ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

COMPUTER SCIENCE AND ENGINEERING

(Effective for the batches admitted in 2020 - 21)

Semester V (Third year)

Sl.	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	TOTAL
				L	T	P	C			
1	PC	20APC0516	Computer Networks	3	0	0	3	30	70	100
2	PC	20APC0518	Formal Languages & Automata Theory	3	0	0	3	30	70	100
3	PC	20APC0519	Software Engineering	3	0	0	3	30	70	100
4	OE-1	20APE0417 20AOE0303 20AOE9925	Sensors and IoT Optimization Techniques Deterministic & Stochastic Statistical Methods	3	0	0	3	30	70	100
5	PE-1	20APE0501 20APE0502 20APE0503	Data Warehousing and Mining Design Patterns Computer Graphics	3	0	0	3	30	70	100
6	PC Lab	20APC0520	Software Engineering Lab	0	0	3	1.5	30	70	100
7	PC Lab	20APC0517	Computer Networks Simulation Lab	0	0	3	1.5	30	70	100
8	SC	20ASA0503	Mobile Application Development	1	0	2	2	100	0	100
9	MC	20AMC9901	Biology for Engineers	2	0	0	0	30	0	30
10	CSP	20CSP0501	Community service project	0	0	0	1.5	100	0	100
Total credits							**21.5**	**440**	**490**	**930**
Honors/Minor courses (The hours distribution can be 3-0- 2 or 3-1-0 also)				4	0	0	4	0	0	0

AITS TPT CSE

Course Code	Computer Networks		L	T	P	C
20APC0516			3	0	0	3
Pre-requisite	Digital Communications and Operating Systems	Semester	III-I			

Course Objectives:

The students will be able to
- Run and manage the Internet, part of the Internet, or an organization's network that is connected to the Internet.
- understand the basics of data communications and networking
- the protocols used in the Internet communication

Course Outcomes:

CO1: understand the basics of data communications and networking
CO2: classify the functionalities of two sub layers of Data link Layer
CO3: know briefly about Network Layer through algorithms and protocols
CO4: distinguish the services provided by Transport Layer
CO5: recognize the services offered by Application Layer to the user

UNIT - I 9 Hrs

Introduction: Data Communications, Networks, Network Types, Internet History, Standards and Administration.
Network Models: Protocol Layering, TCP/IP Protocol Suite, The OSI Model
Introduction to Physical Layer: Data and Signals, Transmission Impairment, Data Rate Limits, Performance.
Transmission Media: Introduction, Guided Media, Unguided Media, Switching: Introduction, Circuit Switched Networks, Packet Switching

UNIT - II 9Hrs

The Data Link Layer: Introduction, Link layer addressing, Error detection and Correction: Cyclic codes, Checksum, Forward error correction, Data link control: DLC Services, Data link layer protocols, HDLC, Point to Point Protocol.
Media Access control: Random Access, Controlled Access, Channelization, Connecting devices and virtual LANs: Connecting Devices.

UNIT - III 9 Hrs

The Network Layer: Network layer design issues, Routing algorithms, Congestion control algorithms, Quality of service, Internetworking.
The network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

UNIT - IV 9 Hrs

The Transport Layer: The Transport Service, Elements of Transport Protocols, Congestion Control, The internet transport protocols: UDP, TCP, Performance problems in computer networks, Network performance measurement.

UNIT - V 9 Hrs

The Application Layer: Introduction, Client-Server Programming, WWW and HTTP, FTP, e-mail, TELNET, Secure Shell, Domain Name System, SNMP.

Textbooks:

1. "Data communications and networking", Behrouz A. Forouzan, Mc Graw Hill Education, 5th edition, 2012.
2. "Computer Networks", Andrew S. Tanenbaum, Wetherall, Pearson, 5th edition, 2010.

Reference Books:

1. Data Communication and Networks, Bhushan Trivedi, Oxford
2. "Internetworking with TCP/IP – Principles, protocols, and architecture - Volume 1, Douglas E. Comer, 5th edition, PHI
3. "Computer Networks", 5E, Peterson, Davie, Elsevier.
4. "Introduction to Computer Networks and Cyber Security", Chawan- Hwa Wu, Irwin, CRC Publications.
5. "Computer Networks and Internets with Internet Applications", Comer.

Online Learning Resources:

https://www.youtube.com/watch?v=O--rkQNKqls&list=PLbRMhDVUMngf-peFloB7kyiA40EptH1up

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												2	
CO2	2	3											2	
CO3	2	2	3		1								2	
CO4	2	3	3		2								3	2
CO5	2	2											1	

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS-CSE

Course Code	Formal Languages and Automata Theory		L	T	P	C
20APC0518			3	0	0	3
Pre-requisite	Discrete Mathematics and Data Structures	Semester	III-I			

Course Objectives:

- Understand formal definitions of machine models. Classify machines by their power to recognize languages. Understanding of formal grammars, analysis
- Understanding of hierarchical organization of problems depending on their complexity
- Understanding of the logical limits to computational capacity Understanding of undecidable problems

Course Outcomes:

CO1: Design finite state machines to recognize formal languages.
CO2: Identify different types of grammars in formal languages.
CO3: Construct context free grammars for context free languages
CO4: Find solutions to the problems using PDA.
CO5: Develop Turing machine for different computational problems.

UNIT - I Introduction to Finite Automata — 9 Hrs

Introduction: Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages.
Finite Automata: An Informal picture of Finite Automata, Deterministic Finite Automata (DFA), Non Deterministic Finite Automata (**NFA**), Finite Automata with Epsilon transitions (ϵ-NFA or NFA- ϵ), Finite Automata with output, Conversion of one machine to another, Minimization of Finite Automata, Myhill- Nerode Theorem.

UNIT - II Regular Language — 9Hrs

Regular Languages: Regular Expressions (RE), Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic laws for Regular Expressions, The Arden_s Theorem, Using Arden's theorem to construct RE from FA, Pumping Lemma for RLs, Applications of Pumping Lemma, Equivalenceof Two FAs, Equivalence of Two REs, Construction of Regular Grammar from RE, Constructing FA from Regular Grammar, Closure properties of RLs, Decision problems of RLS, Applications of REs and FAs

UNIT - III Context Free Grammars and Languages — 9 Hrs

Context Free Grammars and Languages: Definition of Context Free Grammars (CFG), Derivations and Parse trees, Ambiguity in CFGs, Removing ambiguity, Left recursion and Left factoring, Simplification of CFGs, Normal Forms, Linear grammars, Closure properties for CFLs, Pumping Lemma for CFLs, Decision problems for CFLs, CFG and Regular Language.

UNIT - IV Push Down Automata — 9 Hrs

Push Down Automata (PDA): Informal introduction, The Formal Definition, Graphical notation, Instantaneous description, The Languages of a PDA, Equivalence of PDAs and CFGs, Deterministic PushDown Automata, Two Stack PDA.

UNIT - V Turing Machines and Undecidability — 9 Hrs

Turing Machines and Undecidability: Basics of Turing Machine (TM), Transitional Representation of TMs, Instantaneous description, Non Deterministic TM, Conversion of Regular Expression to TM, Two stack PDA and TM, Variations of the TM, TM as an integer function, Universal TM, Linear Bounded Automata, TM Languages, Unrestricted grammar , Properties of Recursive and Recursively enumerable languages, Undecidability, Reducibility, Undecidable problems about TMs, Post's Correspondence Problem(PCP), Modified PCP

Textbooks:

1. Introduction to Automata Theory, Formal Languages and Computation, Shyamalendu Kandar, Pearson, 2013
2. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages,and Computation, Pearson Education Asia.

Reference Books:

1. J.P. Trembley and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science,McGraw Hill Book Co.
2. Michael Sipser, Introduction to The Theory of Computation, Thomson Course Technology.
3. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.John E. Hopcroft and J.D.Ullman, Introduction to Automata Theory, Languages and Computation, Narosa Pub, 2021
4. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
5. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
6. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

Online Learning Resources:

https://www.youtube.com/channel/UCb8HLf1c_-m0MovWMWdg_bA

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2									2	
CO2	3	3												
CO3	3	3												
CO4	2	3	3										2	
CO5	3	3	3	3									2	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS RPT-CSE

Course Code	Software Engineering		L	T	P	C
20APC0519			3	0	0	3
Pre-requisite	NIL	Semester	III-I			

Course Objectives:

To learn the basic concepts of software engineering and life cycle models

- To explore the issues in software requirements specification and enable to write SRS documents for software development problems
- To elucidate the basic concepts of software design and enable to carry out procedural and object oriented design of software development problems
- To understand the basic concepts of black box and white box software testing and enable to design test cases for unit, integration, and system testing
- To reveal the basic concepts in software project management

Course Outcomes:

CO1: Characterize software engineering models
CO2: Focus on analysis in software project management
CO3: Design important features of software project management
CO4: Test the software specifications
CO5: Measure the software quality

UNIT - I 9 Hrs

Introduction: Evolution, Software Development Projects, Exploratory style of Software Development, Emergence, Notable Changes in Software Development Practices, Computer Systems Engineering
Software Life Cycle Models: A few basic concepts, Waterfall Model and its extensions, RAD, Agile Development Models, Spiral Model, Comparison

UNIT - II 9Hrs

Software Project Management: SPM complexities, Responsibility of a software Development Manager, Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Empirical Estimation Techniques, COCOMO, Halstead's Software Science, Staffing Level-Estimation, Scheduling, Organization and Team Structures, Risk Management, Software Configuration Management
Requirement Analysis and Specification: Requirements Gathering and Analysis, SRS, Formal System Specification, Axiomatic Specification, Algebraic Specification, Executable Specification and 4GL

UNIT - III 9 Hrs

Software Design: Overview of the Design Process, Characterize good design, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design
Function-oriented Software Design: Overview, Structured Analysis, Developing the DFD model of a system, Structured Design, Detailed Design and Review
User Interface Design: Characteristics, Basic Concepts, Types, Fundamentals of Component-based GUI Development, A UI Design Methodology

UNIT - IV 9 Hrs

Object Modeling Using UML: Unified Modeling Language (UML), UML Diagrams, Use Case Model, Class Diagrams, Interaction Diagrams, Activity Diagram, State Chart Diagram, Package, Component, and Deployment Diagrams
Coding and Testing: Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-box Testing, Debugging, Program Analysis Tools, Integration Testing, Testing Object-oriented Programs, System Testing, Issues associated with Testing

UNIT - V 9 Hrs

Software Reliability and Quality Management: Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model, Other Important Standards, Six Sigma
Software Reuse: What can be reused, Issues, A Reuse Approach, Reuse at Organization level
Emerging Trends: Client-Server Software, Architectures, CORBA, COM, DCOM, SOA, SAAS

Textbooks:

1. Fundamentals of Software Engineering, Rajib Mall, PHI Learning, 5th edition
2. Software Engineering: A Practitioner's Approach, R S Pressman, McGraw Hill Education, 7th edition

Reference Books:

1. Software Engineering, Ian Sommerville, Pearson Education, Tenth edition
2. Pankaj Jalote's Software Engineering: A Precise Approach, Wiley publications

Online Learning Resources:

https://nptel.ac.in/courses/106/105/106105182/
http://peterindia.net/SoftwareDevelopment.html

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3	3	2										3	
CO3	3	2	2	2									3	
CO4	2	2	2	1									2	2
CO5	2	2	2										2	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS-CPT-CSE

Course Code	Sensors and IoT		L	T	P	C
20APE0417			3	0	0	3
Pre-requisite	Nil	Semester	III-I			

Course Objectives:

- This Course focuses on hands-on IoT concepts such as sensing, actuation and communication. It covers the development of Internet of Things (IoT) prototypes—including devices for sensing, actuation, processing, and communication—to help you develop skills and experiences. The Internet of Things (IOT) is the next wave, world is going to witness. Today we live in an era of connected devices the future is of connected things.

Course Outcomes (CO):

CO1: Understand the characteristics of sensors and Transducers.

CO2: Identify different types of sensors and its technologies based on recent trends.

CO3: Determine the Market perspective of IoT.

CO4: Compare and Contrast the use of Devices, Gateways and Data Management in IoT.

CO5: Analyze IOT design methodologies and can understand basic concepts about Arduino

UNIT - I 9 Hrs

Sensors: Introduction to sensors- Principles, Classifications, Parameters- Characteristics, sensor Types- Resistive Potentiometer, Inductive sensor, Capacitive senor, Thermal sensors, Magnetic sensors, Radiation sensors, Smart sensors, Sensor Classification, criteria to choose a sensor, Generation of sensors, Transducers: Active & Passive Transducers- Measurement of Displacement(Resistance, Capacitance, Inductance, LVDT), Force (Strain Gauges), Pressure(Piezoelectric transducers).

UNIT - II 9Hrs

Recent Trends in Sensor Technologies: Film Sensors, Semiconductor IC Technology, MEMS, Nano Sensors.
Applications of sensors: Temperature sensors, Home appliance sensors, Medical diagnostic sensor, Sensors for Environmental Monitoring-Pollution Hazards, Sensing Environmental Pollution.

UNIT - III 9 Hrs

IoT: Characteristics of IoT, Design principles of IoT, IoT Architecture and Protocols, Enabling Technologies for IoT, IoT levels and IoT vs M2M, A Use case example.
M2M to IoT - A Market Perspective- Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT.

UNIT - IV 9 Hrs

M2M to IoT-An Architectural Overview- Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.
M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Knowledge management.

UNIT - V 9 Hrs

IoT Design Methodology: Design methodology, Challenges in IoT Design, IoT System Management. IoT Servers.
Basics of Arduino: Introduction to Arduino, Arduino IDE, Basic Commands for Arduino, Connecting LEDs with Arduino, Connecting LCD with Arduino.

Textbooks:

1. D.Patranabis, “Sensors & Transducers”, PHI, 2nd ed., 2018.
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014. (ISBN-13:978-0124076846)
3. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahendra Swain, Internet of Things with Raspberry Pi and Arduino, CRC Press, 2019.

Reference Books:

1. H.S.Kalsi, "Electronic Instrumentation", 2nd ed., TataMcGrawHill 2004.
2. A.K. Sawhney,- A course in Electrical & Electronic Measurement and Instrumentation, Dhanpat Rai and Company Private Limited, Reprint: 2014.

Online Learning Resources:

https://www.youtube.com/results?search_query=Sensors+and+IoT+nptel+videos

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2		3								3	
CO2	3		3	2									3	
CO3	2		3		3									2
CO4	3		3		2									3
CO5	2		3	3	2									2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS TPT-CSE

Course Code	Optimization Techniques		L	T	P	C
20AOE0303			3	0	0	3
Pre-requisite	Problem Solving Skills	Semester	III-I			

Course Objectives:

- Operation research models using optimization techniques based upon the fundamentals of engineering mathematics (minimization and Maximization of objective function).
- The problem formulation by using linear, dynamic programming, game theory and queuing models.
- The stochastic models for discrete and continuous variables to control inventory and simulation of manufacturing models for the production decision making.
- Formulation of mathematical models for quantitative analysis of managerial problems in industry.

Course Outcomes (CO):

CO 1: Explain the need of optimization of engineering systems
CO 2: Understand optimization of electrical and electronics engineering problems
CO 3: Apply classical optimization techniques, linear programming, simplex algorithm, transportation problem
CO 4: Apply unconstrained optimization and constrained non-linear programming and dynamic programming
CO 5: Formulate optimization problems.

UNIT - I 9 Hrs

Introduction and Classical Optimization Techniques: Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.
Classical Optimization Techniques: Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – Multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT - II 9Hrs

Linear Programming: Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.
Transportation Problem: Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

UNIT - III 9 Hrs

Unconstrained Nonlinear Programming: One dimensional minimization method, Classification, Fibonacci method and Quadratic interpolation method Unconstrained Optimization Techniques: Univariant method, Powell's method and steepest descent method.

UNIT - IV 9 Hrs

Constrained Nonlinear Programming: Characteristics of a constrained problem - classification – Basic approach of Penalty Function method - Basic approach of Penalty Function method - Basic approaches of Interior and Exterior penalty function methods - Introduction to convex programming problem.

UNIT - V 9 Hrs

Dynamic Programming: Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

Textbooks:

1. Singiresu S. Rao, Engineering Optimization: Theory and Practice by John Wiley and Sons, 4th edition, 2009.
2. H. S. Kasene & K. D. Kumar, Introductory Operations Research, Springer (India), Pvt. Ltd., 2004

Reference Books:

1. George Bernard Dantzig, Mukund Narain Thapa, "Linear programming", Springer series in operations research 3rd edition, 2003.
2. H.A. Taha, "Operations Research: An Introduction", 8th Edition, Pearson/Prentice Hall, 2007.
3. Kalyanmoy Deb, "Optimization for Engineering Design – Algorithms and Examples", PHI Learning Pvt. Ltd, New Delhi, 2005.

Online Learning Resources:

https://www.youtube.com/watch?v=gw_ZEUjI9KM&list=PLYihddLF-CgZGDFVwB1v699kvl4FMeAr-

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2													
CO2		1												
CO3				3										
CO4		3												
CO5	2													

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS IPT - CSE

Course Code	Deterministic & Stochastic Statistical Methods		L	T	P	C
20AOE9925			3	0	0	3
Pre-requisite	Basic Mathematics	Semester	III-I			

Course Objectives:

- This course provides a study of various Mathematical Methods and Statistical Methods which is needed for Artificial Intelligence, Machine Learning, and Data Science and also for Computer Science and engineering problems.

Course Outcomes :

CO1: Identify logical thinking to problem-solving in context.
CO2: Employ methods related to these concepts in a variety of data science applications.
CO3: Solve problems by using appropriate technology to aid problem-solving and data analysis.
CO4: Analyze Distribution Theory and Bayesian process of inference in probabilistic reasoning system.
CO5: Develop skills in solving unconstrained optimization problems.

UNIT - I **Data Representation** 9 Hrs

Distance measures, Projections, Notion of hyper planes, half-planes. Principal Component Analysis- Population Principal Components, sample principal coefficients, covariance, matrix of data set, Dimensionality reduction, Singular value decomposition, Gram Schmidt process.

UNIT - II **Single Variable Distribution** 9Hrs

Random variables (discrete and continuous), probability density functions, properties, mathematical expectation- Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties-Uniform distribution-exponential distribution.

UNIT - III **Stochastic Processes And Markov Chains:** 9 Hrs

Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, step transition probabilities, Markov chain, Steady state condition, Markov analysis.

UNIT - IV **Multivariate Distribution Theory** 9 Hrs

Multivariate Normal distribution – Properties, Distributions of linear combinations, independence, marginal distributions, conditional distributions, Partial and Multiple correlation coefficient. Moment generating function.
BAYESIAN INFERENCE AND ITS APPLICATIONS: Statistical tests and Bayesian model comparison, Bit, Surprisal,Entropy, Source coding theorem, Joint entropy, Conditional entropy, Kullback-Leibler divergence.

UNIT - V **Optimization** 9 Hrs

Unconstrained optimization, Necessary and sufficiency conditions for optima, Gradient descent methods, Constrained optimization, KKT conditions, Introduction to non-gradient techniques, Introduction to least squares optimization, Optimization view of machine learning. Data Science Methods: Linear regression as an exemplar function approximation problem, linear classification problems.

Textbooks:

1. Mathematics for Machine Learning by A. Aldo Faisal, Cheng Soon Ong, and Marc Peter Deisenroth
2. Dr.B.S Grewal, Higher Engineering Mathematics, 45th Edition, Khanna Publishers.
3. Operations Research, S.D. Sharma

Reference Books:

1. Operations Research, An Introduction, Hamdy A. Taha, Pearson publishers.
2. A Probabilistic Theory of Pattern Recognition by Luc Devroye,. Laszlo Gyorfi, Gabor Lugosi.

Online Learning Resources:

https://www.math.brown.edu/swatson2/classes/data1010/pdf/data1010.pdf

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS UPTO CST

Course Code	Data Warehousing and Mining		L	T	P	C
20APE0501			3	0	0	3
Pre-requisite	Basic Mathematics and Database	Semester	III-I			

Course Objectives:

- To know the basic concepts and principles of data warehousing and data mining
- Learn pre-processing techniques and data mining functionalities
- Learn and create multidimensional models for data warehousing
- Study and evaluate performance of Frequent Item sets and Association Rules
- Understand and Compare different types of classification and clustering algorithms

Course Outcomes :

CO1: Understand the basic concepts of Data Warehouse and data Mining
CO2: Apply OLAP technology for Data Warehouse
CO3: Analyze and evaluate performance of Association Rules and classification algorithms
CO4: Evaluate various Clustering algorithms
CO5: Analyze advanced Data Mining techniques

UNIT - I 9 Hrs

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining. **Data Preprocessing:** Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT - II 9Hrs

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining. **Data Cube Computation and Data Generalization:** Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

UNIT - III 9 Hrs

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining, **Classification and Prediction:** Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods

UNIT - IV 9 Hrs

Cluster Analysis: Introduction, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High- Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

UNIT - V 9 Hrs

Mining Streams, Time Series and Sequence Data: Mining Data Streams, Mining Time- Series Data, Mining Sequence Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining, Social Network Analysis and Multi relational Data Mining, **Mining Object, Spatial, Multimedia, Text and Web Data**: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Textbooks:

1. Data Mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, Second Edition, 2012.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson Education.

Reference Books:

1. Data Mining Techniques, Arun KPujari, Second Edition, Universities Press.
2. Data Warehousing in the Real World, Sam Aanhory & Dennis Murray Pearson EdnAsia.
3. Insight into Data Mining, K.P.Soman, S.Diwakar, V.Ajay, PHI,2008.

Online Learning Resources:

https://www.youtube.com/watch?v=ykZ-_UGcYWg&list=PLLspfyoOYoQcI6Nno3gPkq0h5YSe81hsc

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3										1	1	1
CO2	2	3	2										1	
CO3	2	3	2	2	3	2								2
CO4	2	2	3	2	2	3						2	1	
CO5	2	2	3	2	2	3						2	1	1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS EEE CSE

Course Code	DESIGN PATTERNS		L	T	P	C
20APE0502			3	0	0	3
Pre-requisite	Object Oriented Programming basics	Semester	III-I			

Course Objectives:

- To understand design patterns and their underlying object oriented concepts.
- To understand implementation of design patterns and providing solutions to real world software design problems.
- To understand patterns with each other and understanding the consequences of combining patterns on the overall quality of a system.

Course Outcomes :

CO1: Know the underlying object oriented principles of design patterns.
CO2: Understand the context in which the pattern can be applied.
CO3: Understand how the application of a pattern affects the system quality and its tradeoffs.
CO4: Importance in behavioral pattern in terms of different types
CO5: Understanding about the importance of design patterns

UNIT - I — 9 Hrs

Introduction to Design Patterns: Design Pattern Definition, Design Patterns in Small Talk MVC, Describing Design Patterns, Catalog of Design Patterns, Organizing the Catalog, Solving of Design Problems using Design Patterns, Selection of a Design Pattern, Use of Design Patterns.

UNIT - II — 9Hrs

Designing A Document Editor: A Case Study Design problems, Document structure, Formatting, Embellishing the User Interface, Supporting Multiple Look and Feel standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation.
Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

UNIT - III — 9 Hrs

Structural Patterns-1: Adapter, Bridge, Composite.
Structural Patterns-2: Decorator, Façade, Flyweight, Proxy, Discuss of Structural Patterns.

UNIT - IV — 9 Hrs

Behavioral Patterns-1: Chain of Responsibility, Command, Interpreter, Iterator.
Behavioral Patterns-2: Mediator, Memento, Observer.

UNIT - V — 9 Hrs

Behavioral Patterns-2(cont'd): State, Strategy, Template Method, Visitor, Discussion of Behavioral Patterns.
What to Expect from Design Patterns, A Brief History, The Pattern Community An Invitation, A Parting Thought.

Textbooks:

1. Design Patterns By Erich Gamma, Pearson Education

Reference Books:

1. Pattern's in JAVA Vol-I By Mark Grand, Wiley DreamTech.
2. Pattern's in JAVA Vol-II By Mark Grand, Wiley DreamTech.
3. JAVA Enterprise Design Patterns Vol-III By Mark Grand, Wiley DreamTech.
4. Head First Design Patterns By Eric Freeman-Oreilly - spd
5. Design Patterns Explained By Alan Shalloway, Pearson Education.
6. Pattern Oriented Software Architecture, F.Buschmann & others, John Wiley & Sons.

Online Learning Resources:

https://www.youtube.com/watch?v=1xUz1fp23TQ

Mapping of course outcomes with program outcomes

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

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITSTPT-CSE

Course Code	COMPUTER GRAPHICS		L	T	P	C
20APE0503			3	0	0	3
Pre-requisite	Data Structures and Algorithms	Semester	III-I			

Course Objectives:

This course is designed to:

- Introduce the use of the components of a graphics system and become familiar with the building approach of graphics system components and related algorithms.
- Understand the basic principles of 3- 3-dimensional computer graphics.
- Provide insights on how to scan, convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
- Provide an understanding of mapping from world coordinates to device coordinates, clipping, and projections.
- Discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.

Course Outcomes :

CO1: Explain the basic concepts used in computer graphics
CO2: Design algorithms based on output primitives.
CO3: Construct 2D graphics transformations
CO4: Construct 3D graphics transformations
CO5: Remove hidden surfaces from graphs and anime

UNIT - I	OVERVIEW OF COMPUTER GRAPHICS SYSTEM	9 Hrs

OverView of Computer Graphics System – Video display devices – Raster Scan and randomscan system – Input devices – Hard copy devices.

UNIT - II	OUTPUT PRIMITIVES AND ATTRIBUTES	9Hrs

Drawing line, circle and ellipse generating algorithms – Scan line algorithm – CharacterGeneration – attributes of lines, curves and characters – Antialiasing.

UNIT - III	TWO DIMENSIONAL GRAPHICS TRANSFORMATIONS AND VIEWING	9 Hrs

Two-dimensional Geometric Transformations – Windowing and Clipping – Clipping of lines andclipping of polygons.

UNIT - IV	THREE DIMENSIONAL GRAPHICS AND VIEWING	9 Hrs

Three-dimensional concepts – Object representations- Polygon table, Quadric surfaces, Splines, Bezier curves and surfaces – Geometric and Modelling transformations – Viewing -Parallel and perspective projections.

UNIT - V	REMOVAL OF HIDDEN SURFACES	9 Hrs

Visible Surface Detection Methods – Computer Animation.

Textbooks:

Hearn, D. and Pauline Baker,M., Computer Graphics (C-Version), 2nd Edition, Pearson Education, 2002.

Reference Books:

1. Neuman, W.M., and Sproull, R.F., Principles of Interactive Computer Graphics, Mc Graw Hill Book Co., 1979.
2. Roger, D.F., Procedural elements for Computer Graphics, Mc Graw Hill Book Co., 1985.
3. Asthana, R.G.S and Sinha, N.K., Computer Graphics, New Age Int. Pub. (P) Ltd., 1996.
4. Floey, J.D., Van Dam, A, Feiner, S.K. and Hughes, J.F, Computer Graphics, Pearson Education, 2001.

Online Learning Resources:

https://www.youtube.com/watch?v=fwzYuhduME4&list=PL338D19C40D6D1732

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2		3	2										2	
CO3	3	2												
CO4	3	2												
CO5		2	2											

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS TPT CSE

Course Code	SOFTWARE ENGINEERING LABORATORY		L	T	P	C
20APC0520			0	0	3	1.5
Pre-requisite	Mathematics and Programming	Semester	III-I			

Course Objectives:

This course is designed to:

- To Learn and implement the fundamental concepts of software Engineering.
- To explore functional and non functional requirements through SRS.
- To practice the various design diagrams through appropriate tool.
- To learn to implement various software testing strategies.

Course Outcomes :

CO1: Understand precisely about functional and non functional requirements
CO2: Gain knowledge in project managements and its principles
CO3: Identify the relationship between requirements and usecase
CO4: Know the interface of modules such as cohesion and coupling
CO5: Able to deduct the bugs during testing

List of Experiments

1. a) Draw the Control Flow Graph of following using MS-Word:
   i. if-else
   ii. while
   iii. do-while
   iv. for

   b) Draw the Flow chart and CFG for the following Program by using MS Word:
   if A = 10 then
   if B > C
   A = B
   else
   A = C
   endif
   endif
   print A, B, C.
2. Define Functional and Non-Functional Requirements for Hospital Management System.
3. Draw the Deliverable and Phase based Work Breakdown Structure for House construction System using MS Word.
4. Schedule all the Task and sub-Task using the PERT/CPM charts using MS –Excel.
5. Identify and analyze all the possible risks and its risk mitigation plan for the system to be automated
6. Diagnose any risk using Ishikawa Diagram (Can be called as Fish Bone Diagram or Cause & Effect Diagram)
7. Define Complete Project plan for the system to be automated using Microsoft Project Tool
8. Define the Features, Vision, Business objectives, Business rules and stakeholders in the vision document
9. Define the functional and non-functional requirements of the system to be automated by using Usecases and document in SRS document
10. Define the following tracebility matrices:
    i. Usecase Vs. Features
    ii. Functional requirements Vs.Usecases
11. Estimate the effort using the following methods for the system to be automated:
    i. Function point metric
    ii. Usecase point metric
12. Develop a tool which can be used for quantification of all the non-functional requirements
13. Write C/C++/Java/Python program for classifying the various types of coupling.
14. Write a C/C++/Java/Python program for classifying the various types of cohesion.
15. Write a c program to demonstrate the working of the Following constructs:
    i) do…while
    ii) while…do
    ii) if-else
    iii) switch
    iv) for loop.
16. A program written in c language for matrix multiplication fails —Introspect the causes for its failure and write down the possible reasons for its failure.
17. Take ATM system and study its system specifications and report the various bugs.
18. Write the test cases for Banking application.
19. Create a test plan document for Library Management System.
20. Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on boundary-value analysis, execute the test cases and discuss the results.
21. Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Derive test cases for your program based on decision table approach, execute the test cases and discuss the results.
22. Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume the upper limit for the size of any side is 10. Derive test cases for your program based on equivalence class partitioning, execute the test cases and discuss the results.
23. Draw standard UML diagrams using an UML modeling tool for a given case study and map design to code and implement a 3 layered architecture. Test the developed code and validate whether the SRS is satisfied.
    A. Identify a software system that needs to be developed.
    B. Document the Software Requirements Specification (SRS) for the identified system.

AITS TIRUPATI CSE

C. Identify use cases and develop the Use Case model.
D. Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.
E. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams
F. Draw relevant State Chart and Activity Diagrams for the same system.
G. Implement the system as per the detailed design
H. Test the software system for all the scenarios identified as per the usecase diagram
I. Improve the reusability and maintainability of the software system by applying appropriate design patterns.
J. Implement the modified system and test it for various scenarios
Suggested domain for validate the following system:

i. Passport automation system.
ii. Book bank
iii. Exam registration
iv. Stock maintenance system.
v. Online course reservation system

Reference Books:

1. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018.
2. Pressman Roger, "Software Engineering- Practioner Approach", McGraw Hill, 7 th Edition, 2012.
3. Ian Somerville, "Software Engineering", Pearson 2, 10 th Edition, 2017.
4. Jalote Pankaj, "An integrated approach to Software Engineering", Narosa, 3 rd Edition, 2005.
5. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2									2	
CO2	3	3	3					2		3	3		2	1
CO3	3	3											1	1
CO4	3	3	3	3	3								3	2
CO5	3	3	3	3	3								2	1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AITS TPT - CSE

Course Code	COMPUTER NETWORKS SIMULATION LAB		L	T	P	C
20APC0517			0	0	3	1.5
Pre-requisite	Digital Communications and Operating Systems	Semester	III-I			

Course Objectives:

- Learn basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP. A lab provides a practical approach to Ethernet/Internet networking: networks are assembled, and experiments are made to understand the layered architecture and how do some important protocols work.

Course Outcomes :

CO1: Deal with Error detection/ correction techniques
CO2: Simulate Data link layer protocols
CO3: Simulate network layer protocols
CO4: Able to get knowledge about NS2 simulator
CO5: Able to develop network applications

List of Experiments

1. Study of basic network command and Network configuration commands.
2. Connect the computers in Local Area Network.
3. Performing an Initial Switch and Router Configuration
4. Connecting, Configuring and Troubleshooting a Switched Network
5. Implementation of Error Detection / Error Correction Techniques
6. Implementation of Stop and Wait Protocol and sliding window
7. Implementation and study of Goback-N and selective repeat protocols
8. Implementation of High Level Data Link Control
9. Implementation of Link state routing algorithm
10. Implement the data link layer framing methods such as character, character-stuffing and bitstuffing.
11. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
12. Develop a simple data link layer that performs the flow control using the sliding window protocol,and loss recovery using the Go-Back-N mechanism.
13. Implement Dijsktra's algorithm to compute the shortest path through a network
14. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
15. Implement distance vector routing algorithm for obtaining routing tables at each node.
16. Write a program for congestion control using Leaky bucket algorithm.
17. Do the following using NS2 Simulator
    a. NS2 Simulator-Introduction
    b. Simulate to Find the Number of Packets Dropped
    c. Simulate to Find the Number of Packets Dropped by TCP/UDP
    d. Simulate to Find the Number of Packets Dropped due to Congestion
    e. Simulate to Compare Data Rate& Throughput.
    f. Simulate to Plot Congestion for Different Source/Destination
    g. Simulate to Determine the Performance with respect to Transmission of Packets
    h. To create scenario and study the performance of network with CSMA/CA protocol and CSMA/CD protocols.
18. Implement the following executing protocols of Internet in action using Wireshark Lab.
    a. Packet Capture and Observations using Packet Sniffer.
    b. Explore various aspects of HTTP Protocol.
    c. Tracing DNS with Wireshark.
    d. Analysis and Obtain various parameters-Values for TCP Protocol in action
19. Introduction to Network Simulator – Packet Tracer
    a. Configuration of a Router using Packet Tracer
    b. Network using Packet Tracer
    c. Implementation of Static Routing using Packet Tracer
    d. Implementation of RIP using Packet Tracer
20. Develop the network application using socket API
    a. Write a Socket program for echo
    b. Write a Socket program for Ping
    c. Write a Socket program for Chat applications.
    d. Write a Socket program for DNS(Domain Name System)
21. Planning Network-based Firewalls

Reference Books:

Shivendra S.Panwar, Shiwen Mao, Jeong-dong Ryoo, and Yihan Li, —TCP/IP Essentials A Lab-Based Approachǁ, Cambridge University Press, 2004.

Cisco Networking Academy, —CCNA1 and CCNA2 Companion Guideǁ, Cisco Networking Academy Program, 3rd edition, 2003.

Ns Manual, Available at: https://www.isi.edu/nsnam/ns/ns-documentation.html, 2011.

Elloitte Rusty Harold, —Java Network Programmingǁ, 3rd edition, O'REILLY, 2011.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			3								2	2
CO2	3				2								2	2
CO3	3				2								2	2
CO4	3			2	2								2	2
CO5	3	2		2	2								2	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

KIET - CSE

Course Code	Mobile Application Development		L	T	P	C
20ASA0503			1	0	2	2
Pre-requisite	Basic Mathematics and Programming	Semester	III-I			

Course Objectives:

- To understand fundamentals of android operating systems.
- Illustrate the various components, layouts and views in creating android applications
- To understand fundamentals of android programming.

Course Outcomes :

CO1: Demonstrate knowledge on mobile platforms, mobile user interface and user interface design requirements.
CO2: Design user interfaces by analyzing user requirements
CO3: Develop mobile applications for messaging, location based services and networking
CO4: Develop mobile applications and publish in different mobile platforms
CO5: Use android studio and IoS tools to develop mobile applications

UNIT - I 9 Hrs

Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation,Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

1.Setting Up the Development Environment

1.1 Download/Install the SDK
1.2 Download/Install the Eclipse Plugin
1.3 Download/Install the SDK Platform Components

2. Test the android development environment by performing the following operations.

2.1. Add the sample application to a project in Android studio.
2.2. Create an Android Virtual Device (AVD) for sample project.
2.3. Create a launch configuration for sample project.
2.4. Run a sample application in Android Emulator.

UNIT - II 9Hrs

Android Application Design Essentials: Anatomy of an Android applications, Android terminologies,Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

3.Create "Hello World" Application
4. Develop a program which will implement Sub menu in android application.
5. Develop a program to implement Context menu (Floating List of Menu Items) in android application.

UNIT - III 9 Hrs

ADVANCED USER INTERFACE AND DATA PERSISTENCE Basic views, Picker views, List view, Image view, Menus with views, Web view, saving and loading user preferences, Persisting data to files, Creating and using databases.

6. Develop a program to implement the List View in android application.
7. Creating the Application Choosing Options (i) CheckBox (ii) RadioButton
8. Develop application by using Linear Layout Views with different attributes.

UNIT - IV 9 Hrs

MESSAGING, LOCATION-BASED SERVICES, AND NETWORKING SMS messaging, sending e-mail, displaying maps, getting location data, monitoring a location, Consuming web services using HTTP

9. Develop a program to implement a Custom Button and handle the displayed message on button click
10. Develop a program to implement the Table layout in View Group that displays child View elements in rows and columns.

UNIT - V 9 Hrs

ANDROID SERVICES, PUBLISHING ANDROID APPLICATIONS: Services, Communication between a service and an activity, Binding activities to services, Threading, Preparing for publishing, Deploying APK files. Building the app in android debugging an android app.

11. Develop a program to show how to use Date picker control of ADK in android applications.
12. Develop a program to insert, delete, display, and update the employee details in Android APP

Textbooks:

1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)
2. J. F. DiMarzio, Beginning Android Programming with Android Studio, Wiley India, 4 thEdition, 2017.
3. Wei – Meng Lee, Beginning Android 4 Application Development, Wrox, 2017.
4. Jeff McWherter and Scott Gowell, Professional Mobile Application Development,Wiley India, 1 stEdition, 2012.

Reference Books:

1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies by Barry Burd, Edition:
4. Neils Smyth, Android Stduio Development Essentials, Creative Space Independent publishing platform, 7 th Edition 2016.
5. Paul Deital and Harvey Deital, Android How to Program,Detial associates pu

Online Learning Resources:

https://www.youtube.com/watch?v=Bz0aw4_K8oc&list=PL49hKkxjHVqHilv8CUb-p9gMPFZtfqZTN5

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1		1								1	1
CO2	3	3	3										3	
CO3	2		2		1	2				2				2
CO4		2	2	2	1			2		2				2
CO5			2		1									2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

MIST-CSE

Course Code	BIOLOGY FOR ENGINEERS		L	T	P	C
20AMC9901			2	0	0	0
Pre-requisite		Semester	III-I			

Course Objectives:

This course is designed to:

- To provide basic understanding about life and life process animals and plant system
- To understand what bio-molecules are their structure are function application of certain bio-molecules in industry
- Brief introduction about human physiology and bio engineering
- To understand hereditary units
- Brief introduction to the production of transgenic microbes, plants and animals

Course Outcomes :

CO1: Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
CO2: Explain about biomolecules, their structure, function and their role in the living organisms. How biomolecules are useful in Industry.
CO3: Brief about human physiology.
CO4: Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
CO5: Know about application of biological principles in different technologies for the production of medicines and pharmaceutical molecules through transgenic microbes, plants and animals.

UNIT - I	Introduction to Basic Biology	9 Hrs

Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification.

UNIT - II	Introduction to Biomolecules	9Hrs

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

UNIT - III	Human Physiology	9 Hrs

Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle. Excretory system.

UNIT - IV	Introduction to Molecular Biology and recombinant DNA Technology	9 Hrs

Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. DNA technology. Introduction to gene cloning.

UNIT - V	Application of Biology	9 Hrs

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels, and Bio Engineering. Basics of Production of Transgenic plants and animals.

Textbooks:

1. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications
2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

Reference Books:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A Global Approach", Pearson Education Ltd, 2018.
2. T Johnson, Biology for Engineers, CRC press, 2011
3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed.. Panima Publications. PP 434.
4. David Hames, Instant Notes in Biochemistry –2016
5. Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology – 2014.

Online Learning Resources:

https://www.youtube.com/watch?v=qmK9CF3k4sc&list=PLdaynbt2YwqHUqHJrnb860xRWKiyBO29S

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3						2							3
CO2	2					3								2
CO3	2		2			3								
CO4	1			3	2									
CO5				3		2								3

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

AUSTRI-CSE