs.)

Study of Relational Database Management Systems through Oracle/PL SQL/MySQL: Architecture, physical files, memory structures, background process. SQL queries, Data extraction from single, multiple tables equijoin, non equijoin, self-join, outer join. Usage of like, any, all, exists, in Special operators. User defined functions their limitations. Triggers, mutating errors, instead of triggers.

Course Outcome:

1. Describe basic concepts of DBMS and Explain ER model.
2. Solve queries using Relational Algebra, Relational Calculus and SQL.
3. Explain database schema and discuss the Query optimization methods.
4. Describe transaction processing, concurrency control and recovery technique.
5. Analyze the Various DBMS software like Oracle, SQL/PL SQL etc.

List of Text/Reference Books:

1. Date C J, "An Introduction to Database System", Pearson Educations, 8th Edition, 2003.
2. Korth, Silbertz, Sudarshan, "Fundamental of Database System", McGraw Hill, 5th Edition, 2006.
3. Peter Rob, "Data Base System: Design Implementation & Management", Cengage Learning 4th Edition, 2000.
4. Elmasri, Navathe, "Fundamentals of Database Systems", Pearson Educations, 7th Edition 2017.
5. Atul Kahate, "Introduction to Database Management System", Pearson Educations, 2004.
6. Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press, TMH.
7. Paneerselvam, "Database Management System", PHI Learning, 3rd Edition, 2018.
8. J. D. Ullman, "Principles of Database and Knowledge – Base Systems", Computer Science Press, 2nd Edition 1988.
9. Serge Abiteboul, Richard Hull, Victor Vianu, "Foundations of Databases", Addison-Wesley, 1995.

List of Experiments:

1. Introduction to Oracle and SQL
2. Write the queries for Data Definition language (DDL)
3. Write the queries for Data manipulation language (DML)
4. Use of various types of Integrity Constraints
5. Write the queries for Data Control language (DCL)
6. Use of SELECT command with different clauses.
7. Write SQL queries using logical operation (AND, OR, NOT)
8. Write SQL queries for aggregate functions (Max, Min, Sum, Avg, and Count)
9. Write SQL queries for group by and having
10. Write SQL queries for sub queries and nested queries
11. Write an SQL query to implement JOINS
12. Write SQL queries to create views
13. Write program by the use of PL/SQL
14. Design and implementation of any Database system (like Banking, University 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)
IV Semester

IO01(P)	IoT Workshop	0L:0T:4P(4hrs.)	2credits
----------------	---------------------	------------------------	-----------------

Prerequisite: Fundamentals of Electronics and Electrical Engineering

Course Objective:

The main objective of this course is:

1. To understand the basics of various active & passive electronic components
2. To understand the operation of various instruments like CRO, Function generator & Multi meter.
3. To understand the basics of bread board & PCB design.

Course Contents:

Module 1: (04hrs.)

Study of Electronic components, all types of discrete active and passive devices, display devices, integrated components/circuits with their packing's etc.

Module 2: (06hrs.)

Electromechanical components; switches, sockets, connectors (BNC, TNC and N types of connectors) etc., Electromagnetic components; coils-different types of magnetic and ferrite cored, potted components, relays, step up and step-down transformers etc.

Module 3: (06hrs.)

Operation of Function generator, multi meter and DC power supply.

Module 4: (04hrs.)

Operation of CRO & Measurement of voltage, frequency, and Phase Angle.

Module 5:(04hrs.)

Soldering and de soldering exercise using discrete components and ICs for a specific circuit requirement

Course Outcome:

As an outcome of completing this workshop, students should be able:

1. To recognize the basic electronic components and devices.
2. To operate the basic Electronic Instruments.
3. To make small circuits on bread boards and check their continuity.
4. To design PCBs for small circuits.

List of Text/Reference Books:

1. Zbar, P.B. Basic Electronics. A Text-Lab Manual, 7th Edition, TMH, 1995.
2. James M. Kirkpatrick, Electronic drafting and Printed Circuits board design, Galgotia Publisher, 1988.
3. Paul B. Zbar, Industrial Electronics, A Text – Lab Manual, 3 rd Edition, TMH, 1983.
4. Harper, Handbook of Electronic Component, 2 nd Edition, 1997.
5. Goyal & Khetan, A Monograph of Electronic Design, 2 nd Edition, 1983, Khanna Pub.

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)

IV Semester

MLC(02)	Constitution of India	1L:0T:0P(1hrs.)	0 credit
----------------	------------------------------	------------------------	-----------------

Prerequisite: Nil

Course Objective:

The objective of this course is to familiarize the students with the feature of the Indian constitution, laws, democracy etc.

Course Contents:

Module 1: (08hrs.)

Historical background: Formation and working of constituent assembly, formation and working of drafting committee, commencement of Indian constitution, Dr. Ambedkar's ideas of reservation in constitution.

Module 2: (08hrs.)

Important features of the constitution: Preamble, fundamental rights, directive principles of state policy, fundamental duties, center state relation.

Module 3: (08hrs.)

Parliamentary democracy: Loksabha, Rajyasabha, central executive president, prime minister, and central ministry, Vidhansabha, Vidhanparishad and state executive (Governor, Chief minister, Minister of state).

Module 4: (08hrs.)

Special provisions in Indian constitution: finance commission contingency fund, consolidated fund, public service commissions, election commission, safeguards for SC, ST and backward classes, provisions for emergency and constitutional amendments, Indian judiciary supreme court and high court.

Course Outcome:

After completion of this course, the students can:

- 1: Commencement of Indian Constitution
- 2: Features of Indian constitution
- 3: Working and functions of Parliamentary house
- 4: Provisions in Indian Constitution

List of Text/Reference Books:

1. Austin, G. (1999), The Indian Constitution, Oxford, Oxford University Press
2. Pylee, M. V. (2016), India's Constitution (16 Edition), New, Delhi, S. Chand Publication
3. Kumar, R. (2011), Ambedkar and Constitution (1st Edition), New Delhi, Commonwealth Publication Pvt. Ltd.