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DEPARTMENT OF ARTIFICIAL INTELLIGENCE & MACHINE LEARNING (AI&ML)

I YEAR I SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	MA101BS	Linear Algebra and Calculus	3	1	0	4	30	70	100
2	AP102BS	Applied Physics	3	1	0	4	30	70	100
3	CS105ES	Programming for Problem Solving	3	1	0	4	30	70	100
4	ME106ES	Engineering Graphics	1	0	4	3	30	70	100
5	AP103BS	Applied Physics Lab	0	0	3	1.5	30	70	100
6	CS107ES	Programming for Problem Solving Lab	0	0	3	1.5	30	70	100
		Total	**10**	**3**	**10**	**18**	**180**	**420**	**600**
Mandatory Course (Non-Credit)									
7	*ES104BS	Environmental Science	3	0	0	-	100	-	100
8	*TS109	Technical Seminar	0	0	2	-	100	-	100
		Induction Programme							

I YEAR II SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	MA201BS	Advanced Calculus	3	1	0	4	30	70	100
2	CH202BS	Engineering Chemistry	3	1	0	4	30	70	100
3	EE206ES	Basic Electrical Engineering	3	0	0	3	30	70	100
4	ME207ES	Engineering Workshop	1	0	3	2.5	30	70	100
5	EN203HS	Professional English	2	0	0	2	30	70	100
6	CH204BS	Engineering Chemistry Lab	0	0	3	1.5	30	70	100
7	EN205HS	English Language and Communication Skills Lab	0	0	2	1	30	70	100
8	EE208ES	Basic Electrical Engineering Lab	0	0	2	1	30	70	100
		Total	**12**	**2**	**10**	**19**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
9	*MP209	Micro Project	0	0	2	-	100	-	100

***MC – Satisfactory/ Unsatisfactory**

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

II YEAR I SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	AIM301PC	Discrete Mathematics	3	0	0	3	30	70	100
2	AIM302PC	Data Structures	3	1	0	4	30	70	100
3	MA301BS	Mathematical and Statistical Foundations	3	0	0	3	30	70	100
4	AIM304PC	Computer Architecture and Organization	3	0	0	3	30	70	100
5	AIM305PC	Python Programming	2	0	0	2	30	70	100
6	BE304MS	Business Economics and Financial Analysis	3	0	0	3	30	70	100
7	AIM307PC	Data Structures Lab	0	0	3	1.5	30	70	100
8	AIM308PC	Python Programming Lab	0	0	3	1.5	30	70	100
Total			**17**	**1**	**6**	**21**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
9	*GS309MC	Gender Sensitization Lab	0	0	3	-	100	-	100

II YEAR II SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	AIM401PC	Formal Languages and Automata Theory	3	0	0	3	30	70	100
2	AIM402PC	Introduction to Artificial Intelligence	3	0	0	3	30	70	100
3	AIM403PC	Operating Systems	3	0	0	3	30	70	100
4	AIM404PC	Database Management Systems	3	1	0	4	30	70	100
5	AIM405PC	Object Oriented Programming using Java	3	1	0	4	30	70	100
6	AIM406PC	Artificial Intelligence Lab	0	0	3	1.5	30	70	100
7	AIM407PC	Database Management Systems Lab	0	0	3	1.5	30	70	100
8	AIM408PC	Java Programming Lab	0	0	2	1	30	70	100
Total			**15**	**2**	**8**	**21**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
9	*CI407MC	Constitution of India	3	0	0	-	100	-	100

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DEPARTMENTOFARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

III YEAR I SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	AIM501PC	Design and Analysis of Algorithms	3	0	0	3	30	70	100
2	AIM502PC	Machine Learning	3	0	0	3	30	70	100
3	AIM503PC	Computer Networks	3	0	0	3	30	70	100
4	AIM504PC	Compiler Design	3	0	0	3	30	70	100
5		Professional Elective-I	3	0	0	3	30	70	100
6		Professional Elective-II	3	0	0	3	30	70	100
7	AIM505PC	Machine Learning Lab	0	0	3	1.5	30	70	100
8	AIM508PC	Computer Networks Lab	0	0	3	1.5	30	70	100
9	EN506HS	Advanced Communication Skills Lab	0	0	2	1	30	70	100
Total			**18**	**0**	**8**	**22**	**270**	**630**	**900**
Mandatory Course (Non-Credit)									
9	*IP507MC	Intellectual Property Rights	3	0	0	-	100	-	100

III YEAR II SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	AIM601PC	Software Engineering	3	1	0	4	30	70	100
2	AIM602PC	DevOps	3	1	0	4	30	70	100
3	AIM603PC	Natural Language Processing	3	1	0	4	30	70	100
4		Professional Elective–III / MOOCs	3	0	0	3	30	70	100
5		Open Elective-I	3	0	0	3	30	70	100
6	AIM604PC	Natural Language Processing Lab	0	0	3	1.5	30	70	100
7	AIM605PC	DevOps Lab	0	0	3	1.5	30	70	100
8		Professional Elective - III Lab	0	0	2	1	30	70	100
Total			**15**	**3**	**8**	**22**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
10	*ES608BS	Environmental Science	3	0	0	-	100	-	100

***MC – Satisfactory/ Unsatisfactory**

Note:-Environmental Science should be registered by lateral entry students only

IV YEAR I SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	AIM701PC	Neural Networks & Deep Learning	3	0	0	3	30	70	100
2	AIM702PC	Reinforcement Learning	2	0	0	2	30	70	100
3		Professional Elective - IV	3	0	0	3	30	70	100
4		Professional Elective - V	3	0	0	3	30	70	100
5		Open Elective - II	3	0	0	3	30	70	100
6	AIM703PC	Deep Learning Lab	0	0	2	1	30	70	100
7	AIM704PC	Industrial Oriented Mini Project/ Summer Internship	0	0	0	2	--	100	100
8	AIM705 PC	Seminar	0	0	2	1	100	--	100
9	AIM706PC	Project Stage – I	0	0	6	3	30	70	100
Total			**14**	**0**	**10**	**21**	**310**	**590**	**900**

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	SM801MS	Organizational Behaviour	3	0	0	3	30	70	100
2		Professional Elective– VI	3	0	0	3	30	70	100
3		Open Elective - III	3	0	0	3	30	70	100
4	AIM802PC	Project Stage– II	0	0	14	7	30	70	100
Total			**9**	**0**	**14**	**16**	**120**	**280**	**400**

Professional Elective-I		**Professional Elective - II**	
AIM511PE	Graph Theory	AIM521PE	Software Testing Methodologies
AIM 512PE	introduction to Data Science	AIM522PE	Information Retrieval Systems
AIM 513PE	Web Programming	AIM523PE	Pattern Recognition
AIM 514PE	Image Processing	AIM524PE	Computer Vision and Robotics
AIM 515PE	Computer Graphics	AIM525PE	Data Warehousing and Business Intelligence
Professional Elective - III		**Professional Elective -IV**	
AIM611PE	Internet of Things	AIM711PE	Quantum Computing
AIM612PE	Data Mining	AIM712PE	Expert Systems
AIM613PE	Scripting Languages	AIM713PE	Cloud Computing
AIM614PE	Mobile Application Development	AIM714PE	Game Theory
AIM615PE	Cryptography and Network Security	AIM715PE	Mobile Computing
Professional Elective - V		**Professional Elective – VI**	
AIM721PE	Social Network Analysis	AIM811PE	Speech and Video Processing
AIM722PE	Federated Machine Learning	AIM812PE	Robotic Process Automation
AIM723PE	Augmented Reality & Virtual Reality	AIM813PE	Randomized Algorithms
AIM724PE	Web Security	AIM814PE	Cognitive Computing
AIM725PE	Ad-hoc & Sensor Networks	AIM815PE	Semantic Web

Professional Elective – III Lab	
AIM606PE	Internet of Things Lab
AIM607PE	Data Mining Lab
AIM608PE	Scripting Language Lab
AIM609PE	Mobile Application Development Lab
AIM610PE	Cryptography and Network Security Lab

List of Open Elective I

AIM616OE	Fundamentals of AI
AIM617OE	Machine Learning Basics

List of Open Elective II

AIM716OE	Introduction to Natural Language Processing
AIM717OE	AI applications

List of Open Elective III

AIM816OE	Chatbots
AIM817OE	Genetic Algorithms & Fuzzy logic

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LINEAR ALGEBRA AND CALCULUS

I B. TECH- I SEMESTER								
Course Code	**Programme**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
MA101BS	**B. Tech**	**3**	**1**	**0**	**4**	**30**	**70**	**100**

COURSE OBJECTIVES

To learn

1. Types of matrices and their properties.
2. Concept of a rank of the matrix which is used to know the consistency of system of linear equations.
3. Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
4. Determine the maxima and minima of functions of several variables by using partial differential coefficients.
5. Evaluation of improper integrals using Beta and Gamma functions.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
2. Find the Eigen values and Eigen vectors , reduce the quadratic form to canonical form using orthogonal transformations.
3. Apply the Mean value theorems for the single variable functions.
4. Apply maxima and minima for functions of several variables and Lagrange's method of multipliers.
5. Evaluate the improper integrals using Beta and Gamma functions.

UNIT-I	**MATRICES**	**Classes: 12**

Matrices: Types of Matrices, Symmetric, Hermitian, Skew-symmetric, Skew-Hermitian, orthogonal matrices, Unitary Matrices, rank of a matrix by Echelon form and Normal form, Inverse of Non-singular Matrices by Gauss-Jordan method, System of linear equations, solving system of Homogeneous and Non- Homogeneous equations. Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II	**EIGEN VALUES AND EIGEN VECTORS**	**Classes:12**

Linear Transformation and Orthogonal Transformation, Eigen values and Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III	MEAN VALUE THEOREMS	Classes:12

Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series. Applications: Finding areas, volumes of revolutions of curves (Only in Cartesian coordinates)

UNIT-IV	FUNCTIONS OF SEVERAL VARIABLES	Classes: 12

Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative, Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers. Application: Errors and approximations.

UNIT-V	FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS AND SPECIAL FUNCTIONS	Classes: 12

First Order linear and nonlinear Partial Differential Equations, Method of separation of variables.

Beta and Gamma functions, properties, relation between Beta and Gamma functions, evaluation of integrals using Beta and Gamma functions.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition.
2. Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2017.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

REFERENCE BOOKS

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2010.
2. B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint,2002.

WEB REFERENCES

1. https://www.efunda.com/math/gamma/index.cfm
2. https://ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

E -TEXT BOOKS

1. https://www.e-
2. booksdirectory.com/listing.php?category=4https://www.e-booksdirectory.com/details.php?ebook=10830

MOOCS COURSE

1. https://swayam.gov.in/
2. https://swayam.gov.in/NPTEL

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APPLIED PHYSICS

I B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AP102BS	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

To learn

1. The fundamental postulates of quantum mechanics.
2. The concepts related tosemiconductors.
3. The concepts related to PN Junction diode and itsapplications.
4. The basic concepts of laser and optical fiber and itsapplications.
5. The fundamentals of dielectrics and magneticmaterials.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to

1. Demonstrate the fundamental concepts on Quantum behavior of matter in its microstate.
2. Understand the knowledge of fundamentals of Semiconductorphysics.
3. Design and explain the characteristics of Optoelectronicdevices.
4. Analyze the properties of Laser and Optical Fibers and its application in engineering fields.
5. Design, characterize and prepare new materials for various engineering applications by using dielectric and magneticmaterials.

UNIT-I	QUANTUM MECHANICS	Classes: 12

Introduction to quantum physics, Black body radiation, Planck's Law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

UNIT-II	SEMICONDUCTOR PHYSICS	Classes: 14

Intrinsic and Extrinsic semiconductors, Carrier Concentration in Intrinsic and Extrinsic semiconductors Dependence of Fermi level on Temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics.

UNIT-III	OPTOELECTRONICS	Classes: 10

Radiative and non-radiative recombination mechanisms in semiconductors and LED: Device structure, Materials, Characteristics and figures of merit, Semiconductor photo detectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

UNIT-IV	LASERS AND FIBRE OPTICS	Classes: 12

Lasers: Introduction to interaction of radiation with matter, Characteristics, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, He-Ne laser and Semiconductor laser, Applications of laser. Fibre Optics: Introduction, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres in Communication System and Sensors.

UNIT-V	Dielectric and Magnetic Properties of Materials	Classes: 12

Introduction to Dielectrics, Polarization, Permittivity and Dielectric constant, Types of Polarization (Qualitative), Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezo electrics. Magnetization, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and Domain theory of ferromagnetism – Hysteresis curve based on domain theory, Applications of magnetic materials.

TEXT BOOKS

1. Engineering Physics, B.K. Pandey, S. Chaturvedi – CengageLearning.
2. Halliday and Resnick,Physics-Wiley.
3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar-S.Chand.
4. Introduction to Solid State Physics by Charles Kittel (Publishers: JohnWiley&Sons)

REFERENCE BOOKS

1. Richard Robinett ,QuantumMechanics.
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hillinc.(1995).
3. Online Course: "Optoelectronics Materials and Devices" by Monica Katiyar andDeepak GuptaNPTEL.

WEB REFERENCES

1. Introductory QuantumMechanics:https://nptel.ac.in/courses/115104096/
2. Fundamental concepts of semiconductors:https://nptel.ac.in/courses/115102025/
3. SemiconductorOptoelectronics:https://nptel.ac.in/courses/115102103/
4. FibreOptics:https://nptel.ac.in/courses/115107095/

E -TEXT BOOKS

1. library genesis: https://libgen.is/

MOOCS COURSE

1. Swayam:https://swayam.gov.in/nd1_noc19_ph13/preview
2. Alison:https://alison.com/courses?&category=physics

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PROGRAMMING FOR PROBLEM SOLVING

I B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS105ES	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

1. To learn the fundamentals ofcomputers.
2. To understand the various steps in programdevelopment.
3. To learn the syntax and semantics of C programminglanguage.
4. To learn the usage of structured programming approach in solvingproblems.

COURSE OUTCOMES

Upon successful completion of the course, the student is able:

1. To write algorithms and to draw flowcharts for solvingproblems.
2. To convert the algorithms/flowcharts to CPrograms.
3. To code and test, a given logic in C programminglanguage.
4. To decompose a problem into functions and to develop modular reusablecode.
5. To use arrays, pointers, strings and structures to write Cprograms
6. Searching and sortingproblems

UNIT-I	INTRODUCTION TO C PROGRAMMING LANGUAGE	Classes: 16

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems Introduction to Algorithms: steps to solve logical and numerical problems, Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming.

Introduction to C Programming Language: I/O: Simple input and output with scanf and printf, variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, type conversion

UNIT-II	CONDITIONAL BRANCHING, LOOPS, ARRAY AND STRINGS	Classes: 14

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do-while loops.

Arrays: one- and two-dimensional arrays, creating, accessing and manipulating elements of arrays.

Strings: Introduction to strings, handling strings as array of characters, basicstringfunctions available in C (strlen, strcat, strcpy, strstr etc.), arraysofstrings.

UNIT-III	STRUCTURE AND POINTER	Classes:10

Structures: Defining structures, initializing structures, unions, Array of structures.
Pointers: Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers in self- referential structures, usage of self-referential structures in linked list (no implementation), Enumeration data type.
Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different datatypes

UNIT-IV	FUNCTION AND STORAGE CLASSES	Classes: 12

Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries
Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions
Storage classes (auto, extern, static and register)

UNIT-V	FILES AND PRE-PROCESSOR	Classes: 12

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef.
Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions

TEXT BOOKS

1. The C Programming Language by Dennis M Ritchie, Brian W. Kernigham, 1988,PHI
2. Computer System & Programming in C by S Kumar & S Jain, Nano Edge Public publications,Meerut.
3. Fundamentals of Computing and C Programming, R. B. Patel, Khanna Publications, 2010, NewDelhi.

REFERENCE BOOKS

1. Computer Fundamentals and Programming in C, ReemaTheraja,Oxford
2. Information technology, Dennis P. Curtin, Kim Foley, Kunal Sen, Cathleen Morin, 1998,TMH
3. Theory and problem of programming with C, Byron CGottfried,TMH

WEB REFERENCES

1. https://www.tutorialspoint.com/cprogramming/
2. https://www.tutorialspoint.com/cplusplus/
3. https://www.cprogramming.com/tutorial/c-tutorial.html

E -TEXT BOOKS

1. https://fresh2refresh.com/c-programming/
2. https://beginnersbook.com/2014/01/c-tutorial-for-beginners-with-examples/
3. https://www.sanfoundry.com/simple-c-programs/

MOOCS Course

1. nptel.ac.in/courses/106105085/4
2. https://www.quora.com/Are-IIT-NPTEL-videos-good-to-learn-basic-C-programming

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ENGINEERING GRAPHICS

I B. TECH- I SEMESTER								
Course Code	**Programme**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
ME106ES	**B.Tech**	**1**	**0**	**4**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

To learn

1. The course aims at empowering the students with drafting skills and enhancing their visualization capacity in order to draw different views of the given object.
2. To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
3. To expose them to existing national standards related to technicaldrawings.
4. To impart knowledge about standard principles of orthographic projection of objects.
5. It will help students to use the techniques, skills, and modern engineering tools and communicate effectively.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to.

1. Familiarize with the fundamentals and standards of Engineering graphics Project orthographic projections of lines and plane surfaces.
2. Convert orthographic views to isometric views and vice-versa and know the basics of AutoCAD.
3. Preparing working drawings to communicate the ideas andinformation.
4. Know and use common drafting tools with the knowledge of drafting standards.

UNIT-I	INTRODUCTION TO ENGINEERING DRAWING	Classes: 15

Introduction to Engineering Graphics: Principles of Engineering Graphics and their significance, Usage of Drawing instruments, lettering, Conic sections including Rectangular Hyperbola (General method only); Cycloid, Epicycloids and Involutes.

Scales: Plain & Diagonal Scales.

UNIT-II	ORTHOGRAPHIC PROJECTIONS	Classes:15

Projections of points: Principles of orthographic projections – conventions – first and third angle projections. Projection of points in all quadrants.

Projection Of Lines – lines inclined to single plane, lines inclined to both the planes.

Projection of Planes: Projection of regular planes – planes inclined to one plane, planes inclined to both planes.

UNIT-III	PROJECTION OF SOLIDS & SECTION OF SOLIDS	Classes:12

Projection of Solids: Projections of regular solids like cube, prism, pyramid, cylinder and cone. Axis inclined to both the reference planes.

Section of Solids: Sectioning of above solids in simple vertical position with the cutting planeisinclinedtotheoneplaneandperpendiculartotheother–trueshapeofsection.

UNIT-IV	DEVELOPMENT OF SURFACES & ISOMETRIC PROJECTIONS	Classes: 15

Development of Surfaces: Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions –Plane Figures, Simple and Compound Solids.

UNIT-V	TRANSFORMATION OF PROJECTIONS & INTRODUCTION AUTO CAD	Classes: 15

Transformation of Projections: Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects.
Introduction to Auto CAD: Introduction, Salient features of AutoCAD software, Basic Commands, construction, editing and dimensioning, two dimensional drawings.

TEXT BOOKS

1 Engineering Drawing - N.D. Bhatt & V.M. Panchal, 50th edition, 2013-Charotar Publishing House, Gujarat.
2 Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3 K.L.Narayana, P. Kannaiah, “Engineering Drawing”, SciTech Publishers. 2nd Edition, 2013
4 Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.

REFERENCE BOOKS

1 Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited,2011.
2 K. V. Natarajan, “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai,2015.
3 Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore,2007.
4 Trymbaka Murthy, “Computer Aided Engineering Drawing", I.K. international Publishing House, 3rd Edition, 2011.

WEB REFERENCES

1 http://freevideolectures.com/Course/3420/Engineering-Drawing
2 https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing
3 https://www.wiziq.com/tutorials/engineering-drawing
4 http://road.issn.org/issn/2344-4681-journal-of-industrial-design-and-engineering-graphics

E -TEXT BOOKS

1 http://rgpv-ed.blogspot.com/2009/09/development-of-surfaces.html
2 http://www.techdrawingtools.com/12/l1201.htm

MOOCS Course

1 https://nptel.ac.in/course.php
2 https://swayam.gov.in/explorer

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APPLIED PHYSICS LAB

I B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AP103BS	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

1. To study semiconductordevices.
2. To verify the Biot –Savartlaw.
3. To experience resonancephenomena.
4. To compare the experimental results with the class roomlearning.
5. The basic experimental skills which are very essential for an engineeringstudent.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:

1. Learn the working principles of PN Junctiondiode.
2. Examine the electrical and magnetic properties ofmaterials.
3. Determine the characteristics of Opto-Electronicdevices.
4. Understand the basic principles of OpticalFibers.
5. Analyze the basic electroniccircuits.

LIST OF EXPERIMENTS

1. **Energy gap of P-N junction diode**: To determine the energy gap of a semiconductor diode.
2. **Solar Cell**: To study the V-I Characteristics of solarcell.
3. **Light emitting diode**: Plot V-I and P-I characteristics of light emittingdiode.
4. **Stewart – Gee's experiment**: Determination of magnetic field along axis of the current carryingcoil.
5. **Hall Effect**: To determine Hall co-efficient of givensemiconductor.
6. **Photoelectric effect**: To determine work function of a givenmaterial.
7. **LASER**: To study the characteristics of LASERsources.
8. **Optical Fibre**: To determine the Numerical aperture and bending losses of opticalfibres.
9. **LCR Circuit**: To determine the Quality factor of LCRcircuit.
10. **RC Circuit**: To determine the Time constant of RCcircuit.

NOTE: Any 8 experiments are to beperformed

TEXT BOOKS
1. Engineering Physics, B.K. Pandey, S. Chaturvedi –CengageLearning. 2. Halliday and Resnick,Physics-Wiley. 3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar-S.Chand.
REFERENCE BOOKS
1. Main, I. G., Vibrations and Waves in Physics. 2nd. edition. CambridgeUniversity Press,1984. 2. Eugene Hecht, "Optics" , 5thEdition,AdelphiUnioversity,2016
WEB REFERENCES
1. Fundamental concepts of semi conductors:https://nptel.ac.in/courses/115102025/ 2. Semi conductor Optoelectronics:https://nptel.ac.in/courses/115102103/
E -TEXT BOOKS
1. http://www.lehman.edu/faculty/kabat/F2019-166168.pdf 2. https://www.scribd.com/doc/143091652/ENGINEERING-PHYSICS-LAB-MANUAL
MOOCS COURSE
1. Swayam:https://swayam.gov.in/nd1_noc19_ph13/preview 2. Alison:https://alison.com/courses?&category=physics

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PROGRAMMING FOR PROBLEM SOLVING LAB

I B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS107ES	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

1. To learn the fundamentals ofcomputers.
2. To understand the various steps in programdevelopment.
3. To learn the syntax and semantics of C programming language.
4. To learn the usage of structured programming approach in solvingproblems

COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. To write algorithms and to draw flowcharts for solvingproblems.
2. To convert the algorithms/flowcharts to Cprograms.
3. To code and test a given logic in C programminglanguage.
4. To decompose a problem into functions and to develop modular reusablecode.
5. To use arrays, pointers, strings and structures to write Cprograms.
6. Searching and sortingproblems

LIST OF EXPERIMENTS

1. Write a simple program that prints the results of all the operators available inC
2. Write a simple program to convert the temperature from Fahrenheit toCelsius
3. Write a program for find the max and min from the three numbers using if else statement
4. Write a C program to find the roots of a Quadratic equation.
5. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators+,-,*, /, % and use Switch Statement)
6. Write a program that finds if a given number is a primenumber
7. Write a C program to find the sum of individual digits of a positive integer and test given number ispalindrome.
8. Write a C program to generate the Fibonacci sequence ofnumbers.
9. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by theuser.
10. Write a C program to find the minimum, maximum and average in an array of integers
11. Write a C program that uses functions to perform the following:1) Addition of Two Matrices 2) Multiplication of TwoMatrices
12. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)

13. Toinsertasub-stringintoagivenmainstringfromagivenposition.e.ii.TodeletenCharacters from a given position in a givenstring
14. WriteaCprogramthatdisplaysthepositionofacharacterchinthestringSor–1ifSdoesn‘tcontainch
15. Write a C program to count the lines, words and characters in a giventext.
16. Define a structure student to store the details like Roll Number, Name, and Marks in three subjects of a student and display thesame.
17. Write a C program to perform specified operation on complexnumbers.
18. Write a C program to store the information about threestudents.
19. Write a C Program to illustrate the use of nestedstructures.
20. Write a C Program to perform arithmetic operations usingpointers.
21. Write a C Program to display the array elements in reverse order usingpointer.
22. Write a C Program to find factorial of a number usingfunctions.
23. Write a C Program to find factorial of a number using recursivefunctions.
24. Write a C Program to implement call by value and call byreference.
25. Write a C Program to copy the data from one file toanother
26. Write a C Program to append data to thefile
27. Write a C Program to merge the twofiles
28. Write a C Program to display the file content on reverseorder.
29. Write a C Program to count number of vowels, consonants, digits, words in a givenfile

TEXT BOOKS

1. TheCProgrammingLanguagebyDennisMRitchie,BrianW.Kernigham,1988,PHI Publications, 2010,NewDelhi.
2. ComputerSystem&ProgramminginCbySKumar&SJain,NanoEdge Public publications,Meerut.
3. 3 Fundamentals of Computing and C Programming, R. B. Patel,Khanna

REFERENCE BOOKS

1. Computer Fundamentals and Programming in C, ReemaTheraja,Oxford
2. Informationtechnology,DennisP.Curtin,KimFoley,Kunal Sen,Cathleen Morin,1998,TMH
3. Theory and problem of programming with C, Byron CGottfried,TMH.

TEXT BOOKS

1. https://www.tutorialspoint.com/cprogramming/
2. https://www.w3schools.in/c-tutorial/
3. https://www.cprogramming.com/tutorial/c-tutorial.html
4. www.studytonight.com/c/

REFERENCE BOOKS

1. http:///programming-with-c
2. https://developerinsider.co/best-c-programming-book-for-beginners/

REFERENCE BOOKS

1. https://nptel.ac.in/courses/106105085/4
2. https://www.coursera.org/courses?query=c%20programming

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ENVIRONMENTAL SCIENCE

I B. TECH- I SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
*ES104BS	B. Tech	3	0	0	-	100	-	100

COURSE OBJECTIVES

To learn

1. Analyze the inter relationship between living organism andenvironment
2. Describe various types of natural resources available on the earthsurface
3. Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation ofbiodiversity
4. Explain the causes, effects and control measures of various types of environmental pollutions
5. Understand the importance of environment by assessing its impact on the humanworld

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Differentiate between various biotic and abiotic components ofecosystem
2. Describe the various types of naturalresources
3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species ofIndia
4. Illustrate causes, effects,andcontrolmeasuresofvarioustypesofenvironmentalpollutions
5. Understand technologies on the basis of ecological principles environmental regulations which in turn helps in sustainabledevelopment

UNIT-I	ECOSYSTEMS	Classes: 8

Definition, Scope, and Importance of ecosystem. Classification, structure and function of an ecosystem, food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification.

UNIT-II	NATURAL RESOURCES	Classes: 8

Classification of Resources: Living and Non-Living resources.
Waterresources:useandoverutilizationofsurfaceandgroundwater,floodsanddroughts,Dams: benefits andproblems.
Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources
Land resources: Forest resources.
Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III	BIODIVERSITY AND BIOTIC RESOURCES	Classes: 7
Introduction, Definition, genetic, species and ecosystemdiversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic, optional values and hotspots of biodiversity. Endangered and endemic species of India, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation.		
UNIT-IV	**ENVIRONMENTAL POLLUTION**	**Classes: 9**
Types of pollution, Causes, effects and prevention and control measures of air, water, soil, noise and thermal pollution. Solid waste and e-waste management.		
UNIT-V	**ENVIRONMENTAL POLICY AND SUSTAINABLE DEVELOPEMENT**	**Classes: 10**
Concept of sustainable development: Sustainable development goals. Threats to sustainability: Population explosion- crazy consumerism. Green building concept. Water conservation, Rainwater harvesting, watershed management. Environmental Policies and Legislations: EnvironmentProtectionAct,Air(Prevention and Control of Pollution)Act,Forest(conservation) Act, 1980. Wildlife ProtectionAct.		

TEXT BOOKS

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University GrantsCommission
2. Environmental Studies by R. Rajagopalan, Oxford UniversityPress.
3. Textbook of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications
4. Dr. P. D Sharma, "Ecology and Environment", Rastogi Publications, New Delhi,12th Edition, 2015

REFERENCE BOOKS

1. Environmental Studies by Anubha Kaushik, 4th Edition, New age internationalpublishers
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Pvt. Ltd, NewDelhi
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHL Learning Pvt. Ltd, NewDelhi
4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIAedition

WEB REFERENCES

1. https://www.britannica.com/science/ecosystem
2. https://ocw.mit.edu/resources/#EnvironmentandSustainability

E -TEXT BOOKS

1. P N Palanisamy Environmental Science ISBN:9788131773253, eISBN:97899332509771 Edition: Secondedition
2. Environmental Studies. Author, Dr. J. P. Sharma. Publisher, Laxmi Publications, 2009 ISBN, 8131806413,9788131806418.

MOOCS COURSE

1. https://nptel.ac.in/courses/122103039/38
2. https://nptel.ac.in/courses/106105151/12

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ADVANCED CALCULUS

I B. TECH- II SEMESTER								
Course Code	**Programme**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
MA201BS	**B. Tech**	**3**	**1**	**0**	**4**	**30**	**70**	**100**

COURSE OBJECTIVES

To learn

1. Methods of solving the differential equations of first and higherorder
2. Evaluation of multiple integrals and their applications
3. The physical quantities involved in engineering field related to vector valued functions
4. The basic properties of vector valued functions and their applications
5. Vector point functions and scalar point functions

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Identify whether the given differential equation of first order is exact or not.
2. Solve higher order differential equation and apply the concept of differential equation to real problems.
3. Evaluate the multiple integrals and apply the concept to find areas and volumes.
4. Is able to find gradient, directional derivative, divergence and curl.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

UNIT-I	**FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS**	**Classes: 10**

Exact, linear and Bernoulli's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, Applications: Newton's law of cooling, Law of natural growth and decay, Simple Harmonic Motion

UNIT-II	**ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER**	**Classes: 12**

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, sinax, cosax, polynomial in x^m, $e^{ax}V(x)$ and xV(x),method of variation of parameters, Applications: LCR Circuit.

UNIT-III	MULTIPLE INTEGRATION	Classes:12
Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals)		
UNIT-IV	**VECTOR DIFFERENTIATION**	**Classes: 12**
Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors		
UNIT-V	**VECTOR INTEGRATION**	**Classes: 12**
Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and theirapplications		

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.

REFERENCE BOOKS

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

WEB REFERENCES

1. https://www.efunda.com/math/gamma/index.cfm
2. https://ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

E -TEXT BOOKS

1. https://www.e-booksdirectory.com/listing.php?category=4
2. https://www.e-booksdirectory.com/details.php?ebook=10830

MOOCS COURSE

1. https://swayam.gov.in/
2. https://swayam.gov.in/NPTEL

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ENGINEERING CHEMISTRY

I B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CH202BS	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

To learn

1. To provide basic knowledge on atomic, molecular orbitals and the bonding interaction betweenatoms
2. To analyze the impact of water hardness and its various methods for removal of hardness of water, numerical problems to calculate the hardness of water in a givensample
3. To discover the importance of electrical energy which originates from chemical reactions essential for industrialneeds
4. Tounderstandthebasicconceptsofspectroscopyanddrugmoleculestoextrapolatetheir chemical knowledge in day to daylife
5. To enable the students to understand the use of engineering materials such as polymers, lubricants and study the industrial applications in the field of engineering andtechnology

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Achieve the basic concepts of atomic, molecular and electronic changes related to molecular bonding andmagnetism
2. Familiarize with fundamentals of treatment technologies and considerations for its design and implementation in water treatmentplants
3. To extrapolate the knowledge of cell, electrode, electrolysis, electromotive force. To analyze and develop a technical solution to corrosion problems related to engineering materials
4. Acquire the significant knowledge about basic concepts of spectroscopy and synthesis of drug molecules would be known to thestudents
5. Comprehended and explore engineering applications of polymers andlubricants

UNIT-I	MOLECULAR STRUCTURE AND THEORIES OF BONDING	Classes: 10

Introduction to VBT, Postulates and draw backs of VBT- Atomic and Molecular orbitals, Linear Combination of Atomic Orbitals (LCAO), Introduction to Crystal Field Theory (CFT): Salient featuresofCFT-CrystalFieldSplittingoftransitionmetaliond-orbitalsintetrahedral,octahedral and square planar geometries. Applications of CFT- color and magnetic properties.

Postulates of MOT, molecular orbitals of diatomic molecules-molecular orbital energy level diagrams of N_2, O_2 and CO molecules.

UNIT-II	WATER AND ITS TREATMENT	Classes: 12

Introduction-hardness of water-causes of hardness. Types of harness: Temporary and Permanent. Expression and units of hardness. Estimation of hardness of water by complex metric method (EDTA method), Numerical problems. Boiler troubles- scales, sludges, carryover and caustic embrittlement. Internal treatment- Calgon conditioning, phosphate conditioning and colloidal conditioning. External treatment of water- Ion exchange process. Desalination of brackish water- Reverse osmosis. Potable water and its specifications. Steps involved in the treatment of waterby chlorination andozonization.

UNIT-III	ELECTROCHEMISTRY AND CORROSION	Classes: 14

Electrochemical cells- electrode potential, standard electrode potential, Galvanic cell, Nernst equation-Applications.EMFofacell.Typesofelectrodes-standardhydrogenelectrode,calomel and glass electrode- construction and working. Numericalproblems.

Batteries - Primary (Lithium cell) and secondary batteries (Lithium ion, Lead acid storage cell)- Applications.

Corrosion: Introduction, Causes and effects of corrosion- theories of chemical and electrochemical corrosion- mechanism of electrochemical corrosion. Corrosion control methods- Cathodicprotection-sacrificialanodeandimpressedcurrentcathodicmethods. Metallic coatings- Methods of preparation of surface- Hot dipping- Galvanization and tinning. Electro plating and electro lessplating.

UNIT-IV	SPECTROSCOPY AND SYNTHESIS OF DRUG MOLECULES	Classes: 08

Spectroscopy- Introduction, electromagnetic spectrum, principles of UV-visible, IR spectroscopy- selection rules and applications. Basic concepts of Nuclear magnetic resonance spectroscopy, chemical shift, spin-spin splitting. Magnetic resonance imaging.

Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

UNIT-V	MATERIAL CHEMISTRY	Classes: 12

Polymers: Introduction, Classification of polymers with examples. Types of polymerization: Addition and Condensation polymerization with examples.
Plastics: Introduction, Characteristics. Thermoplastic and thermosetting plastics. Compounding and fabrication of plastics (compression and injection molding). Preparation, properties and engineering applications of PVC, Teflon and Bakelite.
Lubricants: Introduction, Characteristics, mechanism-thick film, thin film, extreme pressure lubrication, properties- flash point, fire point, cloud point, pour point, mechanical stability and their significance- applications of lubricants.

TEXT BOOKS

1. P. C. Jain and M. Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company Ltd., New Delhi,18th edition(2018)
2. Prasanta Rath, B. Rama Devi, Ch. Venkataramana Reddy, S. Chakrovarthy, "A Text book of Engineering Chemistry", Cengage publications(2019)
3. Shashi Chawla, "Engineering Chemistry", Dhanpat Rai & Co. Publishers., New Delhi,15thedition(2015)
4. C.N. Banwell, "Fundamentals of MolecularSpectroscopy"

REFERENCE BOOKS

1. B. H. Mahan, "University Chemistry", Narosa Publishing house, New Delhi, 3rd edition (2013)
2. B.R.Puri,L.R.SharmaandM.S.Pathania,"PrinciplesofPhysicalChemistry",S.Nagin Chand & Company Ltd., 46th edition(2013)
3. J.D. Lee, "Concise Inorganic Chemistry", Willey Publications, 5th edition(2008)
4. P.W. Atkins, J.D. Paula, "Physical Chemistry", Oxford, 8th edition(2006)
5. G. L. David Krupadanam, D. Vijaya Prasad, K. Varaprasad Rao, K.L.N. Reddy and C. Sudhakar, "Drugs", Universities Press (India) Limited, Hyderabad(2007)

WEB REFERENCES

1. Chemistry: foundations and applications. J. J. Lagowski, editor in chief. New York, Macmillan Reference USA, c2004. 4v
2. Polymer data handbook. Edited by James E. Mark. 2nd ed. Oxford, New York, Oxford University Press, 2009
3. https://www.wyzant.com/resources/lessons/science/chemistry
4. http://www.chem1.com/acad/webtext/virtualtextbook.html

E -TEXT BOOKS

1. Krishnamurthy, N., Vallinayagam, P., Madhavan, D., Engineering Chemistry, ISBN: 9789389347005, eBook ISBN: 9789389347012, Edition: FourthEdition
2. Vijayasarathy, P. R., Engineering Chemistry, Print Book ISBN : 9789387472778, eBook ISBN : 9789387472785, Edition : Third Edition

MOOCS COURSE

1. https://onlinecourses-archive.nptel.ac.in
2. https://www.mooc-list.com/tags/chemistry

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BASIC ELECTRICALENGINEERING

I B. TECH- II SEMESTER

Course Code	Programme	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EE206ES	B. Tech	3	0	0	3	30	70	100

COURSEOBJECTIVES

To learn

1. To introduce the concepts of electrical circuits and itscomponents
2. To understand magnetic circuits, DC circuits and AC single phase &threephase circuits
3. To study and understand the different types of DC/AC machines andTransformers.
4. To import the knowledge of various electricalinstallations.
5. To introduce the concept of power, power factor and itsimprovement.

COURSEOUTCOMES

Upon successful completion of the course, the student isableto

1. To analyze and solve electrical circuits using networklaws.
2. To analyze and solve electrical circuits usingtheorems.
3. To understand and analyze basic Electric and Magneticcircuits.
4. To study the working principles of ElectricalMachines.
5. To introduce components of Low Voltage ElectricalInstallations.

UNIT-I	D.C.CIRCUITS	Classes:15

Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin's and NortonsTheorems.

Time-domain analysis of first-order RL and RC circuits.

UNIT-II	A.C.CIRCUITS	Classes:10

Representationofsinusoidalwaveforms,peakandrmsvalues,phasorrepresentation,realpower, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L,C,RL,RC,RLCcombinations(seriesandparallel),resonanceinseriesRL-Ccircuit.

UNIT-III	TRANSFORMERS	Classes:15

Ideal and practical transformer, EMF equation, operation on no load and on load, OC and SC tests, phasor diagrams equivalent circuit, losses in transformers, regulation, Efficiency and condition for maximum efficiency, Auto-transformer.

UNIT-IV	ELECTRICALMACHINES	Classes:15

Generation of rotating magnetic fields, Construction and working of a three-phase induction Motor, Significance of torque-slip characteristics. Loss components and efficiency. Construction, working, Torque-speed characteristics of separately excited, shunt, series, compound dc motors.

UNIT-V	ELECTRICALINSTALLATIONS	Classes:10

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, electrical Safety precautions in handling electrical appliances, electric shock, first aid for electric shock, safetyrules.

TEXTBOOKS

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010,Tata, McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGrawHill,2009.
3. L.S.Bobrow,FundamentalsofElectricalEngineering",OxfordUniversityPress,2011
4. Electrical and Electronics Technology, E. Hughes, 10th Edition,Pearson,2010

REFERENCEBOOKS

1. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition,PrenticeHallIndia, 1989.
2. P. V. Prasad, S. Sivanagaraju, R. Prasad, "Basic ElectricalandElectronics Engineering" Cengage Learning, 1stEdition,2013.
3. V. D. Toro, – Electrical Engineering Fundamentals Prentice HallIndia,1989.

WEBREFERENCES

1. https://www.electrical4u.com/
2. http://www.basicsofelectricalengineering.com/
3. https://www.khanacademy.org/science/physics/circuits-topic/circuits-
4. resistance/a/ee-voltage-and-current
5. https://circuitglobe.com/

E -TEXTBOOKS

1. https://easyengineering.net/basic-electrical-engineering-by-wadhwa/
2. https://easyengineering.net/objective-electrical-technology-by-mehta/

MOOCSCOURSE

1. https://nptel.ac.in/courses/108108076/1
2. https://nptel.ac.in/courses/108102146/
3. https://nptel.ac.in/courses/108108076/35

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ENGINEERING WORKSHOP

I B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
ME207ES	B.Tech	1	0	3	2.5	30	70	100

COURSE OBJECTIVES

To learn

1. To Study of different hand operated power tools, uses and theirdemonstration.
2. To gain a good basic working knowledge required for the production of variousengineering products.
3. To provide hands on experience about use of different engineering materials,tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Study and practice on machine tools and their operations
2. Practice on manufacturing of components using workshop trades including Fitting, Carpentry, Foundry, Tin-smithy, House Wiring and Welding.
3. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. Apply basic electrical engineering knowledge for house wiring practice.

LIST OF EXPERIMENTS

TRADES FOR EXERCISES (Any two exercises from each trade)

1. Tin-Smithy – (Square Tin, Cone and Cylinder)
2. Carpentry – (T-Lap Joint, Planning Sawing &Dovetail Joint)
3. Welding Practice – (Arc Welding-Butt Joint, Lap Joint&T-Joint)
4. Black Smithy – (Round to Square, S-Hook&U-Clamp)
5. Foundry – (Mould using Single Piece and SplitPattern)
6. Fitting – (V-Fit, Square Filing & Semi-circular fit)
7. House-wiring – (Two-way Switch and one-way switch inseries)

TRADES FOR DEMONSTRATION

8. Plumbing, Machine Shop, Power tools in construction, Wood turning lathe and Casting Process.

Note: At least perform 10 Exercises out of 14 Exercises.

TEXT BOOKS

1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ ScitechPublishers.
2. Workshop Manual / Venkat Reddy/ BS Publications/SixthEdition
3. Workshop Technology byChapman
4. A Textbook Of Workshop Technology : Manufacturing Processes/J. KGUPTA

REFERENCE BOOKS
1. Work shop Manual - P. Kannaiah/ K. L. Narayana/ SciTech 2. Workshop Manual / Venkat Reddy/BSP 3. Workshop Technology byHazra-Chowdhary 4. Production Engineering byR.K.Jain
WEB REFERENCES
1. https://nptel.ac.in/courses/112105126/ 2. https://nptel.ac.in/downloads/112105127/ 3. https://nptel.ac.in/courses/112107145/ 4. https://nptel.ac.in/courses/122104015/
E -TEXT BOOKS
1. http://103.135.169.82:81/fdScript/RootOfEBooks/MED/Introduction Workshop%20Technology 2. https://www.quora.com/Download-free-mechanical-engineering-ebooks-sites
MOOCS Course
1. http://www.nits.ac.in/workshops/Workshop_on_MOOCS_26082017.pdf 2. https://www.nitttrc.ac.in/swayam/index.html

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PROFESSIONAL ENGLISH

I B. TECH- II SEMESTER

Course Code	Programme	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EN203HS	B. Tech	2	0	0	2	30	70	100

COURSE OBJECTIVES:

To enable students

1. To enhance their vocabulary and basic grammar rules for communicative competence.
2. To hone their comprehensive skills through various reading techniques.
3. To develop the professional writing with the practice of formal letters,e-mails, reports, resumes,etc.
4. To use various sentence structures effectively in formal and informal on texts.
5. To improve scientific and technical communication skills through technical vocabulary and appropriate prose texts.

COURSE OUTCOMES:

Upon successful completion of the course, the students are able to

1. Use vocabulary effectively and syntactically.
2. Translate the reading techniques and apply them in literary texts.
3. Demonstrate enhanced competence in standard Written English.
4. Develop the competence in writing professional documents.
5. Exhibit appropriate communicative approaches to suit various contexts.

UNIT-I	THE RAMAN EFFECT	Classes:7

Vocabulary: Word Formation, Use of affixes,
Grammar: Articles, Prepositions
Writing: Paragraph Writing, Organizing principles of Paragraphs in documents

UNIT-II	THE LOST CHILD	Classes:9

Vocabulary: Synonyms and Antonyms
Grammar: Noun – Pronoun Agreement and Concord
Reading: Significance & Techniques of reading; Skimming – Reading for the gist of a text; Scanning– Reading for specific information; Intensive; Extensive reading; SQ3R Technique; Reading Comprehension;
Reading Poetry -The Road Not Taken Writing: Narrative Writing

UNIT-III	SATYA NADELLA'S EMAIL TO HIS EMPLOYEES	Classes:10

Vocabulary: Homonyms-Homophones-Homographs Grammar: Tenses
Writing : Significance & Effectiveness of Writing; Writing Descriptions; Letter writing; E-mail writing

UNIT-IV	WHAT SHOULD YOU BE EATING?	Classes:10
Vocabulary: Technical vocabulary; Words from Foreign Languages; abbreviations and acronyms Grammar: Misplaced Modifiers; Redundancies and Cliches Writing: Information Transfer, Note Making, Writing an Abstract and Report Writing		
UNIT-V	**HOW A CHINESE BILLIONAIRE BUILT HER FORTUNE**	**Classes:9**
Vocabulary: Words often Confused; Idioms and Phrasal verbs, One- word Substitutes; Grammar: Conditional Sentences; Degrees of Comparison; Simple-Complex-Compound Sentences and Common errors Writing: Essay writing		

TEXTBOOKS:

1. Sudarshana, N.P. and Savitha, C. (2018). English forEngineers. Cambridge UniversityPress.
2. Education for Life and Work – English Workbook prepared by English Faculty of St. Martin's EngineeringCollege.

REFERENCE BOOKS:

1. Swan, M. (2016). Practical English Usage. Oxford UniversityPress.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford UniversityPress.
3. Zinsser, William. (2001). On Writing Well. Harper ResourceBook.

WEB REFERENCES:

1. www.edufind.com
2. www.myenglishpages.com
3. http://grammar.ccc.comment.edu
4. http://owl.english.prudue.edu

E –TEXTBOOKS:

1. http://bookboon.com/en/communication-ebooks-zip
2. http://learningenglishvocabularygrammar.com/files/idiomsandphraseswithmeaningsandexamlespdf.pdf

MOOCS COURSE:

1. https://mooec.com/courses/grammar-guru-1
2. https://mooec.com/courses/learning-styles

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ENGINEERING CHEMISTRY LABORATORY

I B. TECH- II SEMESTER

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CH204BS	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. Estimationofhardnessandchloridecontentinwatertocheckitssuitabilityfordrinking purpose
2. To find the concentration of ions present in an unknown solution
3. To know the handling procedure of colorimetric and conductometricinstruments
4. The fundamentals of drugsynthesis
5. The measurement of physical properties like surface tension, viscosity and acidvalue

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the total dissolved salts present in a sample ofwater
2. Determine the concentration of ions existing in asolution
3. Find the strength of an acid by conductometricmethods
4. Acquire basic knowledge on the chemical reaction used to synthesize drugmolecules like aspirin andParacetamol
5. Select lubricants for various purposes such as to reduce the friction betweentwo movable surfaces and to determine the surface tension of a givenliquid

LIST OF EXPERIMENTS

Volumetric Analysis

1. Determination of total hardness of water by complex metric method usingEDTA.
2. Determination of chloride content of water byArgentometry.
3. Determination of acid value of coconut oil.

Potentiometry

4. Determination of Fe^{2+} ions present in the given sample by Potentiometric titration.

Conductometry

5. Estimation of HCl by conductometrictitration.
6. Estimation of acetic acid by conductometrictitration.

Colorimetry

7. Estimation of Copper by colorimetricmethod.

Synthesis of Drugs

8. Synthesis of aspirin andParacetamol.

Physicalconstants

9. Determination of viscosity of the given sample byusing Ostwald's Viscometer.
10. Determination of surface tension of a given liquid usingstalagmometer.

TEXT BOOKS

1. Senior practical physical chemistry, B. D. Khosla, A. Gulati and V. Garg (R. Chand and Co.,Delhi)
2. Prasanta Rath, B. Rama Devi, Ch. Venkataramana Reddy, S. Chakrovarthy, "A Text book of Engineering Chemistry", Cengage publications(2019)
3. An introduction to practical; chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, NewDelhi)
4. Vogel's text book of practical organic chemistry, 5th edition
5. S. S. Dhara, Text book on experiments and calculations in engineering chemistry, B.S Publications

REFERENCE BOOKS

1. G. H. Jeffery, J. Bassett, J. Mendham and R. C. Denney, "Vogel's Text Book of Quantitative ChemicalAnalysis"
2. O. P. Vermani & Narula, "Theory and Practice in Applied Chemistry", New Age InternationalPublishers
3. Gary D. Christian, "Analytical chemistry", 6th Edition, WileyIndia

WEB REFERENCES

1. Phillip E. Savage, Industrial & Engineering Chemistry: At the Forefront ofChemical Engineering Research since 1909, *Ind. Eng.Chem.Res.*20195811
2. Elias, AI. Sundar Manoharan S. and Raj, H. "Laboratory Experiments for General Chemistry", I.I.T. Kanpur,1997

E -TEXT BOOKS

1. Payal B Joshi, Experiments In Engineering Chemistry, Edition: First, ISBN:978-93-85909-13-9, Publisher: I.K. International Publishing House Pvt.Ltd
2. Mohapatra, Ranjan Kumar, Engineering Chemistry With Laboratory Experiments, ISBN: 978- 81-203-5158-5, PHI Learning PrivateLimited

MOOCS COURSE

1. https://sce.ethz.ch/en/programmes-and-courses/suche-angebote.html?polycourseId=1299
2. https://www.classcentral.com/course/open2study-chemistry-building-blocks-of-the-world-1297

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ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

I B. TECH- II SEMESTER

Course Code	Programme	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EN205HS	B. Tech	0	0	2	1	30	70	100

COURSE OBJECTIVES:

To train students

1. Touseaccurateandappropriatepronunciationthroughthepracticeofphonetic sounds, symbols, word accent and intonation.
2. ToimprovetheirfluencyInspokenEnglishandneutralizethe mother tongue influence through JAM Sessions, Role-play,etc.
3. To comprehend the speech of people of various regions through Listening practice exercises.
4. To enable students to transfer information verbally with the right usage of Body language through individual and group activities.
5. TounderstandnuancesofEnglishlanguagebypracticingvariousexercisesat Multi-media lab.

COURSE OUTCOMES:

Upon successful completion of the course, student will be able to

1. Differentiate the speech sounds in English and demonstrate accurate pronunciation.
2. Communicate with others in clear and confident manner.
3. Improve their effective and empathetic listening ability.
4. Show the zeal to participate in Public Speaking Sessions.
5. Neutralize the Mother tongue influence in day to communication.

LIST OF EXPERIMENTS:

EXERCISE: I

CALL LAB:

Introduction to Phonetics – Speech sounds - vowels and consonants

ICS LAB:

Ice-breaking Activity – Non-verbal Communication

EXERCISE: II

CALL LAB:

Minimal Pairs – Consonant Clusters – Past Tense Marker and Plural Marker Rules

ICS LAB:

Role Play – Expressions in various Situations – Making Requests and Seeking Permissions

EXERCISE: III

CALL LAB:

Structure of Syllables – Word Accent –Stress shift–Intonation

ICS LAB:

Telephone Communication –Etiquette

EXERCISE: IV

CALL LAB:

Listening Comprehension Tests

ICS LAB:

Presentations Skills & JAM Session

EXERCISE: V

CALL LAB:

Mother Tongue Interference – Differences in British and American Pronunciation

ICS LAB:

Interview Skills – Mock Interviews

TEXTBOOKS:

1. ELCS Lab Manual prepared by English faculty of St. Martin's EngineeringCollege.
2. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. OxfordUniversity Press.

REFERENCE BOOKS:

1. T Balasubramanian. A Textbook of English Phonetics for Indian Students,Macmillan,2008
2. J Sethi et al. A Practical Course in English Pronunciation, Prentice Hall India,2005.
3. Priyadarshi Patnaik. Group Discussions and Interviews, Cambridge University Press PvtLtd2011.
4. Arun Koneru, Professional Speaking Skills, Oxford UniversityPress,2016.

WEB REFERENCES:

1. https://www.asha.org/PRPSpecificTopic.aspx?folderid=8589935321&section=References
2. Argyle,MichaelF.,Alkema,Florisse,&Gilmour,Robin."Thecommunicationof friendly and hostile attitudes: Verbal and nonverbal signals." European Journalof Social Psychology, 1, 385-402:1971
3. Blumer, Herbert. Symbolic interaction: Perspective and method. Engle wood Cliffs; NJ: PrenticeHall.1969

E –TEXTBOOKS:

1. Mc corry Laurie Kelly Mc Corry Jeff Mason, Communication Skills forthe Healthcare Professional, 1st edition,ISBN:1582558140, ISBN-13:9781582558141
2. RobertEOwens,Jr,LanguageDevelopment, 9th edition, ISBN:0133810364,9780133810363

MOOCS Course:

1. https://www.coursera.org/specializations/improve-english
2. https://www.edx.org/professional-certificate/upvalenciax-upper-intermediate-english

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BASIC ELECTRICAL ENGINEERINGLABORATORY

I B. TECH- II SEMESTER

Course Code	Programme	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EE208ES	B. Tech	0	0	2	1	30	70	100

COURSEOBJECTIVES:

To learn

1. To analyze a given network by applying various electrical laws
2. To analyze a given network by applying various network theorems
3. To know the response of electrical circuits for different excitations
4. To calculate, measure and know the relation between basic electrical parameters.
5. To analyze the performance characteristics of DC and AC electrical machines

COURSEOUTCOMES:

Upon successful completion of the course, the student is able to

1. Get an exposure to basic electrical laws.
2. Understand the response of different types of electrical circuits
3. Understand the response of different types of electrical Theorems
4. Understand different types of Excitations.
5. Understand the basic characteristics of transformers and electrical machines.

LIST OFEXPERIMENTS

PART-A

1. Verification of Ohms Law
2. Verification of KVL andKCL
3. Transient Response of Series RL and RC circuits using DCexcitation
4. Transient Response of RLC Series circuit using DCexcitation
5. Resonance in series RLCcircuit.
6. Verification of Super position theorem.
7. Verification of Thevenin'sTheorem.
8. Verification of Norton's Theorem.

PART-B

9. O.C. & S.C. Tests on Single Phase Transformer.
10. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation).
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
12. Torque-Speed Characteristics of a Separately/Self ExcitedDCShunt/Compound Motor.
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor

*Note: Any five experiments from Part-A and Part-B.

TEXTBOOKS

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rdedition2010,Tata
2. McGraw Hill.
3. D.C. Kulshreshtha, "Basic Electrical Engineering", McGrawHill,2009.
4. L.S.Bobrow,FundamentalsofElectricalEngineering",OxfordUniversityPress, 2011
5. Electrical and Electronics Technology, E. Hughes, 10th Edition,Pearson,2010

REFERENCEBOOKS

1. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition,Prentice Hall India,1989.
2. P.V.Prasad, S.sivanagaraju, R.Prasad, "BasicElectricalandElectronics Engineering" Cengage Learning, 1stEdition,2013.
3. V. D. Toro, – Electrical Engineering Fundamentals Prentice HallIndia,1989.

WEBREFERENCES

1. https://www.electrical4u.com/
2. http://www.basicsofelectricalengineering.com/
3. https://www.khanacademy.org/science/physics/circuits-topic/circuits-resistance/a/ee-voltage-and-current
4. https://circuitglobe.com/

E -TEXTBOOKS

1. https://easyengineering.net/basic-electrical-engineering-by-wadhwa/
2. https://easyengineering.net/objective-electrical-technology-by-mehta/

MOOCSCourse

1. https://nptel.ac.in/courses/108108076/1
2. https://nptel.ac.in/courses/108102146/
3. https://nptel.ac.in/courses/108108076/35

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DEPARTMENTOFARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

DISCRETE MATHEMATICS

II B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM301PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. The elementary discrete mathematics for computer science and engineering.
2. Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand and construct precise mathematical proofs
2. Use logic and set theory to formulate precise statements
3. Analyze and solve counting problems on finite and discrete structures
4. Describe and manipulate sequences
5. Apply graph theory in solving computing problems

UNIT-I	FOUNDATIONS	Classes: 11

The Foundations: Logic and Proofs: Propositional Logic, Applications of Propositional Logic,Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference,Introduction to Proofs, Proof Methods and Strategy.

UNIT-II	SETS AND RELATIONS	Classes: 11

Basic Structures, Sets, Functions, Sequences, Sums, Matrices and Relations Sets, Functions, Sequences & Summations, Cardinality of Sets and Matrices Relations, Relations and Their Properties,n-ray Relations and Their Applications, Representing Relations, Closures of Relations, EquivalenceRelations, Partial Orderings.

UNIT-III	INDUCTION AND RECURSION	Classes: 12

Algorithms, Induction and Recursion: Algorithms, The Growth of Functions, Complexity ofAlgorithms

Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, RecursiveDefinitions and Structural Induction, Recursive Algorithms, Program Correctness

UNIT-IV	DISCRETE PROBABILITY AND ADVANCED COUNTING TECHNIQUES	Classes: 11

Discrete Probability and Advanced Counting Techniques: An Introduction to Discrete Probability,Probability Theory, Bayes' Theorem, Expected Value and Variance

Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion-Exclusion,Applications of Inclusion-Exclusion

UNIT-V	GRAPHS AND TREES	Classes: 11

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, RepresentingGraphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems,Planar Graphs, Graph Coloring.

Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, MinimumSpanning Trees

TEXT BOOKS

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory- Kenneth HRosen, 7th Edition, TMH.

REFERENCE BOOKS

1. Discrete Mathematical Structures with Applications to Computer Science-J.P. Tremblay and R.Manohar, TMH,
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott, Abraham Kandel, Teodore P. Baker, 2nd ed, Pearson Education.
3. Discrete Mathematics- Richard Johnsonbaugh, 7Th Edn., Pearson Education.
4. Discrete Mathematics with Graph Theory- Edgar G. Goodaire, Michael M. Parmenter.
5. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, 5th edition, Pearson Education.

WEB REFERENCES

1. https://math.dartmouth.edu/archive/m19f03/public_html/
2. https://nptel.ac.in/courses/106/106/106106094/

E -TEXT BOOKS

1. Discrete Mathematics, An Open Introduction, Oscar Levin.

MOOCS COURSES

1. https://www.edx.org/learn/discrete-mathematics
2. https://www.udemy.com/course/discrete-math/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

DATA STRUCTURES

II B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM302PC	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

To learn

1. Exploringbasicdatastructuressuchasstacksandqueues.
2. A variety of data structures such as hash tables, search trees,tries, heaps,graphs
3. Sorting and pattern matchingalgorithms

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Select the data structures that efficiently model the informationin a Problem.
2. Assess efficiency trade-offs among differentdata structure Implementations orcombinations.
3. Designprogramsusingavarietyofdatastructures,includinghashtables,binary and general tree structures, search trees, tries, heaps, graphs, andAVL-trees.
4. Implementandknowtheapplicationofalgorithmsforsortingand pattern matching
5. Implementandknowtheapplicationofalgorithms inGraph Traversal methods.

UNIT-I	INTRODUCTION TO DATA STRUCTURES	Classes: 12

Introduction to Data Structures:Abstract data types, Linear list – singly linked list implementation,insertion, deletion and searching operations on linear list, Stacks-Operations, array and linkedrepresentations of stacks, stack applications, Queues-operations, array and linked representations.

UNIT-II	DICTIONARIES AND HASH TABLE	Classes: 12

Dictionaries: Linear list representation, skip list representation, operations - insertion, deletion andsearching.

Hash Table Representation: Hash functions, collision resolution-separate chaining, open addressing linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT-III	SEARCH TREES	Classes: 10

Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion andDeletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

UNIT-IV	GRAPHS AND SORTING	Classes: 12

Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sorting: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort,Heap Sort, External Sorting-Model for external sorting, Merge Sort.

UNIT-V	PATTERN MATCHING AND TRIES	Classes: 12

Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm,the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

TEXT BOOKS

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan AndersonFreed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/PearsonEducation.

REFERENCE BOOKS

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B.A. Forouzan,Cengage Learning.
2. Classic Data Structures, D. Samanta, 2nd edition,PHI.

WEB REFERENCES

1. Alfred Aho, John Hopcroft, and Jeffrey Ullman, Data Structures andAlgorithms, Addison-Wesley, 1983, ISBN0-201-00023-7.
2. https://www.studytonight.com/data-structures/introduction-to-data-structures
3. https://nptel.ac.in/courses/106/102/106102064/

E -TEXT BOOKS

1. Peter Brass, Advanced Data Structures, Cambridge University Press, 2008, ISBN 978-0521880374
2. G. H. Gonnetand R. Baeza-Yates, Handbook of Algorithms and Data Structures - inPascal and C, second edition, Addison-Wesley, 1991, ISBN0-201-41607-7.

MOOCS COURSES

1. https://www.udemy.com/data-structures-and-algorithms
2. https://onlinecourses.swayam2.ac.in/cec21_cs02/preview

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

MATHEMATICAL AND STATISTICAL FOUNDATIONS

II B. TECH-I SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
MA301BS	**B. Tech**	**3**	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

To learn

1. The Number Theory basic concepts useful for cryptographyetc
2. The theory of Probability and probability distributions of single and multiple random variables
3. The sampling theory and Estimating Parameters
4. Testing of hypothesis and making inferences
5. Stochastic process and Markovchains.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Apply the number theory concepts to cryptography domain.
2. Apply the concepts of probability and distributions to some case studies.
3. Correlate the material of one unit to the material in other units.
4. Estimating a Proportion of single mean and difference of means
5. Resolve the potential misconceptions and hazards in each topic of study.

UNIT-I	GREATEST COMMON DIVISORS AND PRIME FACTORIZATION	Classes: 8

Greatest Common divisors and prime factorization:Greatest common divisors, The Euclidean algorithm, The fundamental theorem of arithmetic, Factorization of integers and the Fermat numbers, Congruences: Introduction to congruences, Linear congruences, The Chinese remainder theorem, Systems of linear congruences

UNIT-II	SIMPLE LINEAR REGRESSION AND CORRELATION AND RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS	Classes: 8

Simple Linear Regression and Correlation: Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted Model, Properties of the Least Squares Estimators, Inferences Concerning the Regression Coefficients, Prediction,

Simple Linear Regression Case Study.

Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Statistical Independence.

Discrete Probability Distributions: Binomial Distribution, Poisson distribution.

UNIT-III	CONTINUOUS PROBABILITY DISTRIBUTIONS AND FUNDAMENTAL SAMPLING DISTRIBUTIONS	Classes:8

Continuous Probability Distributions: Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial

Fundamental Sampling Distributions: Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S2, t–Distribution, F- Distribution.

UNIT-IV	ESTIMATION & TESTS OF HYPOTHESES	Classes: 8

Estimation & Tests of Hypotheses: Introduction, Statistical Inference, Classical Methods of Estimation. Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion for single mean , Difference between Two Means, between Two Proportions for Two Samples and Maximum Likelihood Estimation.

UNIT-V	STOCHASTIC PROCESSES AND MARKOV CHAINS	Classes: 8

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

TEXT BOOKS

1. Kenneth H. Rosen, Elementary number theory & its applications, sixth edition, Addison- Wesley, ISBN 978 0-321-50031-1.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.
3. S. D. Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi

REFERENCE BOOKS

1. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.
2. T.T. Soong, Fundamentals of Probability And Statistics For Engineers, John Wiley & Sons Ltd, 2004.
3. Sheldon M Ross, Probability and statistics for Engineers and scientists, Academic Press.

WEB REFERENCES

1. https://www.efunda.com/math/gamma/index.cfm
2. https://ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

E -TEXT BOOKS

1. https://www.e-booksdirectory.com/listing.php?category=4
2. https://www.e-booksdirectory.com/details.php?ebook=10830

MOOCS COURSE

1. https://swayam.gov.in/
2. https://swayam.gov.in/NPTEL

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

COMPUTER ARCHITECTURE AND ORGANIZATION

II B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM304PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. The principles of computer organization and the basic architectural concepts.
2. The basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
3. Computer arithmetic, instruction set design, microprogrammed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the basics of instructions sets and their impact on processor design.
2. Demonstrate an understanding of the design of the functional units of a digital computer system.
3. Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
4. Design a pipeline for consistent execution of instructions with minimum hazards.
5. Recognize and manipulate representations of numbers stored in digital computers

UNIT-I	BASIC OPERATIONS	Classes: 14

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of ComputerOrganization, Computer Design and Computer Architecture.

Register Transfer Language and Micro operations: Register Transfer language, Register Transfer,Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations,Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT-II	CPU & MICRO PROGRAMMED CONTROL	Classes: 13

Microprogrammed Control: Control memory, Address sequencing, micro program example, designof control unit.
Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes,Data Transfer and Manipulation, Program Control.

UNIT-III	DATA REPRESENTATION AND COMPUTER ARTIHMETIC	Classes: 12

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.
Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms,Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT-IV	INPUT-OUTPUT AND MEMORY ORGANIZATION	Classes: 11

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer,Priority Interrupt Direct memory Access.
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory,Cache Memory.

UNIT-V	PIPELINE PROCESSING AND MULTI PROCESSORS	Classes: 11

Reduced Instruction Set Computer: CISC Characteristics, RISC Characteristics.
Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, InstructionPipeline, RISC Pipeline, Vector Processing, Array Processor.
Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessorarbitration, Interprocessor communication and synchronization, Cache Coherence.

TEXT BOOKS

1. Computer System Architecture – M. Morris Mano, Third Edition, Pearson/PHI.

REFERENCE BOOKS

1. Computer Organization – Car Hamacher, ZvonksVranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
3. Structured Computer Organization – Andrew S. Tanenbaum,4thEdition, PHI/Pearson.

WEB REFERENCES

1. "Computer Organization and Design:TheHardware/SoftwareInterface"byDavid A Patterson and John LHennessy
2. "Computer Organization"byZvoncoVranesicand SafwatZaky"
3. Computer Architectureand Organization"byJohn P Hayes.

E -TEXT BOOKS
1. Fundamentals of Computer organization and Design by ShivaramaDandamudi 2. Computer Architecture: Complexity and Correctness by Mueller andPaul
MOOCS COURSES
1. https://www.mooc-list.com › tags›computer-architecture 2. https://www.edx.org › course›computation-structures-3-computer-mitx-6

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

PYTHON PROGRAMMING

II B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM305PC	B. Tech	2	0	0	2	30	70	100

COURSE OBJECTIVES

To learn

1. Learn Syntax and Semantics and create Functionsin Python.
2. Understand Lists, Dictionaries and Regular expressionsin Python.
3. Handle Strings and Files inPython.
4. Implement Object Oriented Programming and graphics concepts in Python.
5. Build Web Services and introduction to Network and Database Programming in Python.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Examine Python syntax and semantics and be fluent in the useof Python flow control and functions.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
4. Interpret the concepts of Object-Oriented Programming and graphics as used in Python.
5. Implement exemplary applications related to Network Programming, Web Services andDatabases in Python.

UNIT-I	INTRODUCTION TO PYTHON	Classes: 13

Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types,Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types,Unsupported Types

Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers,Operators, Built-in Functions, Related Modules

Sequences - Strings, Lists, and Tuples, Mapping and Set Types

UNIT-II	FILES, EXCEPTIONS AND MODULES	Classes: 12

FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes,Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules,Related Modules

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management,
Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions,Why Exceptions?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules
Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, ModuleBuilt-in Functions, Packages, Other Features of Modules

UNIT-III	FUNCTIONS AND OBJECT-ORIENTED PROGRAMMING	Classes: 12

Functions: What are functions? Calling Functions, Creating Functions, Passing Functions, Formal Arguments, Variable-Length Arguments, Functional Programming, Recursion.
Object Oriented Programming: Introduction, Classes, Instances, Binding and Method Invocation, Inheritance, Built-in Functions, Customizing Classes, Privacy, Delegation and Wrapping.

UNIT-IV	REGULAR EXPRESSIONS AND MULTITHREADING	Classes: 12

Regular Expressions: Introduction, Special Symbols and Characters, re Module.
Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

UNIT-V	GUI AND WEB PROGRAMMING	Classes: 12

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, RelatedModules and Other GUIs
WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, AdvancedWeb Clients, CGI-Helping Servers Process Client Data, Building CGI ApplicationAdvanced CGI, Web (HTTP) Servers

TEXT BOOKS

1. Core Python Programming, Wesley J. Chun, Second Edition,Pearson.

REFERENCE BOOKS

1. Think Python, Allen Downey, Green Tea Press
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Python Programming: A Modern Approach, VamsiKurama, Pearson
4. Learning Python, Mark Lutz, O'Reilly.

WEB REFERENCES

1. https://www.tutorialspoint.com/python3/
2. https://www.geeksforgeeks.org/cgi-programming-python/
3. https://realpython.com/python-beginner-tips/
4. https://www.python.org/

E -TEXT BOOKS

1. https://www.tutorialspoint.com/python3/
2. https://books.goalkicker.com/PythonBook/

MOOCS COURSES

1. https://www.coursera.org/learn/python-programming
2. https://www.edx.org/professional-certificate/python-data-science
3. https://swayam.gov.in/nd1_noc19_cs41/preview
4. https://swayam.gov.in/nd1_noc19_cs40/preview

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

II B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
BE304MS	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To learn the basic Business types, impact of the Economy on Business.

and firms specifically. To analyze the Business from the Financial Perspective.

2. To Plan production and cost concepts for maximizing profit.
3. To Construct financial statement in accordance with generally accepted accounting principles
4. To Analyze the Financial performance of business through Ratios
5. To Estimate investment proposals through Capital Budgeting Methods

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand Business with the use of economic theories and business structure
2. Learn Production and cost concepts for maximizing profit
3. Construct financial statement in accordance with generally accepted accounting principles.
4. Analyze the Financial performance of business through Ratios.
5. Estimate investment proposals through Capital Budgeting Methods

UNIT-I	INTRODUCTION TO BUSINESS AND ECONOMICS	Classes: 10

Business: Characteristic features of Business, Features and evaluation of Private Enterprises and Public Enterprises.

Economics: Significance of Economics, types, Concepts and Importance of National Income, Inflation, Nature and Scope of Business Economics.

Demand Analysis: Demand Definition, Types of Demand, Demand Function, Law of Demand, Elasticity of Demand, Types of Elasticity of Demand, Demand Forecasting Methods.

UNIT-II	THEORY OF PRODUCTION AND COST ANALYSIS	Classes:8

Theory of Production: Factors of Production, Production Function, Production Function with one variable input, Production function with two variable inputs (ISO Quants and ISO Costs), Scale of Production with Law of Returns,Cobb-Douglas Production Function.

Cost Analysis: Types of Costs, Short run and Long run Cost Functions, Break Even Analysis.

UNIT-III	MARKET STRUCTURES, PRICING & FINANCIAL ACCOUNTING	Classes: 10

Market Structures, Pricing: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly and Monopolistic Competition, Types of Pricing.		
UNIT-IV	**FINANCIAL ANALYSIS THROUGH RATIOS**	**Classes: 8**
Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts. Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Capital Structure Ratios and Profitability Ratios (simple problems), Cash Flow Statement (simple problems) and Funds Flow Statement (simple problems)		
UNIT-V	**CAPITAL BUDGETING**	**Classes: 8**
Capital, significance, Types of Capital, Methods and sources of raising finance. Nature of Capital Budgeting, featuresof Capital Budgeting proposals, Methods of Capital Budgeting:Pay Back Period Method (PBP), Accounting Rate of Return (ARR), Net Present Value Method (NPV) Simple problems.		

TEXT BOOKS

1. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata Mc –Graw Hill, 2011.
3. GeethikaGhosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata Mc Graw Hill Education Pvt. Ltd. 2012.

REFERENCE BOOKS

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

WEB REFERENCES

1. https://nptel.ac.in/courses/110106050/17
2. https://nptel.ac.in/courses/110106050/39
3. https://nptel.ac.in/courses/110106050/38

E -TEXT BOOKS

1. https://www.sciencedirect.com/book/9780750644549/business-economics
2. http://www.freebookcentre.net/Business/Economics-Books.html

MOOCS COURSE

1. https://nptel.ac.in/courses/110106050/
2. https://nptel.ac.in/courses/110106050/11

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

DATA STRUCTURES LAB

II B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM307PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. It introduces searching and sorting algorithms
2. It provides an understanding of data structures such as stacks and queues.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Able to identify the appropriate data structures and algorithms for solving real Worldproblems.
2. Able to implement various kinds of searching and sortingtechniques.
3. Able to implement data structures such as stacks, queues, Search trees, and hash tables to solve various computingproblems.

LIST OF EXPERIMENTS

1. Write a program that uses functions to perform thefollowing operations on singly linked list.
   a) Creation.
   b) Insertion
   c) Deletion.
   d) Traversal
2. Write a program that uses functions to perform thefollowing operations on doubly linked list.
   a) Creation.
   b) Insertion
   c) Deletion.
   d) Traversal
3. Write a program that uses functions to perform thefollowing operations on circular linked list.
   a) Creation.
   b) Insertion
   c) Deletion.
   d) Traversal

4. Write a program that implement Stack operations using Arrays and Pointers.
5. Write a program that implement Queue operations using Arrays and Pointers.
6. Write a program that implements the following sorting methods to sort a given list of integers
   in ascending order

   i) Bubble sort ii) Selection sort iii) Insertion sortiv) Quick sort v) Merge sort
7. Write a program that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:

   i) Linear search ii) Binary search
8. Write a program to implement the tree traversal methods.
9. Write a program to implement the graph traversal methods.

TEXT BOOKS

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan AndersonFreed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/PearsonEducation.

REFERENCE BOOKS

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage Learning.

WEB REFERENCES

1. "Python Data Structures and Algorithms" byBenjamin Baka.

E -TEXT BOOKS

1. Data Structures in C Nair, Achuthsankar S.Mahalakshmi,T.

MOOCS COURSES

1. https://nptel.ac.in/courses/106/106/106106127/
2. https://nptel.ac.in/courses/106/106/106106145/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

PYTHON PROGRAMMING LAB

II B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM308PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. core programming basics and program design with functions using Python programming language.
2. A range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
3. The high-performance programs designed to strengthen the practical expertise.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Write, test, and debug simple Pythonprograms.
2. Implement Python pattern programs with conditionals andloops.
3. Develop Python programs step-wise by defining functions and callingthem, Read and write data from/to files inPython.
4. Use Python lists, tuples, dictionaries for representing compounddata.
5. Design agaming.

LIST OF EXPERIMENTS

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
4. Write a python script to print the current date in the following format “Sun May 29 02:26:23IST 2017”
5. Write a program to create, append, and remove lists in python.
6. Write a program to demonstrate working with tuples in python.
7. Write a program to demonstrate working with dictionaries in python.
8. Write a python program to find largest of three numbers.
9. Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula :c/5 = f-32/9]

10. Write a Python program to construct the following pattern, using a nested for loop
```
*
* *
* * *
* * * *
* * * * *
* * * *
* * *
* *
*
```
11. Write a Python script that prints prime numbers less than 20.
12. Write a python program to find factorial of a number using Recursion.
13. Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of thesquares of the other two sides).
14. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
15. Write a python program to define a module and import a specific function in that module to another program.
16. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
17. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
18. Write a Python class to convert an integer to a roman numeral.
19. Write a Python class to implement pow(x, n)
20. Write a Python class to reverse a string word by word.

TEXT BOOKS

1. A Practical Introduction to Python Programming, Brian Heinold.
2. Core Python Programming, Wesley J. Chun, Second Edition,Pearson.
3. Kenneth A. Lambert, The Fundamentals of Python: First Programs,2011, Cengage Learning. Think Python First Edition, by Allen B. Downey, Orielly publishing.

REFERENCE BOOKS

1. Learn Python in 1 Day: Complete Python Guide with Examples KindleEdition
2. Python Crash Course Paperback – 8 Dec 2015 by Eric Matthes
3. Python Cookbook: Recipes for Mastering Python 33rd Edition, KindleEdition

WEB REFERENCES

1. Python Programming (Edit): An Introduction to Computer Science Paperback– 7 May2010
2. Programming Python 4e Paperback – 14 Jan 2011 by Mark Lutz
3. Introduction to Machine Learning with Python Paperback – 7 Oct 2016 byAndreas C. Mueller (Author), Sarah Guido

E -TEXT BOOKS

1. http://www.oreilly.com/programming/free/a-whirlwind-tour-of-python.csp
2. http://www.oreilly.com/programming/free/20-python-libraries-you-arent-using-but- should.csp
3. http://www.oreilly.com/programming/free/hadoop-with-python.csp
4. http://www.oreilly.com/programming/free/how-to-make-mistakes-in-python.csp

MOOCS COURSES
1. https://www.mooc-list.com › tags ›python-programming 2. https://www.mooc-list.com › tags ›python 3. https://www.edx.org › learn ›python 4. https://www.udacity.com › course ›introduction-to-python--ud1110

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

GENDER SENSITIZATION LAB

II B. TECH- I SEMESTER

CourseCode	Category	Hours /Week			Credits	MaximumMarks		
		L	T	P	C	CIE	SEE	Total
*GS309MC	B.Tech	-	-	3	-	100	-	100

COURSEOBJECTIVES:

1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.

COURSEOUTCOMES:

Upon successful completion of the course

1. Students will have developed a better understanding of vital issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from various knowledge sources.
3. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
4. Students will attain a finer grasp of how gender discrimination works in oursociety and how to counter it.
5. Men and women students and professionals will be better equipped with impartiality to work and live together as equals and develop a sense of appreciations of women

UNIT-I	UNDERSTANDING GENDER	Classes:8

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men-Preparing for Womanhood. Growing up Male.

UNIT-II	GENDER ROLE AND RELATIONS	Classes:8

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences- Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the

UNIT-III	GENDER AND LABOUR	Classes:8
Division and Valuation of Labor-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming		
UNIT-IV	**GENDER BASED VIOLENCE**	**Classes:8**
The Concept of Violence-Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing-Coping with Everyday Harassment- Further Reading: "*Chupulu".* Domestic Violence: Speaking Out: Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."		
UNIT-V	**GENDER AND CULTURE**	**Classes:8**
Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues -Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals-Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks- The Brave Heart)		

TEXTBOOKS:

1. A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, VasudhaNagaraj, AsmaRasheed, GoguShyamala, DeepaSreenivas and Susie Tharu, The Textbook, "Towards a World of Equals: A Bilingual Textbook on Gender" writtenbypublished by Telugu Akademi, Telangana Government (2015).
2. Raj Pal Singh, AnupamaSihag, "Gender Sensitization: A World of Equals", Raj Publications (Dist.), ISBN: 9789386695123, 938669512X (2019)

REFERENCE BOOKS:

1. S.Benhabib. Situating the Self: Gender, Community, Gender and Post modernism in Contemporary Ethics, London; Routledge, 1992.

WEBREFERENCES:

1. https://www.researchgate.net/publication/329541569_EMPOWERING_WOMEN_THROUGH_GENDER_SENSITIZATION
2. https://eige.europa.eu/gender-mainstreaming/toolkits/gender-sensitive-parliaments/references-and-resources

E –TEXTBOOKS:

1. https://harpercollins.co.in/BookDetail.asp?BookCode=3732
2. https://unesdoc.unesco.org/ark:/48223/pf0000158897_eng

MOOCSCOURSE:

1. https://www.mooc-list.com/course/sustainable-development-goal-5-gender-equality-canopylab
2. https://www.coursera.org/learn/gender-sexuality

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

FORMAL LANGUAGES AND AUTOMATA THEORY

II B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM401PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. Central ideas of theoretical computer science from the perspective of formallanguages.
2. The fundamental concepts of formal languages, grammars and automatatheory.
3. Classify machines by their power to recognizelanguages.
4. Employ finite state machines to solve problems incomputing.
5. The differences between decidability andundecidability

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the concept of abstract machines and their power to recognize the languages.
2. Employ finite state machines for modeling and solving computingproblems.
3. Design context free grammars for formallanguages.
4. Distinguish between decidability andundecidability.
5. Gain proficiency with mathematical tools and formalmethods.

UNIT-I	FINITE AUTOMATA	Classes: 15

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.

DeterministicFiniteAutomata: DefinitionofDFA,HowADFAProcessStrings,Thelanguageof DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA, Moore and Melaymachines.

Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.

UNIT-II	REGULAR EXPRESSIONS AND REGULAR LANGUAGES	Classes: 11

RegularExpressions:FiniteAutomataandRegularExpressions,ApplicationsofRegularExpressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to RegularExpressions.

Pumping Lemma for Regular Languages, Statement of the pumping lemma, Applications of the Pumping Lemma.

Closure Properties of Regular Languages: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT-III	CONTEXT FREE GRAMMAR AND AUTOMATA	Classes: 10

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Tress, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages.

PushDownAutomata:DefinitionofthePushdownAutomaton,theLanguagesofaPDA,Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata. Equivalence of PDA's and CFG's, From CFG to PDA, From PDA toCFG.

UNIT-IV	PROPERTIES OF CFG AND TURING MACHINES	Classes: 11

NormalFormsforContext-FreeGrammars:Eliminatinguselesssymbols,Eliminating€-Productions. Chomsky Normal form Griebech Normalform.

Pumping Lemma for Context-Free Languages: Statement of pumping lemma, Applications **Closure Properties of Context-Free Languages**: Closure properties of CFL's, Decision Properties of CFL's

TuringMachines:IntroductiontoTuringMachine,FormalDescription,Instantaneousdescription,The language of a Turingmachine, Turing machines and halting problems.

UNIT-V	UNDECIDABILITY	Classes: 11

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems,

TEXT BOOKS

1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, PearsonEducation.

REFERENCE BOOKS

1. Introduction to Languages and the Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.
5. Introduction to Formal languages Automata Theory and Computation, Kamala Krithivasan, Rama R, Pearson.

WEB REFERENCES
1. https://www.ics.uci.edu/~goodrich/teach/cs162/notes/ 2. http://www.cse.iitd.ac.in/~sak/courses/toc/2011-12.index.html 3. https://web.cs.hacettepe.edu.tr/~ilyas/Courses/BBM401/
E -TEXT BOOKS
1. https://www.cis.upenn.edu/~cis262/notes/tcbook-u.pdf 2. http://people.math.sc.edu/mlevet/Lecture_Notes.pdf 3. https://www.cs.utexas.edu/~ear/cs341/automatabook/AutomataTheoryBook.pdf
MOOCS COURSES
1. https://www.udemy.com/course/formal-languages-and-automata-theory/ 2. https://nptel.ac.in/courses/106/106/106106049/ 3. https://www.udemy.com/course/theory-of-automata/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

INTRODUCTION TO ARTIFICIAL INTELLIGENCE

II B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM402PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. The distinction between optimal reasoning Vs. human like reasoning
2. The concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
3. Different knowledge representation techniques.
4. The applications of AI, namely game playing, theorem proving, and machine learning.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Formulate an efficient problem space for a problem expressed in natural language.
2. Select a search algorithm for a problem and estimate its time and space complexities.
3. Possess the skill for representing knowledge using the appropriate technique for a given problem.
4. Possess the ability to apply AI techniques to solve problems of game playing, and machinelearning.

UNIT-I	BASICS OF ARTIFICIAL INTELLIGENCE	Classes: 11

Introduction: Foundations of AI, History of AI, Intelligent Agents, Agents and Environments, The Nature of Environments, The structure of Agents, Problem-Solving Agents.

Basic Search Strategies: Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions.

UNIT-II	SEARCH STRATEGIES	Classes: 11

Basic Search Strategies: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces, Searching with Non-Deterministic Actions, Searching with Partial Observations, Online Search Agents and Unknown Environment.

Advanced Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions.

UNIT-III	CONSTRAINT SATISFACTION PROBLEMS AND PROPOSITIONAL LOGIC	Classes: 12

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.
Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic,
Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definiteclauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based onPropositional Logic.

UNIT-IV	LOGIC CONCEPTS	Classes: 12

First-Order Logic: Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.
Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

UNIT-V	KNOWLEDGE REPRESENTATION	Classes: 12

Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

TEXT BOOKS

1. Stuart Russell and Peter Norvig: Artificial intelligence, A Modern Approach, Pearson Education, Third Edition.2010

REFERENCE BOOKS

1. Artificial Intelligence, 3rd Edition, E. Rich and K.Knight (TMH)
2. Artificial Intelligence, 3rd Edition., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education.

WEB REFERENCES

1. https://eecs.wsu.edu/~cook/ai/lectures/p.html
2. http://www.cs.toronto.edu/~fbacchus/csc384/Lectures/lectures.html
3. http://web.cs.iastate.edu/~cs572/studyguide.html
4. https://faculty.ist.psu.edu/vhonavar/Courses/ai/studyguide.html

E -TEXT BOOKS

1. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.

MOOCS COURSES

1. https://www.udacity.com/course/intro-to-artificial-intelligence--cs271
2. https://www.classcentral.com/course/edx-artificial-intelligence-ai-7230
3. https://www.my-mooc.com/en/mooc/intro-to-artificial-intelligence/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

OPERATING SYSTEMS

II B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM403PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. Operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
2. The issues to be considered in the design and development of operating system
3. Basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Control access to a computer and the files that may be shared
2. Demonstrate the knowledge of the components of computer and their respective roles in computing.
3. Recognize and resolve user problems with standard operating environments.
4. Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

UNIT-I	OPERATING SYSTEM INTRODUCTION	Classes: 12

Introduction: Operating system objectives, User view, System view, Operating system Definition, Computer System Organization, Computer System Architecture, OS Structure, OSOperations, ProcessManagement,MemoryManagement,Storage Management, Protection and Security, Computing Environments. Operating Systems services, User and OS Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation, OSStructure.

UNIT-II	PROCESS AND CPU SCHEDULING	Classes: 14

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, SchedulingAlgorithms, Multiple -Processor Scheduling.
System call interface for process management-fork, exit, wait, waitpid, exec

UNIT-III	DEADLOCKS AND PROCESS SYNCHRONIZATION	Classes: 11

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, DeadlockPrevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock
Process Management and Synchronization - The Critical Section Problem, Synchronization
Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors
Interprocess Communication Mechanisms: IPC between processes on a single computer system,IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT-IV	MEMORY MANAGEMENT AND VIRTUAL MEMORY	Classes: 12

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping,Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, PageReplacement, Page Replacement Algorithms.

UNIT-V	FILE SYSTEM INTERFACE AND OPERATIONS	Classes: 13

File System Interface and Operations:Access methods, Directory Structure, Protection, FileSystem Structure, Allocation methods, Free-space Management. Usage of open, create, read, write,close, seek system calls.

TEXT BOOKS

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition,John Wiley
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS

1. Modern Operating Systems, Andrew S Tanenbaum, 3rdEdition, PHI.
2. Operating Systems: A concept-based Approach, 2nd Edition,D.M.Dhamdhere, TMH.
3. Operating System A Design Approach- Crowley, TMH.
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

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1. http://www.dreamcss.com/2009/07/-operating-system-applications.html
2. http://www.cornelios.org/
3. http://www.yousaytoo.com/best--operating-systems/247122
4. http://www.masternewmedia.org/operating_systems/web-operating-systems-vi...
5. http://desizntech.info/2009/08/top-5-web-operating-systems/

E -TEXT BOOKS

1. An Introduction To Operating Systems : Concepts And Practice(Gnu/Linux and Windows) Bhatt, PramodChandraP.
2. Operating Systems : PrinciplesAnd DesignChoudhury, Pabitra Pal
3. Operating Systems Mohan,I.Chandra
4. UnderstandingUnixSrirengan,K.

MOOCS COURSES

1. https://www.udacity.com › course introduction-to-operating-systems--ud.
2. https://www.classcentral.com › tag operating-systems
3. https://www.my-mooc.com›mooc›introduction-to-operating-systems-ucs140.stanford.edu

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

DATABASE MANAGEMENT SYSTEMS

II B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM404PC	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

To learn

1. The basic concepts and the applications of database systems.
2. The basics of SQL and construct queries using SQL.
3. Data models, design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Gain knowledge of fundamentals of DBMS, database design and normal forms
2. Master the basics of SQL for retrieval and management of data.
3. Be acquainted with the basics of transaction processing and concurrency control.
4. Familiar with database storage structures and access techniques

UNIT-I	DATABASE SYSTEM APPLICATIONS AND INTRODUCTION	Classes: 13

Database System Applications: A Historical Perspective, File Systems versus a DBMS**,** the DataModel, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, andEntity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, ConceptualDesign with the ER Model.

UNIT-II	RELATIONAL MODEL	Classes: 12

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views,destroying/altering tables and views.

Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT-III	SQL AND NORMAL FORMS	Classes: 12

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, andEXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL,triggers and active data bases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms,BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normalform.

UNIT-IV	TRANSACTION PROCESSING	Classes: 12

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, ConcurrentExecutions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, LockBased Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity,Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT-V	STORAGE STRUCTURE	Classes: 13

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and SecondaryIndexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of FileOrganizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed SequentialAccess Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw hill, V Edition.

REFERENCE BOOKS

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, ElmasriNavathe, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

WEB REFERENCES
1. https://www.edx.org/learn/databases 2. https://www.youtube.com/playlist?list=PLyvBGMFYV3auVdxQ1-88ivNFpmUEy-U3M 3. https://www.youtube.com/watch?v=bGyHqvQW6JY&list=PLRFPL_aa_SLVjQn93cUGZaKZVGr_80vYv&index=1
E -TEXT BOOKS
1. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.
MOOCS COURSES
1. https://onlinecourses.nptel.ac.in/noc21_cs04/preview 2. https://www.coursera.org/learn/database-management 3. https://www.udemy.com/course/database-management-system-from-scratch-part-1/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

OBJECT ORIENTED PROGRAMMING USING JAVA

II B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM405PC	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

To learn

1. The object-oriented programming concepts.
2. Object-oriented programming concepts, and apply them in solving problems.
3. The principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes
4. The implementation of packages and interfaces
5. The concepts of exception handling and multithreading.
6. To introduce the design of Graphical User Interface using applets and swing controls.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Solve real world problems using OOP techniques.
2. Understand the use of abstract classes.
3. Solve problems using java collection framework and I/o classes.
4. Develop multithreaded applications with synchronization.
5. Develop applets for web applications and GUI based applications.

UNIT-I	OBJECT-ORIENTED THINKING AND INHERITANCE	Classes: 13

Object-Oriented Thinking- A way of viewing world – Agents and Communities,messagesandmethods,Responsibilities,ClassesandInstances,ClassHierarchies-Inheritance,Methodbinding,OverridingandExceptions,SummaryofObject-Orientedconcepts.Javabuzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, Stringhandling.

Inheritance– Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance-specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance

UNIT-II	PACKAGES AND STREAM BASED I/O	Classes: 12

Packages - Defining a Package, CLASSPATH, Access protection, importing packages. Interfaces - defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

StreambasedI/O(java.io)–TheStreamclasses-BytestreamsandCharacterstreams,Reading console Input and Writing Console Output, File class, Reading and writing Files, Randomaccessfileoperations,TheConsoleclass,Serialization,Enumerations,autoboxing,generics.

UNIT-III	EXCEPTION HANDLING AND MULTITHREADING	Classes: 12

Exception handling - Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes.

Multithreading- Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads; inter thread communication

UNIT-IV	COLLECTIONS FRAMEWORK AND INTERFACES	Classes: 12

The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collectionclasses-
ArrayList,LinkedList,HashSet,TreeSet,PriorityQueue,ArrayDeque.Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map InterfacesandClasses,Comparators,Collectionalgorithms,Arrays,TheLegacyClassesand Interfaces- Dictionary, Hashtable, Properties, Stack, Vector

More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random,Formatter,Scanner.

UNIT-V	GUI PROGRAMMING WITH SWING	Classes: 13

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout,CardLayout,GridBagLayout.

EventHandling-TheDelegationeventmodel- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and Image Icon, JText Field, The Swing Buttons-JButton, JToggle Button, JCheck Box, JRadio Button, JTabbed Pane, JScroll Pane, JList, JCombo Box, Swing Menus, Dialogs.

TEXT BOOKS

1. Java The complete reference, 11th edition, Herbert Schildt,McGraw Hill Education (India) Pvt.Ltd,2018.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

REFERENCE BOOKS

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
5. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage Learning.

WEB REFERENCES

1. http://www.developer.com/icom_includes/feeds/developer/dev-25.xml
2. http://www.ibm.com/developerworks/views/java/rss/libraryview.jsp
3. http://www.javaworld.com/rss/index.html
4. http://feeds.feedburner.com/DevxLatestJavaArticles

E -TEXT BOOKS

1. HTTP Programming Recipes for Java Bots by Jeff Heaton - Heaton Research, Inc.
2. Java Distributed Computing by Jim Farley -O'ReillyMedia
3. Java Precisely by Peter Sestoft - IT Universityof Copenhagen
4. Java for Absolute Beginners: Learn to Program the Fundamentals the Java9+ Way
5. Fundamentals of the Java Programming Language, JavaSE6
6. JAVA: Easy Java Programming for Beginners, Your Step-By-StepGuideto

MOOCS COURSES

1. https://www.mooc-list.com › tags›java-programming
2. https://www.mooc-list.com › tags›java
3. https://www.edx.org › learn›java
4. https://www.udacity.com › course›java-programming-basics--ud282
5. https://www.futurelearn.com › courses›begin-programming.

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

ARTIFICIAL INTELLIGENCE LAB

II B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM406PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. Basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
2. Advanced topics of AI such as planning, Bayes networks and Natural Language Processing

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Identify problems that are amenable to solution by AImethod.
2. Understand and analyze working of an AItechnique.
3. Formalize a given problem in the language/framework of different AImethods.
4. Apply AI techniques to real-world problems to develop intelligent systems.

LIST OF EXPERIMENTS

1. Write a program to implement A* algorithm .
2. Write a program to implement Hill Climbing algorithm.
3. Write a program to implement depth first search.
4. Write a program to implement breadth first search.
5. Write a program to implement Water Jug Problem.
6. Write a program to implement Tic-Tac-Toe game.
7. Write a program to implement Simulated Annealing Algorithm
8. Write a program to find the solution for wampus world problem
9. Write a program to solve 8-Queens problem.
10. Write a program to implement search problems of 3 x 3 puzzle.
11. Write a program to find solution for travelling salesman problem.

TEXT BOOKS

1. Stuart Russell and Peter Norvig: Artificial intelligence, A Modern Approach,Pearson Education, Third Edition.2010

REFERENCE BOOKS

1. Artificial Intelligence, 3rd Edition, E. Rich and K.Knight (TMH)
2. Artificial Intelligence, 3rd Edition., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education.

WEB REFERENCES

1. https://eecs.wsu.edu/~cook/ai/lectures/p.html
2. http://www.cs.toronto.edu/~fbacchus/csc384/Lectures/lectures.html
3. http://web.cs.iastate.edu/~cs572/studyguide.html
4. https://faculty.ist.psu.edu/vhonavar/Courses/ai/studyguide.html

E -TEXT BOOKS

1. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.

MOOCS COURSES

1. https://onlinecourses.swayam2.ac.in/cec21_cs08/preview
2. https://onlinecourses.nptel.ac.in/noc21_cs42/preview
3. https://www.coursera.org/learn/introduction-to-ai

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

DATABASE MANGEMENT SYSTEMS LAB

II B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM407PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn
1. ER data model, database design and normalization
2. SQL basics for data definition and data manipulation

COURSE OUTCOMES

Upon successful completion of the course, the student is able to
1. Design database schema for a given application and apply normalization
2. Acquire skills in using SQL commands for data definition and data manipulation.
3. Develop solutions for database applications using procedures, cursors and triggers

LIST OF EXPERIMENTS

1. Concept design with E-R Model (Library Management System and Employee Management System)
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Practicing DCL commands
7. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
8. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
9. Queries using Joins (NATURAL, INNER, OUTER, LEFT, RIGHT)
10. Triggers (Creation of insert trigger, delete trigger, update trigger)
11. Procedures
12. Usage of Cursors

TEXT BOOKS

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

REFERENCE BOOKS

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, ElmasriNavrate, Pearson Education
3. Introduction to Database Systems, C.J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.

WEB REFERENCES

1. https://www.edx.org/learn/databases
2. https://www.youtube.com/playlist?list=PLyvBGMFYV3auVdxQ1-88ivNFpmUEy-U3M
3. https://www.youtube.com/watch?v=bGyHqvQW6JY&list=PLRFPL_aa_SLVjQn93cUGZaKZVGr_80vYv&index=1

E -TEXT BOOKS

1. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

MOOCS COURSES

1. https://onlinecourses.nptel.ac.in/noc21_cs04/preview
2. https://www.coursera.org/learn/database-management
3. https://www.udemy.com/course/database-management-system-from-scratch-part-1/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

JAVA PROGRAMMING LAB

II B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM408PC	B. Tech	0	0	2	1	30	70	100

COURSE OBJECTIVES

To learn

1. To build software development skills using java programming for real-worldapplications.
2. To understand and apply the concepts of classes, packages,interfaces, array list, exception handling and fileprocessing.
3. To write programs using abstractclasses.
4. To write programs for solving real world problems using javacollection frame work and multithreadedprograms.
5. To write GUI programs using swing controls inJava.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Able to write programs for solving real world problems usingjava collection framework.
2. Able to write programs using abstractclasses.
3. Able to write multithreadedprograms.
4. Able to write GUI programs using swing controls inJava.

LIST OF EXPERIMENTS

1. Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a forloop.
2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.
3. a) Develop an applet in Java that displays a simple message.
   b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.
4. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a

Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialogbox.

5. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
6. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in selected color. Initially, there is no message shown.
7. Write a Java program for thefollowing:
   - Create a doubly linked list ofelements.
   - Delete a given element from the abovelist
   - Display the contents of the list afterdeletion.
8. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the givenshape.
9. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.
10. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

11. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).
12. Write a Java program that correctly implements the producer – consumer problem using the concept of interthread communication.
13. Write a Java program to list all the files in a directory including the files present in all its subdirectories.
14. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order.
15. Write a Java program that implements Bubble sort algorithm for sorting in descending order and also shows the number of interchanges occurred for the given set of integers.
16. Write a Java program to design a registration form for creating a new email account.

TEXT BOOKS

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearsoneducation.
2. Thinking in Java, Bruce Eckel, PearsonEducation.
3. Java Programming, D. S. Malik and P. S. Nair, CengageLearning.

REFERENCE BOOKS

1. "TheJavaProgrammingLanguage"byArnold
2. "Java: TheComplete Reference" byHerbert Schildt
3. "CoreJava: AnIntegrated Approach,New:Includes All Versions uptoJava 8"by R Nageswara Rao and DT EditorialServices
4. "JavaProgramming InterviewsExposed (WROX)''byNoel Markham
5. "Advanced JavaProgramming"byUttamRoy
6. "Crackingthe C, C++and JavaInterview"byS GGaneshandKUSubhash

WEB REFERENCES

1. Head First Java: A Brain-Friendly Guide 2nd Edition, Kindle Edition byKathySierra.
2. Effective Java: A Programming Language Guide (Java Series)2nd Edition, Kindle Edition by JoshuaBloch.
3. AI Algorithms, Data Structures, and Idioms in Prolog, Lisp, andJavaPaperback – Import, 25 Aug 2008 by George F. Luger(Author),William A Stubblefield (Author).

E -TEXT BOOKS

1. Introduction to Java Programming and Data Structures,Comprehensive Version (11th Edition) 11th Edition by Y. DanielLiang.
2. Java How to Program, Early Objects (11th Edition) (Deitel: Howto

MOOCS COURSES

1. https://www.mooc-list.com › tags ›java-programming
2. https://www.mooc-list.com › tags ›java
3. https://www.edx.org › learn ›java
4. https://onlinecourses.nptel.ac.in/noc21_cs03/preview

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

CONSTITUTION OF INDIA

II B. TECH II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
*CI407MC	B.Tech	3	0	0	0			

COURSE OBJECTIVES

To learn
Objective of the constitution of India is very well written in its preamble and that is to create a state which will be

This Course deals with Fundamentals and Structures of Indian Government; it is specifically designed to give a complete overview and in-depth knowledge regarding the concerns and challenges faced by the modern constitutional governments and elaborately discusses the structure, procedures, powers and duties of governmental institutions. The Course analyses in detail the basic functions of a written constitution. Also, the theories and concepts relating to constitutionalism, federalism, judicial review, constitutional interpretation, etc. are reviewed. All the discussions in the Course are updated according to the latest position and the modifications made by judicial intervention

1.Sovereign -independent to conduct internal as well as external affairs
2.Socialist - preventing concentration of wealth into few hands
3.Secular - respecting all religions equally
4.Democratic- government by the people, of the people, for the people
5.Republic - Head of the state will be elected not hereditary

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. To understand the basic concepts of democracy, republicanism, constitutionalism and to know about the constitutional theories, virtues and constitutional interpretation
2. To study and analyse the quasi-federal nature of Indian Constitution and the basic function of a written constitution regarding the allocation of State power, the functions, powers and limits of the organs of state
3. To analyse elaborately regarding the emergency and amendment procedures; the need for granting of special status or special provisions to some states
4. To know about Panchayats, Municipalities, Scheduled and Tribal areas
5. To utilize Judiciary System of India

UNIT-I	INTRODUCTION TO INDIAN CONSTITUTION	Classes: 6
Meaning and importance of Constitution, Making of Indian Constitution, Salient features and the Preamble, Fundamental rights, Fundamental duties, Directive Principles.		
UNIT-II	THE AMENDMENT OF THE CONSTITUTION	Classes: 6

Need for Amendment, Types of Amendment, Judicial Review of Constituent Power, Doctrine of Basic Structure, Major Amendments and their Constitutional Values.		
UNIT-III	**UNION & STATE EXECUTIVE AND LEGISLATURE**	**Classes:8**
Lok Sabha & Rajya Sabha (Composition, Powers & Functions), President & Prime Minister (Powers, Functions, position), Supreme Court-Composition, Powers & Functions, The President: Powers, Functions and Procedure for Impeachment, Judicial Review of Presidents Actions, Governor: Powers, Functions ,Legislative Power of the Executive – Ordinance, Parliament and State Legislature ,Privileges of Legislature ,Council of Ministers - Prime Minister.		
UNIT-IV	**MAJOR FUNCTIONARIES & EMERGENCY POWERS**	**Classes: 6**
Union Public Service Commission , Election Commission, Planning Commission (NITI) , Significance of Emergency Powers , National Emergency – Grounds – Suspension of Fundamental Rights ,State Emergency – Grounds – Judicial Review , Financial Emergency.		
UNIT-V	**INDIAN JUDICIARY**	**Classes: 6**
Supreme Court of India – Appointment of Judges – Composition , Jurisdiction: Original, Appellate and Writ Jurisdiction , Prospective Overruling and Judge - Made Laws in India (Art. 141), Review of Supreme Court Decision , High Courts – Judges - Constitution , Jurisdiction: Original, Appellate, Writ Jurisdiction and Supervisory Jurisdiction		

TEXT BOOKS

1. H.M. Seervai: Constitutional Law of India
2. M.P. Jain: Indian Constitutional Law
3. Mahendra P. Singh: V. N. Shukla's Constitution of India
4. Granville Austin: The Indian Constitution: Cornerstone of a Nation

REFERENCE BOOKS

1. An Introduction to the Constitution of India by Dr.Durga Das Basu
2. An Introduction to the Constitution of India by M.V.Pylee
3. Indian Constitutional Law by M.P. Jain

WEB REFERENCES

1. https://www.wdl.org/en/item/2672/
2. https://nptel.ac.in/courses/109103135/24

E -TEXT BOOKS

1. https://iasexamportal.com/ebook/the-constitution-of-india
2. https://www.india.gov.in/my-government/documents/e-books

MOOCS COURSES

1. http://nludelhi.ac.in/images/moocs/moocs-courses.pdf
2. https://www.classcentral.com/tag/constitutional-law

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

DESIGN AND ANALYSIS OF ALGORITHMS

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM501PC	B.Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. Introduces the notations for analysis of the performance of algorithms.
2. Introduces the data structure disjoint sets.
3. Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
4. Describes how to evaluate and compare different algorithms using worst-, average-, and bestcase analysis.
5. Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to analyze the performance of algorithms
2. Ability to choose appropriate data structures and algorithm design methods for a specified application
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs

UNIT-I	INTRODUCTION ALGORITHM NOTATIONS AND DIVIDE AND CONQUER	Classes: 12

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation. Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT-II	DISJOINT SETS AND BACKTRACKING	Classes: 12

Disjoint Sets: Disjoint set operations, union and find algorithms Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring

UNIT-III	DYNAMIC PROGRAMMING	Classes: 10
Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.		
UNIT-IV	**GREEDY METHOD**	**Classes: 12**
Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem		
UNIT-V	**BRANCH AND BOUND, NP-HARD AND NP-COMPLETE PROBLEMS**	**Classes: 12**
Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution. NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem		

TEXT BOOKS

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

REFERENCE BOOKS

1. 1.Algorithm Design and Analysis, Dr. P Santosh Kumar, Dr. K. Srinivas and K. Radha, Spectrum Education.
2. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
3. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
4. 3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons.

WEB REFERENCES

1. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
2. https://www.javatpoint.com/daa-tutorial
3. https://www.guru99.com/design-analysis-algorithms-tutorial.html
4. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015

E -TEXT BOOKS

1. https://www.kopykitab.com/Design-and-Analysis-of-Algorithms-eBook-By-V-K-Pallaw-isbn-9788184121681
2. https://freecomputerbooks.com/Introduction-to-Design-Analysis-of-Algorithms.html
3. https://www.ebooknetworking.net/ebooks/design-analysis-of-algorithm-book.html

MOOCS COURSES

1. https://www.udemy.com/course/design-and-analysis-of-algorithm-/
2. https://onlinecourses.nptel.ac.in/noc19_cs47/preview
3. https://in.coursera.org/courses?query=algorithm%20design

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

MACHINE LEARNING

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM502PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
2. To understand computational learning theory.
3. To study the pattern comparison techniques

COURSE OUTCOMES

1. Understand the concepts of computational intelligence like machine learning.
2. Ability to get the skill to apply machine learning techniques to address the real time problems in different areas.
3. Understand the Neural Networks and its usage in machine learning application.

UNIT-I	INTRODUCTION OF MACHINE LEARNING	Classes: 12

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning.

Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias.

Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT-II	Artificial Neural Networks	Classes: 12

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.
Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.
Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics

of sampling theory, ageneral approach for deriving confidence intervals, difference in error of two hypotheses, comparinglearningalgorithms.

UNIT-III	BAYESIAN LEARNING	Classes: 10

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, MaximumLikelihoodandleastsquarederrorhypotheses,maximumlikelihoodhypothesesforpredictingprobabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, anexample:learningtoclassifytext,Bayesianbeliefnetworks,theEMalgorithm.

Computational learning theory – Introduction, probably learning an approximately correct hypothesis,sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, themistakeboundmodeloflearning.

Instance-Based Learning- Introduction, *k*-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarksonlazyandeager learning.

UNIT-IV	GENETIC ALGORITHMS	Classes: 12

Genetic Algorithms– Motivation, Genetic algorithms, an illustrative example, hypothes is space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary,learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction,invertingresolution.

Reinforcement Learning – Introduction, the learning task, *Q*–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT-V	ANALYTICAL LEARNING	Classes: 12

AnalyticalLearning-1-Introduction, learning with perfect domain theories: PROLOG-EBG, remarkson explanation-based learning, explanation-based learning of search control knowledge.

AnalyticalLearning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

CombiningInductiveandAnalyticalLearning–Motivation,inductive-analyticalapproachestolearning,usingpriorknowledgetoinitializethehypothesis.

TEXT BOOKS

1. MachineLearning–Tom M.Mitchell, -MGH

REFERENCE BOOKS

1. Machine Learning:An Algorithmic Perspective, Stephen Marshland, Taylor& Francis.

WEB REFERENCES

1. https://www.w3schools.com/ai/ai_whatis.asp
2. https://www.digitalocean.com/community/tutorials/an-introduction-to-machine-learning
3. https://www.geeksforgeeks.org/machine-learning/

E -TEXT BOOKS

1. Introduction to Machine Learning with Python, Andreas C. Müller, Sarah Guido, First Edition

MOOCS COURSES

1. https://www.udemy.com/course/introduction-to-machine-learning-in-python/
2. https://www.coursera.org/learn/machine-learning
3. https://github.com/microsoft/ML-For-Beginners

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

COMPUTER NETWORKS

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM503PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.

1. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

COURSE OUTCOMES

1. Gain the knowledge of the basic computer network technology.
2. Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
3. Obtain the skills of sub netting and routing mechanisms.
4. Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

UNIT-I	INTRODUCTION OF COMPUTER NETWORKS	Classes: 12

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet. Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fibre optics, Wireless transmission. Wireless Networks – Packet Radio Network, Wireless LAN: IEEE 802.11b, Wireless Application Protocols (WAP) & WML and Virtual Private Network VPN Technology.

UNIT-II	DATA LINK LAYER	Classes: 12

Data link layer: Design issues, framing, Error detection and correction. Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error free channel, A simplex stop and wait protocol for noisy channel. Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols. Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT-III	NETWORK LAYER	Classes: 10

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet, Transmission form IPV4 to IPV6.

UNIT-IV	**TRANSPORT LAYER**	**Classes: 12**

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

UNIT-V	**APPLICATION LAYER**	**Classes: 12**

Application Layer –Domain name system, SNMP, Protocols - TELNET & SSH, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXT BOOKS

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI
2. Advanced Computer Network-B.M Harwani DT Editorial Service.

REFERENCE BOOKS

1 Computer Networks, Dr. P. Santosh kumar. Patra and Dr. N. Satheesh, Spectrum Publications. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education.

WEB REFERENCES

1. https://www.geeksforgeeks.org/what-is-Computer-Networks/
2. https://searchsecurity.techtarget.com/definition/Computer-Networksinfosec
3. https://www.cisco.com › Products & Services › Networks

E -TEXT BOOKS

1. http://study-ccna.com/

MOOCS COURSES

1. https://nptel.ac.in/courses/106105081/
2. https://www.geeksforgeeks.org/computer- network-routing-protocols-set-1-distance- vector-routing/
3. https://www.tutorialspoint.com/errorcontrol-in-data-link-layer

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

COMPILER DESIGN

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM504PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To introduce the major concept areas of language translation and compiler design.
2. To enrich the knowledge in various phases of compiler and its use.
3. To provide practical programming skills necessary for constructing a compiler.
4. To introduce the major concept of code optimization techniques.
5. To enrich the knowledge in parsing techniques, syntax directed translation, intermediate code generation, and data flow analysis.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to design, develop, and implement a compiler for any language.
2. Able to use LEX and YACC tools for developing a scanner and a parser.
3. Able to design and implement LL and LR parsers.
4. Able to design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity.
5. Ability to design algorithms to generate machine code.

UNIT-I	INTRODUCTION TO COMPILING	Classes: 15

Introduction: The structure of a compiler, the science of building a compiler, programming language basics

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

UNIT-II	SYNTAX ANALYSIS	Classes: 11

Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators.

UNIT-III	SYNTAX-DIRECTED TRANSLATION	Classes: 10

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.
Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

UNIT-IV	CODE OPTIMIZATION	Classes: 11

Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.
Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

UNIT-V	CODE GENERATION	Classes: 11

Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

TEXT BOOKS

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.
2. Dhamdhere, D. M., "Compiler Construction Principles and Practice", 2nd edition, Macmillan India Ltd., New Delhi.

REFERENCE BOOKS

1. Lex&Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Compiler Construction, Louden, Thomson.
3. Allen I. Holub, "Compiler Design in C", Prentice Hall of India.
4. C. N. Fischer and R. J. LeBlanc, "Crafting a compiler with C", Benjamin Cummings, 2003.
5. HenkAlblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PHI
6. Kenneth C. Louden, "Compiler Construction: Principles and Practice", Thompson Learning.

WEB REFERENCES

1. https://www.cs.cmu.edu/~aplatzer/course/Compilers/waitegoos.pdf
2. https://www.smartzworld.com/notes/compiler-design-notes-pdf-cd-2/
3. https://www.geektonight.com/compiler-design-notes/

E -TEXT BOOKS
1. https://learnengineering.in/pdf-principles-of-compiler-design-by-alfred-v-aho-j-d-ullman-free-download/ 2. https://www.gatevidyalay.com/tag/compiler-design-by-aho-ullman-pdf/ 3. https://learnengineering.in/compiler-design-books/
MOOCS COURSES
1. https://www.udemy.com/course/compiler-design-n/ 2. https://nptel.ac.in/courses/106/105/106105190/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

MACHINE LEARNING LAB

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM505PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. To write programs in java to solve problems using divide and conquer strategy.
2. To write programs in java to solve problems using backtracking strategy.
3. To write programs in java to solve problems using greedy and dynamic programming techniques.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. understand complexity of Machine Learning algorithms and their limitations;
2. understand modern notions in data analysis-oriented computing;
3. be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
4. Be capable of performing experiments in Machine Learning using real-world data.

LIST OF EXPERIMENTS

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is theprobability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
2. Extract the data from database using python
3. Implement k-nearest neighbours classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k- means clustering with 3 means (i.e., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0

1.486 0.759 1
1.266 1.106 0
1.540 0.419 1
0.459 1.799 1
0.773 0.186 1

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.
   medium skiing design single twenties no ->highRisk high golf trading married forties yes ->lowRisk
   low speedway transport married thirties yes ->medRisk medium football banking single thirties yes ->lowRisk high flying media married fifties yes ->highRisk
   low football security single twenties no ->medRisk medium golf media single thirties yes ->medRisk medium golf transport married forties yes ->lowRisk high skiing banking single thirties yes ->highRisk low golf unemployed married forties yes ->highRisk
   Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?
6. Implement linear regression using python.
7. Implement Naïve Bayes theorem to classify the English text
8. Implement an algorithm to demonstrate the significance of genetic algorithm
9. Implement the finite words classification system using Back-propagation algorithm

TEXT BOOKS

1. MachineLearning–Tom M.Mitchell, -MGH.

REFERENCE BOOKS

1. MachineLearning:AnAlgorithmicPerspective,StephenMarshland,Taylor&Francis.

WEB REFERENCES

1. https://www.geeksforgeeks.org/machine-learning/
2. https://www.techtarget.com/searchenterpriseai/definition/machine-learning-ML
3. https://www.javatpoint.com/machine-learning

E -TEXT BOOKS

1. https://www.researchgate.net/publication/344717762_Machine_Learning_Algorithms_-A_Review
2. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SCSA1601.pdf
3. https://www.interactions.com/wp-content/uploads/2017/06/machine_learning_wp-5.pdf

MOOCS COURSES

1. https://onlinecourses-archive.nptel.ac.in
2. https://swayam.gov.in/
3. https://swayam.gov.in/NPTEL

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

COMPUTER NETWORKS LAB

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM508PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

1. To understand the working principle of various communication protocols.
2. To understand the network simulator environment and visualize a network topology and observe its performance
3. To analyse the traffic flow and the contents of protocol frames

COURSE OUTCOMES

1. Implement data link layer farming methods
2. Analyze error detection and error correction codes.
3. Implement and analyze routing and congestion issues in network design.
4. Implement Encoding and Decoding techniques used in presentation layer
5. To be able to work with different network tools

LIST OF EXPERIMENTS

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. 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.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting technique used in buffers.
10. Wireshark
    i. Packet Capture Using Wire shark
    ii. Starting Wire shark

iii. Viewing Captured Traffic

iv. Analysis and Statistics & Filters.

11. How to run Nmap scan

12. Operating System Detection using Nmap

13. Do the following using NS2 Simulator

i. NS2 Simulator-Introduction

ii. Simulate to Find the Number of Packets Dropped

iii. Simulate to Find the Number of Packets Dropped by TCP/UDP

iv. Simulate to Find the Number of Packets Dropped due to Congestion

v. Simulate to Compare Data Rate& Throughput.

vi. Simulate to Plot Congestion for Different Source/Destination

vii. Simulate to Determine the Performance with respect to Transmission of Packets

TEXT BOOKS

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. PearsonEducation/PHI

REFERENCE BOOKS

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

WEB REFERENCES

1. https://www.geeksforgeeks.org/what-is-Computer-Networks/
2. https://searchsecurity.techtarget.com/definition/Computer-Networksinfosec
3. https://www.isi.edu/nsnam/ns/

E -TEXT BOOKS

1. http://study-ccna.com/
2. https://www.cs.ucf.edu/~czou/CDA6530-12/NS2-tutorial.pdf

MOOCS COURSES

1. https://nptel.ac.in/courses/106105081/
2. https://www.geeksforgeeks.org/computer- network-routing-protocols-set-1-distance-vector-routing/
3. https://www.tutorialspoint.com/errorcontrol-in-data-link-layer

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

ADVANCED COMMUNICATION SKILLS LAB

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EN506HS	B. Tech	0	0	2	1	30	70	100

COURSE OBJECTIVES

This Lab focuses on using multi-media instruction for language development to meet the following targets:

1. To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2. Further, they would be required to communicate their ideas relevantly and coherently in writing.
3. To prepare all the students for their placements.

COURSE OUTCOMES

1. Implement data link layer farming methods
2. Analyze error detection and error correction codes.
3. Implement and analyze routing and congestion issues in network design.
4. Implement Encoding and Decoding techniques used in presentation layer
5. To be able to work with different network tools

LIST OF EXPERIMENTS

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1.Activities on Fundamentals of Inter-personal Communication and Building Vocabulary - Starting a conversation – responding appropriately and relevantly – using the right body language

– Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

2. Activities on Reading Comprehension –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.

3. Activities on Writing Skills – Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for

writing – improving one's writing.

4. Activities on Presentation Skills – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ e-mails/assignments etc.

5. Activities on Group Discussion and Interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, openingstrategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

4. MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS

1. Effective Technical Communication by M AsharafRizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

REFERENCE BOOKS

1. LearnCorrectEnglish–

ABookofGrammar,UsageandCompositionbyShivK.KumarandHemalathaNagarajan.Pearson2007
2. ProfessionalCommunicationbyArunaKoneru,McGrawHillEducation(India)Pvt.Ltd,2016.
3. Technical CommunicationbyMeenakshiRaman&SangeetaSharma,OxfordUniversityPress2009.
4. TechnicalCommunicationbyPaulV.Anderson.2007.CengageLearningpvt.Ltd.New Delhi.
5. EnglishVocabularyinUseseries,CambridgeUniversityPress2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley.2012. Cengage Learning.
7. Communication Skills by Leena Sen ,PHI Learning PvtLtd.,NewDelhi,2009.
8. JobHuntingbyColmDownes,CambridgeUniversityPress2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill2009.

WEB REFERENCES

1.https://www.geeksforgeeks.org/what-is-Computer-Networks/

2.https://searchsecurity.techtarget.com/definition/Computer-Networksinfosec

3. https://www.isi.edu/nsnam/ns/

E -TEXT BOOKS

1.http://study-ccna.com/

2.https://www.cs.ucf.edu/~czou/CDA6530-12/NS2-tutorial.pdf

MOOCS COURSES

1. https://nptel.ac.in/courses/106105081/
2. https://www.geeksforgeeks.org/computer- network-routing-protocols-set-1-distance-vector-routing/
3. https://www.tutorialspoint.com/errorcontrol-in-data-link-layer

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

INTELLECTUAL PROPERTY RIGHTS

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
*IP507MC	B. Tech	3	0	0	0	100	---	100

COURSEOBJECTIVES:

1. To acquaint the learners with the basic concepts of Intellectual Property Rights.
2. To develop expertise in the learners in IPR related issues and sensitize the learners with the emerging issues in IPR and the rationale for the protection of IPR.

COURSEOUTCOMES:

Upon successful completion of the course

1. Gain knowledge on Intellectual Property assets and generate economic wealth.
2. Assist individuals and organizations in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of Intellectual Property & knowledge.
3. Gather knowledge about Intellectual Property Rights which is important for students of engineering in particular as they are tomorrow's technocrats and creator of new technology.
4. Discover how IPR are regarded as a source of national wealth and mark of an economic leadership in context of global market scenario.
5. Study the national & International IP system.

Summarize that it is an incentive for further research work and investment in R & D, leading to creation of new and better products and generation of economic and social.

UNIT-I	INTELLECTUAL PROPERTY ACT AND LAW	Classes:7

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II	INTRODUCTION TO TRADE MARK	Classes:8

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT-III	INTRODUCTION TO COPY RIGHTS	Classes:6

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT-IV	INTRODUCTION TO PATENT LAW	Classes:7

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT-V	INTRODUCTION TO TRANSACTIONAL LAW	Classes:6

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT BOOKS

1. KompalBansal and PraishitBansal, “Fundamentals of IPR for Engineers”, 1st Edition, BS Publications, 2012.
2. PrabhuddhaGanguli, “Intellectual Property Rights”,1st Edition, TMH, 2012.

REFERENCE BOOKS:

1. R Radha Krishnan & S Balasubramanian, “Intellectual Property Rights”, 1st Edition, Excel Books, 2012.
2. M Ashok Kumar &mohdIqbal Ali, “Intellectual PropertyRights”, 2nd Edition, Serial publications, 2011.

WEB REFERENCES:

1. http://libgen.rs/book/index.php?md5=C4A6559ECCAEFC767CE71BD91A1BAD41
2. http://libgen.rs/book/index.php?md5=6463CAD16544B347B19335FB19D6917C

E –TEXT BOOKS:

1. http://libgen.rs/book/index.php?md5=13C4B3A45B1C95B4A388F94729CCCFBC
2. https://maklaw.in/intellectualpropertyrights/?gclid=EAIaIQobChMIsprsv_WI7QIVilVgCh29HwPzEAAYASAAEgK5YvD_BwE

MOOCS COURSE:

1. https://nptel.ac.in/courses/110/105/110105139/
2. https://nptel.ac.in/courses/109/106/109106137/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

GRAPH THEORY (Professional Elective-I)

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM511PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To Learn

1. classes of graph theoretic problems;
2. central theorems about trees, matching, connectivity, colouring and planar graphs;
3. Be able to describe and apply some basic algorithms for graphs;
4. Be able to use graph theory as a modelling tool

COURSE OUTCOMES

1. Know some important classes of graph theoretic problems;
2. Be able to formulate and prove central theorems about trees, matching, connectivity, colouring and planar graphs;
3. Be able to describe and apply some basic algorithms for graphs;
4. Be able to use graph theory as a modelling tool.

UNIT-I	INTRODUCTION GRAPH	Classes: 11

Introduction-Discovery of graphs, Definitions, Subgraphs, Isomorphic graphs, Matrix representations of graphs, Degree of a vertex, Directed walks, paths and cycles, Connectivity in digraphs, Eulerian and Hamilton digraphs, Eulerian digraphs, Hamilton digraphs, Special graphs, Complements, Larger graphs from smaller graphs, Union, Sum, Cartesian Product, Composition, Graphic sequences, Graph theoretic model of the LAN problem, Havel-Hakimi criterion, Realization of a graphic sequence.

UNIT-II	CONNECTED GRAPHS AND SHORTEST PATHS	Classes: 11

Connected graphs and shortest paths - Walks, trails, paths, cycles, Connected graphs, Distance, Cut-vertices and cut-edges, Blocks, Connectivity, Weighted graphs and shortest paths, Weighted graphs, Dijkstra‟s shortest path algorithm, Floyd-Warshall shortest path algorithm.

UNIT-III	TREES	Classes: 11

Trees- Definitions and characterizations, Number of trees, Cayley‟s formula, Kircho↵-matrix-tree theorem, Minimum spanning trees, Kruskal‟s algorithm, Prim‟s algorithm, Special classes of graphs, Bipartite Graphs, Line Graphs, Chordal Graphs, Eulerian Graphs, Fleury‟s algorithm, Chinese

Postman problem, Hamilton Graphs, Introduction, Necessary conditions and sufficient conditions.		
UNIT-IV	**INDEPENDENT SETS COVERINGS AND MATCHINGS**	**Classes: 11**
Independent sets coverings and matchings – Introduction, Independent sets and coverings: basic equations, Matchings in bipartite graphs, Hall‟s Theorem, K¨onig‟s Theorem, Perfect matchings in graphs, Greedy and approximation algorithms..		
UNIT-V	**VERTEX COLORINGS**	**Classes: 11**
Vertex Colorings- Basic definitions, Cliques and chromatic number, Mycielski‟s theorem, Greedy coloring algorithm, Coloring of chordal graphs, Brooks theorem, Edge Colorings, Introduction and Basics, Gupta-Vizing theorem, Class-1 and Class-2 graphs, Edge-coloring of bipartite graphs, Class-2 graphs, Hajos union and Class-2 graphs, A scheduling problem and equitable edge-coloring.		

TEXT BOOKS

1. J. A. Bondy and U. S. R. Murty. Graph Theory, volume 244 of Graduate Texts in Mathematics. Springer, 1st edition, 2008.
2. J. A. Bondy and U. S. R. Murty. Graph Theory with Applications.

REFERENCE BOOKS

1. Lecture Videos: http://nptel.ac.in/courses/111106050/13
2. Introduction to Graph Theory, Douglas B. West, Pearson.
3. Schaum's Outlines Graph Theory, Balakrishnan, TMH
4. Introduction to Graph Theory, Wilson Robin j, PHI
5. Graph Theory with Applications to Engineering And Computer Science, NarsingDeo, PHI
6. Graphs - An Introductory Approach, Wilson and Watkins

WEB REFERENCES

1. https://byjus.com/maths/graph-theory/#:~:text=Graph%20theory%20is%20the%20study%20of%20relationship%20between%20the%20vertices,and%20set%20of%20edges%20E.
2. https://www.geeksforgeeks.org/mathematics-graph-theory-basics-set-1/

E -TEXT BOOKS

1. https://meskc.ac.in/wp-content/uploads/2018/12/A-Textbook-of-Graph-Theory-R.-Balakrishnan-K.-Ranganathan.pdf
2. https://www.shahucollegelatur.org.in/Department/Studymaterial/sci/it/BCS/FY/book.pdf

MOOCS COURSES

1. https://onlinecourses.nptel.ac.in/noc20_ma05/preview
2. https://www.udemy.com/course/graph-theory/
3. https://in.coursera.org/learn/graphs

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

INTRODUCTION TO DATA SCIENCE (Professional Elective-I)

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM512PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To introduce a concepts related to the DataScience
2. To performdata analytics using R andPython

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the importance of data science in real world.
2. Manipulate data using Python.
3. Perform exploratory data analysis using Python.
4. Analyze data using python and R.

UNIT-I	INTRODUCTION TO DATA SCIENCE	Classes: 12

Introduction: Definition of Data Science- Big Data and Data Science hype – and getting past the hype
- Datafication - Current landscape of perspectives - Statistical Inference - Populations and samples - Statistical modeling, probability distributions, fitting a model – Over fitting. Basics of R: Introduction, R- Environment Setup, Programming with R, Basic Data Types.

UNIT-II	DATA TYPES & STATISTICAL DESCRIPTION	Classes: 11

Types of Data: Attributes and Measurement, What is an Attribute? The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute, Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes. Basic Statistical Descriptions of Data: Measuring the Central Tendency: Mean, Median, and Mode, Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Inter- quartile Range, Graphic Displays of Basic Statistical Descriptions of Data.

UNIT-III	VECTORS	Classes: 10

Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector sub setting, Matrices: Creating and Naming Matrices, Matrix Sub setting, Arrays, Class. Factors and Data Frames: Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, subsetting of Data Frames, Extending Data Frames, Sorting Data Frames.
Lists: Introduction, creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors

UNIT-IV	CONDITIONALS AND CONTROL FLOW	Classes: 14

Conditionals and Control Flow: Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements. Iterative Programming in R: Introduction, While Loop, For Loop, Looping Over List. Functions in R: Introduction, writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Functions in R.

UNIT-V	DATA REDUCTION	Classes: 10

Data Reduction: Overview of Data Reduction Strategies, Wavelet Transforms, Principal Components Analysis, Attribute Subset Selection, Regression and Log-Linear Models: Parametric Data Reduction, Histograms, Clustering, Sampling, Data Cube Aggregation. Data Visualization: Pixel-OrientedVisualizationTechniques,GeometricProjectionVisualizationTechniques,Icon-BasedVisualizationTechniques,Hierarchical VisualizationTechniques,VisualizingComplexDataandRelations.

TEXT BOOKS

1. DoingDataScience,StraightTalkfromTheFrontline.CathyO'NeilandRachelSchutt,O'Reilly,2014
2. Jiawei Han, Micheline Kamberand Jian Pei. Data Mining: Conceptsand Techniques, 3rded. The Morgan Kaufmann Seriesin Data Management Systems.
3. KG Srinivas,GM Siddesh,"Statistical programminginR", Oxford Publications.

REFERENCE BOOKS

1. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
2. Brain S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014.
3. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.
4. Paul Teetor, "R Cookbook", O'Reilly, 2011.

WEB REFERENCES

1. https://nathancarter.github.io/MA346-course-notes/_build/html/chapter-1-intro-to-data-science.html
2. https://www.geeksforgeeks.org/introduction-to-data-science/
3. https://www.guru99.com/data-science-tutorial.html

E -TEXT BOOKS

1. An Introduction to Data Science, Jeffrey Stanton, 2013

MOOCS COURSES

1. https://www.udemy.com/course/an-introduction-to-data-science/
2. https://nptel.ac.in/courses/106106179
3. https://www.coursera.org/specializations/introduction-data-science

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

WEB PROGRAMMING (Professional Elective - I)

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM513PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To introduce PHP language for server-side scripting
2. To introduce XML and processing of XML Data with Java
3. To introduce Server-side programming with Java Servlets and JSP
4. To introduce Client-side scripting with Javascript and AJAX

COURSE OUTCOMES

Upon Completion of the course, the students will be able to

1. Design web pages.
2. Use technologies of Web Programming.
3. Apply object-oriented aspects to Scripting.
4. Create databases with connectivity using JDBC.
5. Build web-based application using sockets

UNIT-I	SCRIPTING	Classes: 14

Scripting: Web page Designing using HTML, Scripting basics- Client side and server side scripting. Java Script-Object, names, literals, operators and expressions- statements and features-events - windows -documents - frames - data types - built-in functions- Browser object model - Verifying forms.- HTML 5-CSS3- HTML 5 canvas - Web site creation using tools.

UNIT-II	INTRODUCTION TO JAVA	Classes: 13

JAVA: Introduction to object-oriented programming-Features of Java – Data types, variables and arrays–Operators – Control statements – Classes and Methods – Inheritance. Packages and Interfaces – Exception Handling – Multithreaded Programming – Input/ Output – Files – Utility Classes – String Handling.

UNIT-III	INTRODUCTION TO JDBC	Classes: 13

JDBC: JDBC Overview – JDBC implementation – Connection class – Statements - Catching DatabaseResults, handling database Queries. Networking– Inet Address class – URL class- TCP sockets – UDPsockets,JavaBeans–RMI.

UNIT-IV	INTRODUCTION TO Applets	Classes: 14
Applets: Java applets- Life cycle of an applet – Adding images to an applet – Adding sound to an applet. Passing parameters to an applet. Event Handling. Introducing AWT: Working with Windows Graphics and Text. Using AWT Controls, Layout Managers and Menus. Servlet – life cycle of a servlet. The Servlet API, Handling HTTP Request and Response, using Cookies, Session Tracking. Introduction to JSP.		
UNIT-V	**XML AND WEB SERVICES**	**Classes: 12**
XML and Web Services: Xml – Introduction-Form Navigation-XML Documents- XSL – XSLT- Web services-UDDI-WSDL-Java web services – Web resources.		

TEXT BOOKS

1. Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How To Program 5th Edition.
2. Herbert Schildt, Java - The Complete Reference, 7th Edition. Tata McGraw- Hill Edition.
3. Michael Morrison XML Unleashed Tech media SAMS.

REFERENCE BOOKS

1. John Pollock, Javascript - A Beginners Guide, 3rd Edition –- Tata McGraw-Hill Edition.
2. Keyur Shah, Gateway to Java Programmer Sun Certification, Tata McGraw Hill, 2002.

WEB REFERENCES

1. http://bitbucket.org/ -
2. http://github.com/ -
3. http://www.codeplex.com/ -
4. http://sourceforge.net/

TEXT BOOKS

1. https://www.tutorialspoint.com/php/
2. https://www.tutorialspoint.com/php/php_tutorial.pdf
3. https://www.geeksforgeeks.org/web-technology/

OCS COURSES

1. https://nptel.ac.in/courses/106105084/14
2. https://nptel.ac.in/courses/nptel_download.php?subjectid=106105084
3. https://freevideolectures.com/course/3690/advanced-java/29 -servlets

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

IMAGE PROCESSING (Professional Elective-I)

III B.TECH-I SEMESTER

Course Code	Programme	Hours/Week			Credits	MaximumMarks		
		L	T	P	C	CIE	SEE	Total
AIM514PE	B.Tech	3	0	0	3	30	70	100

COURSEOBJECTIVES

1. Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.
2. The topics include image acquisition; sampling and quantization; preprocessing; enhancement; restoration; segmentation; and compression.

COURSEOUTCOMES

Upon successful completion of the course, the student is able to

1. Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.
2. Demonstrate the knowledge of filtering techniques.
3. Demonstrate the knowledge of 2D transformation techniques.
4. Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques

UNIT-I	DIGITALIMAGEFUNDAMENTALS	Classes:15

Digital Image through Scanner, Digital Camera. Concept of Gray Levels. Gray Level to Binary Image Conversion. Sampling and Quantization. Relationship between Pixels. Imaging Geometry.2D Transformations-DFT, DCT, KLT and SVD.

UNIT-II	IMAGEENHANCEMENT	Classes:12

Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering, Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

UNIT-III	IMAGERESTORATION	Classes:12

Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.		
UNIT-IV	**IMAGESEGMENTATION**	**Classes:11**

Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

UNIT-V	IMAGECOMPRESSION	Classes:12

Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

TEXTBOOKS

1. DigitalImageProcessing:R.C.Gonzalez&R.E.Woods, AddisonWesley/PearsonEducation,2ndEd,2004.

REFERENCEBOOKS

1. FundamentalsofDigitalImageProcessing:A.K.Jain,PHI.
2. DigitalImageProcessingusingMATLAB:RafaelC.Gonzalez,RichardE.Woods,StevenL.Eddins: PearsonEducationIndia,2004.
3. DigitalImageProcessing:WilliamK.Pratt,JohnWilely,3rdEdition,2004.

WEBREFERENCES

1. https://www.ijert.org/image-processing-using-web-2-0-2
2. https://iopscience.iop.org/article/10.1088/1742-6596/1087/5/052024/pdf
3. https://en.wikipedia.org/wiki/Digital_image_processing

E-TEXTBOOKS

1. http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf
2. https://sisu.ut.ee/imageprocessing/book/1

MOOCSCOURSES

1. http://nptel.ac.in
2. https://www.coursera.org2.

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DEPARTMENTOFARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

COMPUTER GRAPHICS (Professional Elective-I)

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM515PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
2. Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and color models; animation; rendering and implementation; visible surface detection;

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Acquire familiarity with the relevant mathematics of computer graphics.
2. Be able to design basic graphics application programs, including animation
3. Be able to design applications that display graphic images to given specifications
4. Select a search algorithm for a problem and estimate its time and space complexities.
5. Possess the skill for representing knowledge using the appropriate technique for a given problem.

UNIT-I	BASICS OF COMPUTER GRAPHICS	Classes: 11

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), midpoint circle and ellipse algorithms Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms

UNIT-II	2-D GEOMETRICAL TRANSFORMS	Classes: 11

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland algorithms, Sutherland –Hodgeman

polygon clipping algorithm.

UNIT-III	3-D OBJECT REPRESENTATION	Classes: 12

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces.
Basic illumination models, polygon rendering methods.

UNIT-IV	3-D GEOMETRIC TRANSFORMATION	Classes: 12

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT-V	SURFACE DEDUCTION AND COLOR MODELS	Classes: 12

Visible surface detection methods: Classification, back-face detection, depth-buffer, BSP-tree methods and area sub-division methods
Color Model Properties of Light XYZ RGB, YIQ, and CMY Color Models

TEXT BOOKS

1. Computer Graphics, Dr. P. Santosh Kumar Patra, Dr. N.Krishnaiah and G. Sathish, Sureni Publications.
2. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education
3. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
4. Computer Graphics, Steven Harrington, TMH

REFERENCE BOOKS

1. Procedural elements for Computer Graphics, David F Rogers, Tata McGraw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, ShaliniGovil, Pai, 2005, Springer.

WEB REFERENCES

1. https://eecs.wsu.edu/~cook/ai/lectures/p.html
2. http://www.cs.toronto.edu/~fbacchus/csc384/Lectures/lectures.html
3. http://web.cs.iastate.edu/~cs572/studyguide.html
4. https://faculty.ist.psu.edu/vhonavar/Courses/ai/studyguide.html

E -TEXT BOOKS

1. Computer Graphics C version, Donald Hearn and M. Pauline Baker, Pearson Education

MOOCS COURSES

1. https://www.udacity.com/course/intro-to computer-graphics--cs271
2. https://www.classcentral.com/course/edx-computer-graphics-cg-7230
3. https://www.my-mooc.com/en/mooc/intro-to-computergraphics/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

SOFTWARE TESTING METHODOLOGIES (Professional Elective - II)

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM521PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
2. To develop skills in software test automation and management using latest tools.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Design and develop the best test strategies in accordance to the development model.

UNIT-I	INTRODUCTION	Classes: 15

Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II	TRANSACTION FLOW TESTING	Classes: 12

Transaction flows, transaction flow testing techniques. Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing. Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT-III	PATH PRODUCTS AND REGULAR EXPRESSIONS	Classes: 12

Paths, Path products and Regular expressions: path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.
Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications.

UNIT-IV	STATE GRAPHS AND TRANSITION TESTING	Classes: 11

State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips

UNIT-V	GRAPH MATRICES AND APPLICATION	Classes: 12
Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Win-runner).		
TEXT BOOKS		
1. Software Testing techniques - BarisBeizer, Dreamtech, second edition. 2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.		
REFERENCE BOOKS		
1. The craft of software testing - Brian Marick, Pearson Education. 2. Software Testing Techniques – SPD(Oreille) 3. Software Testing in the Real World – Edward Kit, Pearson. 4. Effective methods of Software Testing, Perry, John Wiley. 5. Art of Software Testing – Meyers, John Wiley.		
WEB REFERENCES		
1.https://www.smartzworld.com/notes/software-testing-methodologies-pdf-notes-stm-pdf-notes/ 2.https://www.academia.edu/27915965/SOFTWARE_TESTING_METHODOLOGIES		
E -TEXT BOOKS		
1. https://examupdates.in/software-testing-methodologies/		
MOOCS COURSES		
1. https://onlinecourses-archive.nptel.ac.in 2. https://swayam.gov.in/ 3. https://swayam.gov.in/NPTEL		

REFERENCE BOOKS
1. The craft of software testing - Brian Marick, Pearson Education. 2. Software Testing Techniques – SPD(Oreille) 3. Software Testing in the Real World – Edward Kit, Pearson. 4. Effective methods of Software Testing, Perry, John Wiley. 5. Art of Software Testing – Meyers, John Wiley.
WEB REFERENCES
1.https://www.smartzworld.com/notes/software-testing-methodologies-pdf-notes-stm-pdf-notes/ 2.https://www.academia.edu/27915965/SOFTWARE_TESTING_METHODOLOGIES
E -TEXT BOOKS
1. https://examupdates.in/software-testing-methodologies/
MOOCS COURSES

1. https://www.udemy.com/courses/development/software-testing/
2. https://in.coursera.org/courses?query=software%20testing
3. https://www.edureka.co/software-testing-certification-courses

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INFORMATION RETRIVEL SYSTEMS(Professional Elective - II)

III B. TECH I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM522PE	B.Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To learn the important concepts and algorithms in IRS
2. To understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems

COURSE OUTCOMES

Students will be able to:

1. Ability to apply IR principles to locate relevant information large collections of data
2. Ability to design different document clustering algorithms
3. Implement retrieval systems for web search tasks.
4. Design an Information Retrieval System for web search tasks.

UNIT-I	INTRODUCTION	Classes: 10

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT-II	CATALOGING AND INDEXING	Classes: 10

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models

UNIT-III	AUTOMATIC INDEXING	Classes:8

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

UNIT-IV	USER SEARCH TECHNIQUES	Classes: 8

User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext Information Visualization: Introduction to Information Visualization, Cognition and Perception,

Information Visualization Technologies		
UNIT-V	**TEXT SEARCH ALGORITHMS**	**Classes: 8**
Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval		

TEXT BOOKS

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer

REFERENCE BOOKS

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval By Yates and Neto Pearson Education.

WEB REFERENCES

1. https://dl.acm.org/doi/book/10.5555/2534490
2. https://www.amazon.in/Christopher-D-Manning/e/B001H6KI62/ref=dp_byline_cont_pop_ebooks_1

E -TEXT BOOKS

1. https://nlp.stanford.edu/IR-book/pdf/irbookonlinereading.pdf
2. http://www.ebooks-for-all.com/bookmarks/detail/Introduction-to-Information-Retrieval/

MOOCS COURSES

1. https://www.cse.iitk.ac.in/pages/CS657.html
2. https://www.coursera.org/courses?query=information%20retrieval

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

PATTERN RECOGNITION (Professional Elective - II)

III B. TECH- ISEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM523PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To provide introduction to some of the fundamental concepts, theories, and algorithms for pattern recognition and machine learning
2. To introduce the fundamental concepts of Pattern Representation, Nearest Neighbor Based Classifier, Bayes Classify.
3. Classify machines by their power to recognizelanguages.
4. Classifier, Hidden Markov Models, Decision Trees, Support Vector Machines, Clusteringmachines to solve problems in Computing.
5. To understand the differences between an application of hand-written digit recognition

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Able to understand the concept of abstract machines and their pattern recognition algorithms
2. Able to employ finite state machines for modeling and solving computing problems and machine learning techniques in classification
3. Able to design pattern recognition problems.
4. Able to distinguish between clustering and decision problems.
5. Able to gain proficiency with mathematical tools and formalmethods.

UNIT-I	PATTEM RECOGNITION	Classes: 11

Introduction: What is Pattern Recognition, Data Sets for Pattern Recognition, and Different Paradigms for Pattern Recognition. Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature Extraction, Feature Selection, Evaluation of Classifier, Evaluation of Clustering.

UNIT-II	NEAREST NEIGHBOR BASED CLASSIFIER	Classes: 11

Nearest Neighbor Based Classifier: Nearest Neighbor Algorithm, Variants of the NN Algorithm use of the Nearest Neighbor Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection. Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naïve Bayes Classifier, Bayesian Belief Network

UNIT-III	HIDDEN MARKOV MODELS	Classes: 10
Hidden Markov Models: Markov Models for Classification, Hidden Morkov Models, Classification using HMMs. Decision Trees: Introduction, Decision Tree for Pattern Classification, Construction of Decision Trees, Splitting at the Nodes, Overfitting and Pruning, Examples of Decision Tree Induction.		
UNIT-IV	**SUPPORT VECTOR MACHINES**	**Classes: 11**
Support Vector Machines: Introduction, Learning the Linear Discriminant Functions, Neural Networks, SVM for Classification. Combination of Classifiers: Introduction, Methods for Constructing Ensembles of Classifiers, Methods for Combining Classifiers.		
UNIT-V	**CLUSTERING**	**Classes: 11**
Clustering: Why are Clustering Important, Hierarchical Algorithms, Partitional Clustering, and Clustering Large Data Sets. An Application-Hand Written Digit Recognition: Description of the Digit Data, Preprocessing of Data, Classification Algorithms, Selection of Representative Patterns, Results		

TEXT BOOKS

1. Bishop, Christopher M., "Pattern Recognition and Machine Learning", First Edition, Springer, 2009.
2. S. Theodoridis, K. Koutroumbas, "Pattern Recognition", Fourth Edition, Academic Press, 2009.

REFERENCE BOOKS

1. Pattern Recognition: An Algorithmic Approach: Murty, M. Narasimha, Devi, V. Susheela, Spinger Pub,1st Ed.
2. Machine Learning - McGraw Hill, Tom M. Mitchell.
3. Fundamentals of Speech Recognition: Lawrence Rabiner and Biing- Hwang Juang. Prentice Hall Pub

WEB REFERENCES

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2. https://www.analyticsvidhya.com/blog/2020/12/an-overview-of-neural-approach-on-pattern-recognition/
3. https://www.educba.com/pattern-recognition-applications/
4. https://www.section.io/engineering-education/understanding-pattern-recognition-in-machine-learning/

E -TEXT BOOKS

1. http://users.isr.ist.utl.pt/~wurmd/Livros/school/Bishop%20%20Pattern%20Recognition%20And%20Machine%20Learning%20-%20Springer%20%202006.pdf
2. https://stuvera.com/pattern-recognition-book-pdf/
3. https://darmanto.akakom.ac.id/pengenalanpola/Pattern%20Recognition%204th% (2009).pdf
4. http://www.mtome.com/Publications/CiML/CiML-v1-book.pdf

MOOCS COURSES

1. https://www.mooc-list.com/tags/pattern-recognition
2. https://www.mooc-list.com/tags/statistical-pattern-recognition
3. https://www.coursera.org/courses?query=pattern%20recognition

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

COMPUTER VISION AND ROBOTICS (Professional Elective – II)

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM524PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To understand the Fundamental Concepts Related To sources, shadows and shading.
2. To understand the Geometry of Multiple Views.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Implement fundamental image processing techniques required for computer vision.
2. Implement boundary tracking techniques.
3. Apply chain codes and other region descriptors, Hough Transform for line, circle, and ellipse detections.
4. Apply 3D vision techniques and Implement motion related techniques.
5. Develop applications using computer vision techniques.

UNIT-I	INTRODUCTION	Classes: 15

CAMERAS: Pinhole Cameras.
Radiometry – Measuring Light: Light in Space, Light Surfaces, Important Special Cases. Sources, Shadows, And Shading: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Interreflections: Global Shading Models.
Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

UNIT-II	TRANSACTION FLOW TESTING	Classes: 12

Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates.
Edge Detection: Noise, Estimating Derivatives, Detecting Edges.
Texture: Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture.

UNIT-III	PATH PRODUCTS AND REGULAR EXPRESSIONS	Classes: 12

The Geometry of Multiple Views: Two Views Stereopsis: Reconstruction, Human Stereposis, Binocular Fusion, Using More Cameras Segmentation by Clustering: What Is Segmentation? Human Vision: Grouping and Getstalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering,		
UNIT-IV	**STATE GRAPHS AND TRANSITION TESTING**	**Classes: 11**
Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, Fitting as a Probabilistic Inference Problem, Robustness Segmentation and Fitting Using Probabilistic Methods: Missing Data Problems, Fitting, and Segmentation, The EM Algorithm in Practice. Tracking With Linear Dynamic Models: Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples		
UNIT-V	**GRAPH MATRICES AND APPLICATION**	**Classes: 12**
Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations. Geometric Camera Calibration: Least-Squares Parameter Estimation, A Linear Approach to CameraCalibration, Taking Radial Distortion into Account, Analytical Photogrammetry, An Application: Mobile Robot Localization. Model-Based Vision: Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering, Obtaining Hypotheses Using Invariants, Verification, Application: Registration In Medical Imaging Systems, Curved Surfaces and Alignment.		
TEXT BOOKS		
1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.		
REFERENCE BOOKS		
1E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities, Elsevier (Academic Press), 4th edition, 2013. 2. R. C. Gonzalez and R. E. Woods "Digital Image Processing" Addison Wesley 2008. 3. Richard Szeliski "Computer Vision: Algorithms and Applications" Springer-Verlag London Limited 2011..		
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E -TEXT BOOKS		
1.https://www.amazon.in/Computer-Vision-Robotics-Industrial-Applications ebook/dp/B00MI916RC		
MOOCS COURSES		
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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

DATA WAREHOUSING AND BUSINESS INTELLIGENCE (Professional Elective – II)

III B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM525PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. This course is concerned with extracting data from the information systems that deal with the day-to-day operations and transforming it into data that can be used by businesses to drive high-level decision making
2. Students will learn how to design and create a data warehouse, and how to utilize the process of extracting, transforming, and loading (ETL) data into data warehouses.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand architecture of data warehouse and OLAP operations.
2. Understand Fundamental concepts of BI and Analytics
3. Application of BI Key Performance indicators
4. Design of Dashboards, Implementation of Web Analytics
5. Understand Utilization of Advanced BI Tools and their Implementation.
6. Implementation of BI Techniques and BI Ethics.

UNIT-I	INTRODUCTION	Classes: 15
Data Warehouse: Data Warehouse-Data Warehouse Architecture- Multidimensional Data Model-Data cube and OLAP Technology-Data Warehouse Implementation -DBMS schemas for Decision support - Efficient methods for Data cube computation.		
UNIT-II	**BUSINESS INTELLIGENCE**	**Classes: 12**
Business Intelligence: Introduction – Definition, Leveraging Data and Knowledge for BI, BI Components, BI Dimensions, Information Hierarchy, Business Intelligence and Business Analytics. BI Life Cycle. Data for BI - Data Issues and Data Quality for BI.		
UNIT-III	**BI IMPLEMENTATION**	**Classes: 12**
BI Implementation - Key Drivers, Key Performance Indicators and Performance Metrics, BI Architecture/Framework, Best Practices, Business Decision Making, Styles of BI-vent-Driven alerts-A cyclic process of Intelligence Creation. The value of Business intelligence -Value driven and Information use.		
UNIT-IV	**ADVANCED BI**	**Classes: 11**

Advanced BI – Big Data and BI, Social Networks, Mobile BI, emerging trends, Description of different BI-Tools (Pentaho, KNIME)		
UNIT-V	**BUSINESS INTELLIGENCE IMPLEMENTATION**	**Classes: 12**
Business intelligence implementation-Business Intelligence and integration implementation-connecting in BI systems- Issues of legality- Privacy and ethics- Social networking and BI.		
TEXT BOOKS		
1. 1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER, Elsevier. 2. Rajiv Sabherwal “Business Intelligence” Wiley Publications, 2012..		
REFERENCE BOOKS		
1. Efraim Turban, Ramesh Sharda, Jay Aronson, David King, Decision Support and Business Intelligence Systems, 9th Edition, Pearson Education, 2009. 2.David Loshin, Business Intelligence - The Savy Manager's Guide Getting Onboard with Emerging IT, Morgan Kaufmann Publishers, 2009		
WEB REFERENCES		
1. https://www.geeksforgeeks.org/data-warehousing/		
E -TEXT BOOKS		
1. Data Warehousing, Business Intelligence		
MOOCS COURSES		
1. https://onlinecourses-archive.nptel.ac.in 2. https://swayam.gov.in/ 3. https://swayam.gov.in/NPTEL		

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

SOFTWARE ENGINEERING

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM601PC	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

1. The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
2. Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

COURSE OUTCOMES

1. Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
2. Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
3. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

UNIT-I	INTRODUCTION TO SOFTWARE ENGINEERING	Classes: 12

Introduction toSoftwareEngineering: The evolving role ofsoftware, Changing Nature ofSoftware,Softwaremyths.
A Generic view of process: Software engineering- A layered technology, a process framework,TheCapabilityMaturityModelIntegration(CMMI).

Processmodels: Thewaterfallmodel,Incrementalprocessmodels,Evolutionaryprocessmodels,TheUnified process.

UNIT-II	SOFTWARE REQUIREMENTS	Classes: 12

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.
Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.
System models: Context models, behavioral models, data models, object models, structured methods.

UNIT-III	DESIGN ENGINEERING	Classes: 12

Design Engineering: Design process and design quality, design concepts, the design model.

Creatinganarchitecturaldesign:softwarearchitecture,datadesign,architecturalstylesandpatterns,architecturaldesign,conceptuallmodelofUML,basicstructuralmodelling,classdiagrams,sequencediagrams,collaborationdiagrams,usecasediagrams,componentdiagrams.

UNIT-IV	TESTING STRATEGIES	Classes: 14

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.

Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT-V	RISK MANAGEMENT	Classes: 10

Metrics for Process and Products: Software measurement, metrics for software quality.

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXT BOOKS

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

REFERENCE BOOKS

1. Software Engineering, Dr. P Santosh Kumar Patra, P. Deva sudha and Dr. P Sai Prasad, Spectrum Publications.
2. Software Engineering, A Precise Approach, PankajJalote, Wiley India,2010.
3. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill,2008
4. Fundamentals of Software Engineering, Rajib Mall, PHI,2005

WEB REFERENCES

1. https://en.wikipedia.org/wiki/Software_engineering

E -TEXT BOOKS

1. https://books.google.co.in/books?id=bL7QZHtWvaUC&printsec=frontcover&dq=software+engineering+by+roger+pressman+vth+edition+free+download&hl=en&sa=X&ved=0ahUKEwiLkOz-pL_TAhWIuI8KHZSxD2cQ6AEIMDAC#v=onepage&q&f=false

MOOC COURSES

1. https://www.coursera.org/specializations/software-development-lifecycle
2. https://www.mooc-list.com/tags/software-engineering

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

DEVOPS

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM602PC	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

1. The main objectives of this course are to:
2. Describe the agile relationship between development and IT operations.
3. Understand the skill sets and high-functioning teams involved in DevOps and related methods to reach a continuous delivery capability.
4. Implement automated system update and DevOps lifecycle

COURSE OUTCOMES

1. On successful completion of this course, students will be able to:
2. Identify components of Devops environment.
3. Describe Software development models and architectures of DevOps.
4. Apply different project management, integration, testing and code deployment tool.
5. Investigate different DevOps Software development models.
6. Assess various Devops practices.
7. Collaborate and adopt Devops in real-time projects.

UNIT-I	INTRODUCTION	Classes: 12

Introduction: Introduction, Agile development model, DevOps, and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples

UNIT-II	SOFTWARE DEVELOPMENT MODELS AND DEVOPS	Classes: 12

Software development models and DevOps: DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing. DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Microservices, and the data tier, DevOps, architecture, and resilience.

UNIT-III	INTRODUCTION TO PROJECT MANAGEMENT	Classes: 12

Introduction to project management: The need for source code control, The history of source code management, Roles and code, source code management system and migrations, Shared authentication, Hosted Git servers, Different Git server

implementations, Docker intermission, Gerrit, The pull request model, GitLab.

UNIT-IV	INTEGRATING THE SYSTEM	Classes: 14

Integrating the system: Build systems, Jenkins build server, Managing build dependencies, Jenkins plugins, and file system layout, The host server, Build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

UNIT-V	TESTING TOOLS AND AUTOMATION	Classes: 10

Testing Tools and automation: Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development

Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker

TEXT BOOKS

1. Joakim Verona. Practical Devops, Second Edition. Ingram short title; 2nd edition (2018). ISBN- 10: 1788392574.
2. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952.

REFERENCE BOOKS

1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley; ISBN-10.

WEB REFERENCES

1. https://learn.microsoft.com/en-us/devops/what-is-devops

E -TEXT BOOKS

1.https://docs.oracle.com/en-us/iaas/Content/devops/using/reference.htm

MOOC COURSES

1. https://www.coursera.org/specializations/software-development-lifecycle
2. https://www.mooc-list.com/tags/software-engineering

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

NATURAL LANGUAGE PROCESSING

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM603PC	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

To learn

1. Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.
2. They will also be able to propose extension of existing NLP techniques for solving a range of problems.
3. They will be able to comprehend the state-of-the-art advanced NLP research articles and present them to an audience.
4. the graduate students will be able to appreciate the theoretical formulation of the natural language processing techniques
5. They will also be able to demonstrate required design skills for large collection sets.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. Understand and carry out proper experimental methodology for training and evaluatingempirical NLP systems.
3. Able to manipulate probabilities, construct statistical models over strings and trees, andestimate parameters using supervised and unsupervised training methods
4. Able to distinguish between decidability andundecidability.
5. Able to design different language modelling Techniques.

UNIT-I	FINDING THE STRUCTURE OF WORDS	Classes: 15

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models
Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT-II	SYNTAX ANALYSIS	Classes: 11

Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT-III	SEMANTIC PARSING	Classes: 10

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.		
UNIT-IV	**PREDICATE-ARGUMENTSTRUCTURE**	**Classes: 11**
Predicate-ArgumentStructure,MeaningRepresentationSystems,Software.		
UNIT-V	**DISCOURSE PROCESSING**	**Classes: 11**
Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling		

TEXT BOOKS

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and ImedZitouni, Pearson Publication.
2. Natural Language Processing and Information Retrieval: TanvierSiddiqui, U.S. Tiwary.

REFERENCE BOOKS

1. SpeechandNaturalLanguageProcessing-DanielJurafsky&JamesHMartin,PearsonPublications.

WEB REFERENCES

1.https://www.cl.cam.ac.uk/teaching/2002/NatLangProc/nlp1-4.pdf

2.https://nptel.ac.in/courses/106/101/106101007/https://web.cs.hacettepe.edu.tr/~ilyas/Courses/BBM401/

E -TEXT BOOKS

1.https://freecontent.manning.com/free-ebook-exploring-natural-language-processing/
2.https://www.ebooksdirectory.com/listing.php?category=281
3.https://www.packtpub.com/free-ebook/hands-on-natural-language-processing-with-python/9781789139495

MOOCS COURSES

1.https://www.mooc-list.com/course/natural-language-processing-and-capstone-assignment-coursera
2.https://www.edx.org/learn/natural-language-processing/
3. https://www.udemy.com/topic/natural-language-processing/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

INTERNET OF THINGS (Professional Elective – III)

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM611PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To introduce the terminology, technology and its applications.
2. To introduce the concept of M2M (machine to machine) with necessary protocols.
3. To introduce the Python Scripting Language which is used in many IoT devices.
4. To introduce the Raspberry PI platform, that is widely used in IoT applications.
5. To introduce the implementation of web-based services on IoT devices.

COURSE OUTCOMES

1. Interpret the impact and challenges posed by IoT networks leading to new architectural models.
2. Compare and contrast the deployment of smart objects and the technologies to connect them to network.
3. Appraise the role of IoT protocols for efficient network communication.
4. Elaborate the need for Data Analytics and Security in IoT.
5. Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

UNIT-I	INTRODUCTION TO INTERNET OF THINGS	Classes: 12

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT-II	IOT AND M2M	Classes: 12

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT-III	INTRODUCTION TO PYTHON	Classes: 12

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT-IV	IOT PHYSICAL DEVICES AND ENDPOINTS	Classes: 14

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT-V	IOT PHYSICAL SERVERS AND CLOUD OFFERINGS	Classes: 10

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

TEXT BOOKS

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759..

REFERENCE BOOKS

1. Software Engineering, A Precise Approach, PankajJalote, Wiley India,2010.
2. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill,2008
3. Fundamentals of Software Engineering, Rajib Mall, PHI,2005

WEB REFERENCES

1. https://wso2.com/whitepapers/a-reference-architecture-for-the-internet-of-things/

E -TEXT BOOKS

1. https://books.google.co.in/books?id=bL7QZHtWvaUC&printsec=frontcover&dq=software+engineering+by+roger+pressman+vth+edition+free+download&hl=en&sa=X&ved=0ahUKEwiLkOz-pL_TAhWIuI8KHZSxD2cQ6AEIMDAC#v=onepage&q&f=false

MOOC COURSES

1. https://www.zdnet.com/article/what-is-the-internet-of-things-everything-you-need-to-know-about-the-iot-right-now/
2. https://onlinecourses.nptel.ac.in/noc22_cs53/preview

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

DATA MINING (Professional Elective – III)

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM612PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. It presents methods for mining frequent patterns, associations, and correlations.
2. It then describes methods for data classification and prediction, and data–clustering approaches.
3. It covers mining various types of data stores such as spatial, textual, multimedia, streams.

COURSE OUTCOMES

1. Ability to understand the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system.
2. Apply preprocessing methods for any given raw data.
3. Extract interesting patterns from large amounts of data.
4. Discover the role played by data mining in various fields.
5. Choose and employ suitable data mining algorithms to build analytical applications
6. Evaluate the accuracy of supervised and unsupervised models and algorithms.

UNIT-I	INTRODUCTION TO DATA MINING	Classes: 12

Data Mining: Data–Types of Data–, Data Mining Functionalities– Interestingness Patterns– Classification of Data Mining systems– Data mining Task primitives – Integration of Data mining system with a Data warehouse–Major issues in Data Mining– Data Preprocessing.

UNIT-II	ASSOCIATION RULE MINING	Classes: 12

Association Rule Mining: Mining Frequent Patterns–Associations and correlations – Mining Methods– Mining Various kinds of Association Rules– Correlation Analysis– Constraint based Association mining. Graph Pattern Mining, SPM.

UNIT-III	CLASSIFICATION	Classes: 12

Classification: Classification and Prediction – Basic concepts–Decision tree induction– Bayesian classification, Rule–based classification, Lazy learner.

UNIT-IV	CLUSTERING AND APPLICATIONS	Classes: 14

Clustering and Applications: Cluster analysis–Types of Data in Cluster Analysis– Categorization of Major Clustering Methods– Partitioning Methods, Hierarchical Methods– Density–Based Methods, Grid–Based Methods, Outlier Analysis.

UNIT-V	ADVANCED CONCEPTS	Classes: 10

Advanced Concepts: Basic concepts in Mining data streams–Mining Time–series data—Mining sequence patterns in Transactional databases– Mining Object– Spatial–Multimedia–Text and Web data – Spatial Data mining– Multimedia Data mining–Text Mining– Mining the World Wide Web.

TEXT BOOKS

1.Data Mining – Concepts and Techniques – Jiawei Han &MichelineKamber, 3rd Edition Elsevier.

2.Data Mining Introductory and Advanced topics – Margaret H Dunham, PEA.

REFERENCE BOOKS

1. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005.

WEB REFERENCES

1. https://en.wikipedia.org/wiki/Software_engineering

E -TEXT BOOKS

1.https://books.google.co.in/books?id=bL7QZHtWvaUC&printsec=frontcover&dq=software+engineering+by+roger+pressman+vth+edition+free+download&hl=en&sa=X&ved=0ahUKEwiLkOz-pL_TAhWIuI8KHZSxD2cQ6AEIMDAC#v=onepage&q&f=false

MOOC COURSES

1. https://in.coursera.org/specializations/data-mining
2. https://onlinecourses.nptel.ac.in/noc21_cs06/preview

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

SCRIPTING LANGUAGES (Professional Elective – III)

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM613PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. This course introduces the script programming paradigm.
2. Introduces scripting languages such as Perl, Ruby and TCL.
3. Learning TCL.

COURSE OUTCOMES

1. Comprehend the differences between typical scripting languages and typical system and application programming languages.
2. Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
3. Acquire programming skills in scripting language.

UNIT-I	INTRODUCTION TO RUBY	Classes: 12

Introduction: Ruby, Rails, The structure and Excution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and webservices
RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT-II	EXTENDING RUBY	Classes: 12

Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interperter

UNIT-III	INTRODUCTION TO PERL AND SCRIPTING	Classes: 12

Introduction to PERL and Scripting
Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT-IV	ADVANCED PERL	Classes: 14

Advanced perl
Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Isses.

UNIT-V	TCL	Classes: 10

TCL

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

Tk

Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

TEXT BOOKS

1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Ruby Progamming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The PramaticProgammers guide by Dabve Thomas Second edition

REFERENCE BOOKS

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J. Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning

WEB REFERENCES

1. https://en.wikipedia.org/wiki/Software_engineering

E -TEXT BOOKS

1. https://books.google.co.in/books?id=bL7QZHtWvaUC&printsec=frontcover&dq=software+engineering+by+roger+pressman+vth+edition+free+download&hl=en&sa=X&ved=0ahUKEwiLkOz-pL_TAhWIuI8KHZSxD2cQ6AEIMDAC#v=onepage&q&f=false

MOOC COURSES

1. https://www.coursera.org/specializations/software-development-lifecycle
2. https://www.mooc-list.com/tags/software-engineering

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

MOBILE APPLICATION DEVELOPMENT (Professional Elective – III)

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM614PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To demonstrate their understanding of the fundamentals of Android operating systems.
2. To improves their skills of using Android software development tools.
3. To demonstrate their ability to develop software with reasonable complexity on mobile platform.
4. To demonstrate their ability to deploy software to mobile devices.
5. To demonstrate their ability to debug programs running on mobile devices.

COURSE OUTCOMES

1. Student understands the working of Android OS Practically.
2. Student will be able to develop Android user interfaces
3. Student will be able to develop, deploy and maintain the Android Applications.

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UNIT-I	INTRODUCTION TO ANDROID OPERATING SYSTEM	Classes: 12

Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools

Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT-II	ANDROID USER INTERFACE	Classes: 12

Android User Interface: Measurements – Device and pixel density independent measuring UNIT - s Layouts – Linear, Relative, Grid and Table Layouts

User Interface (UI) Components – Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers

Event Handling – Handling clicks or changes of various UI components

Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT-III	INTENTS AND BROADCASTS	Classes: 12

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS

Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications – Creating and Displaying notifications, Displaying Toasts.		
UNIT-IV	**PERSISTENT STORAGE**	**Classes: 14**
Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference		
UNIT-V	**DATABASE**	**Classes: 10**
Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)		

TEXT BOOKS

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013.

REFERENCE BOOKS

1. BeginningAndroid4ApplicationDevelopment, Wei-MengLee,WileyIndia(Wrox),2013.

WEB REFERENCES

1. https://en.wikipedia.org/wiki/Software_engineering

E -TEXT BOOKS

1.https://books.google.co.in/books?id=bL7QZHtWvaUC&printsec=frontcover&dq=software+engineering+by+roger+pressman+vth+edition+free+download&hl=en&sa=X&ved=0ahUKEwiLkOz-pL_TAhWIuI8KHZSxD2cQ6AEIMDAC#v=onepage&q&f=false

MOOC COURSES

1. https://www.fita.in/mobile-app-development-course/
2. https://alison.com/tag/app-development

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

CRYPTOGRAPHY AND NETWORK SECURITY (Professional Elective - III)

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM615PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. Explain the objectives of information security
2. Explain the importance and application of each of confidentiality, integrity, authentication and availability
3. Understand various cryptographic algorithms.
4. Understand the basic categories of threats to computers and networks
5. Describe public-key cryptosystem.
6. Describe the enhancements made to IPv4 by IPSec
7. Understand Intrusions and intrusion detection
8. Discuss the fundamental ideas of public-key cryptography.
9. Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
10. Discuss Web security and Firewalls

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COURSE OUTCOMES

1. Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
2. Ability to identify information system requirements for both of them such as client and server.
3. Ability to understand the current legal issues towards information security.

UNIT-I	INTRODUCTION TO SECURITY CONCEPTS	Classes: 12

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT-II	SYMMETRIC KEY CIPHERS	Classes: 12

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA,
Block cipher operation, Stream ciphers, RC4.
Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT-III	CRYPTOGRAPHIC HASH FUNCTIONS	Classes: 12

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric &Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure

UNIT-IV	TRANSPORT-LEVEL SECURITY	Classes: 14

Transport-level Security: Web security considerations, Secure Socket Layer and Transport LayerSecurity,HTTPS,SecureShell (SSH)

WirelessNetworkSecurity: WirelessSecurity,MobileDeviceSecurity,IEEE802.11WirelessLAN,IEEE802.11iWirelessLANSecurity

UNIT-V	E-MAIL SECURITY	Classes: 10

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange

Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

TEXT BOOKS

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: AtulKahate, McGraw Hill, 3rd Edition

REFERENCE BOOKS

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: ForouzanMukhopadhyay, McGraw Hill, 3rd Edition.
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH.
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.

WEB REFERENCES

1. https://en.wikipedia.org/wiki/Software_engineering

E -TEXT BOOKS

1. https://books.google.co.in/books?id=bL7QZHtWvaUC&printsec=frontcover&dq=software+engineering+by+roger+pressman+vth+edition+free+download&hl=en&sa=X&ved=0ahUKEwiLkOz-pL_TAhWIuI8KHZSxD2cQ6AEIMDAC#v=onepage&q&f=false

MOOC COURSES

1. https://www.coursera.org/specializations/software-development-lifecycle
2. https://www.mooc-list.com/tags/software-engineering

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

FUNDAMENTALS OF AI (Open Elective - I)

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM616OE	B. Tech	0	0	0	3	30	70	100

COURSE OBJECTIVES

- To learn the difference between optimal reasoning Vs human like reasoning
- To understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities
- To learn different knowledge representation techniques
- To understand the applications of AI namely, Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing

COURSE OUTCOMES

- Possess the ability to formulate an efficient problem space for a problem expressed in English
- Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.
- Possess the skill for representing knowledge using the appropriate technique
- Possess the ability to apply AI techniques to solve problems of Game Playing, Expert Systems and Machine Learning.

UNIT-I	FOUNDATIONS OF AI	Classes: 13

Foundations of AI: What is AI, History of AI, Strong and weak AI, The State of the Art.
Intelligent Agents: Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

UNIT-II	SOLVING PROBLEMS BY SEARCHING	Classes: 12

Solving Problems by Searching: Problem – Solving Agents, Example Problems, Searching for Solutions, uniformed search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions.

UNIT-III	KNOWLEDGE REPRESENTATION	Classes: 12

Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information, The Internet Shopping World.

UNIT-IV	LEARNING FROM EXAMPLES	Classes: 12

Learning from Examples: Forms of Learning, Supervised Learning, Learning Decision Trees, Evaluating and Choosing the Best Hypothesis, The Theory of Learning, Regression and Classification with Learner Models, Nonparametric Models, Support Vector Machines, Ensemble Learning, Practical Machine Learning.

UNIT-V	LEARNING PROBABILISTIC MODELS	Classes: 13

Learning Probabilistic Models: Statistical Learning, Learning with Complete data, Learning with Hidden variables: The EM Algorithm.

TEXT BOOKS

1. "Artificial Intelligence A Modern Approach", Stuart J. Russell & Peter Norvig – Pearson.
2. "Artificial Intelligence", Elaine Rich, Kevin Knight & Shivashankar B Nair — McGraw HillEducation.

REFERENCE BOOKS

1. Advanced Artificial Intelligence, Spectrum Publications
2. Artificial Intelligence, 3rd Edn, E. Rich and K.Knight (TMH)
3. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
4. Artificial Intelligence, Shivani Goel, Pearson Education.
5. Artificial Intelligence and Expert systems – Patterson, Pearson Education

WEB REFERENCES

1. https://www.ibm.com/in-en/topics/artificial-intelligenc
2. https://www.techtarget.com/searchenterpriseai/definition/AI-Artificial-Intelligence

E -TEXT BOOKS

1. https://people.engr.tamu.edu/guni/csce421/files/AI_Russell_Norvig.pdf=
2. https://link.springer.com/book/10.1007/978-3-030-72357-6

MOOCS COURSES

1. https://in.coursera.org/courses?query=artificial%20intelligence
2. https://www.udemy.com/topic/artificial-intelligence/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

MACHINE LEARNING BASICS (Open Elective - I)

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM617OE	B. Tech	0	0	0	0	30	70	100

COURSE OBJECTIVES

- To understand pattern classification algorithms to classify multivariate data
- To understand the Implementation of genetic algorithms
- To gain knowledge about Q-Learning
- To create new machine learning techniques.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

- Develop and apply pattern classification algorithms to classify multivariate data.
- Develop and apply regression algorithms for finding relationships between data variables.
- Develop and apply reinforcement learning algorithms for learning to control complex systems.
- Write scientific reports on computational machine learning methods, results and conclusions.

UNIT-I	BASICS LEARNING PROBLEMS	Classes: 13

BASICS Learning Problems Perspectives and Issues Concept Learning Version Spaces and Candidate eEliminations – Inductive bias – Decision Tree learning – Representation – Algorithm –Heuristic Space Search

UNIT-II	NEURAL NETWORKS AND GENETIC ALGORITHMS	Classes: 12

Neural Networks and Genetic Algorithms: Neural Network Representation Problems Perceptions Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms Hypothesis Space Search– Genetic Programming – Models of Evolutions and Learning.

UNIT-III	BAYESIAN AND COMPUTATIONAL LEARNING	Classes: 12

Bayesian and Computational Learning: Bayes Theorem Concept Learning Maximum Likelihood Minimum Description Length Principle Bayes Optimal Classifier Gibbs Algorithm Naïve Bayes Classifier Bayesian Belief Network EM Algorithm Probability Learning Sample Complexity Finite and Infinite Hypothesis Spaces — Mistake Bound Model.

UNIT-IV	INSTANT BASED LEARNING	Classes: 12

Instant Based Learning: K- Nearest Neighbour Learning Locally weighted Regression Radial BasesFunctions — Case Based Learning.

UNIT-V	ADVANCED LEARNING	Classes: 13

Advanced Learning: Learning Sets of Rules Sequential Covering Algorithm Learning Rule Set First Order Rules Sets of First Order Rules Induction on Inverted Deduction Inverting Resolution Analytical Learning Perfect Domain Theories Explanation Base Learning — FOCL Algorithm - Reinforcement Learning Task Learning Temporal Difference Learning

TEXT BOOKS

1. Tom M. Mitchell, "Machine Learning", McGraw-Hill, 2010.
2. Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: OxfordUniversity Press, 1995.

REFERENCE BOOKS

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

WEB REFERENCES

1. https://www.w3schools.com/ai/ai_whatis.asp
2. https://www.digitalocean.com/community/tutorials/an-introduction-to-machine-learning
3. https://www.geeksforgeeks.org/machine-learning/

E -TEXT BOOKS

1. Introduction to Machine Learning with Python, Andreas C. Müller, Sarah Guido, First Edition

MOOCS COURSES

1. https://www.udemy.com/course/introduction-to-machine-learning-in-python/
2. https://www.coursera.org/learn/machine-learning
3. https://github.com/microsoft/ML-For-Beginners

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

NATURAL LANGUAGE PROCESSING LAB

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM604PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. To Develop and explore the problems and solutions of NLP.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
3. Able to design, implement, and analyze NLP algorithms

LIST OF EXPERIMENTS

Implement the following using Python
1. Tokenization
2. Stemming
3. Stop word removal (a, the, are)
4. Word Analysis
5. Word Generation
6. Pos tagging
7. Morphology
8. chunking
9. N-Grams
10. N-Grams Smoothing

TEXT BOOKS

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and ImedZitouni, Pearson Publication.
2. Natural Language Processing and Information Retrieval: TanvierSiddiqui, U.S. Tiwary.

REFERENCE BOOKS

1. Speech and Natural Language Processing - Daniel Jurafsky& James H Martin, Pearson Publications.

WEB REFERENCES
1. https://www.coursera.org/learn/machine-learning 2. https://www.ibm.com/in-en/cloud/learn/machine-learning
E -TEXT BOOKS
1. https://www.kdnuggets.com/2020/03/24-best-free-books-understand-machine-learning.html
MOOCS COURSES
1. https://www.mooc-list.com/course/natural-language-processing-and-capstone-assignment-coursera 2. https://www.edx.org/learn/natural-language-processing. 3. https://www.udemy.com/topic/natural-language-processing/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

DEVOPS LAB

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM605PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. Describe the agile relationship between development and IT operations.
2. Understand the skill sets and high-functioning teams involved in.
3. DevOps and related methods to reach a continuous delivery capability.
4. Implement automated system update and DevOps lifecycle.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Identify components of Devops environment.
2. Apply different project management, integration, testing and code deployment tool.
3. Investigate different DevOps Software development, models.
4. Demonstrate continuous integration and development using Jenkins.

LIST OF EXPERIMENTS

1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code written in exercise 1.
4. Jenkins installation and setup, explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker
9. Automate the process of running containerized application developed in exercise 7 using Kubernetes.
10. Install and Explore Selenium for automated testing.
11. Write a simple program in JavaScript and perform testing using Selenium.
12. Develop test cases for the above containerized application using selenium.

TEXT BOOKS

1. Joakim Verona. Practical Devops, Second Edition. Ingram short title; 2nd edition (2018). ISBN-10: 1788392574
2. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952

REFERENCE BOOKS

1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley
2. EdurekaDevOps Full Course - https://youtu.be/S_0q75eD8Yc

WEB REFERENCES

1. https://en.wikibooks.org/wiki/Introduction_to_Software_Engineering

E -TEXT BOOKS

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-170-laboratory-in-software-engineering-fall-2005/

MOOCS COURSES

1. https://www.mooc-list.com/tags/software-engineering
2. https://www.coursera.org/courses?query=software%20engineering

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

INTERNET OF THINGS LAB (PE – III LAB)

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM606PE	B. Tech	0	0	3	1	30	70	100

COURSE OBJECTIVES

To learn

1. To introduce the raspberry PI platform, that is widely used in IoT applications
2. To introduce the implementation of distance sensor on IoT devices

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to introduce the concept of M2M (machine to machine) with necessary protocols and get awareness in implementation of distance sensor.
2. Get the skill to program using python scripting language which is used in many IoT devices.

LIST OF EXPERIMENTS

List of Experiments:

1. Using raspberry pi
   a. Calculate the distance using a distance sensor.
   b. Basic LED functionality.

2. Using Arduino
   a. Calculate the distance using a distance sensor.
   b. Basic LED functionality.
   c. Calculate temperature using a temperature sensor.

3. Using Node MCU
   a. Calculate the distance using a distance sensor.
   b. Basic LED functionality.
   c. Calculate temperature using a temperature sensor.

TEXT BOOKS

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759.

REFERENCE BOOKS

1. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3- 642-19156-5 e-ISBN 978-3-642-19157-2, Springer, 2016.
2. N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014

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2. https://en.wikibooks.org/wiki/Introduction_to_Software_Engineering

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1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-170-laboratory-in-software-engineering-fall-2005/

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2. https://www.coursera.org/courses?query=software%20engineering

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

DATA MINING LAB (PE – III LAB)

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM607PE	B. Tech	0	0	3	1	30	70	100

COURSE OBJECTIVES

To learn

1. Thecourseisintendedtoobtainhands-onexperienceusingdataminingsoftware.
2. Intendedtoprovidepracticalexposureoftheconceptsindataminingalgorithms

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Apply preprocessing statistical methods for any given raw data.
2. Gain practical experience of constructing a data warehouse.
3. Implement various algorithms for data mining in order to discover interesting patterns from large amounts of data.
4. Apply OLAP operations on data cube construction.

LIST OF EXPERIMENTS

Experiments using Weka&Pentaho Tools

1. Data Processing Techniques (i) Data cleaning (ii) Data transformation – Normalization(iii) Data integration
2. Partitioning - Horizontal, Vertical, Round Robin, Hash based
3. Data Warehouse schemas – star, snowflake, fact constellation
4. Data cube construction – OLAP operations
5. Data Extraction, Transformations & Loading operations
6. Implementation of Attribute oriented induction algorithm
7. Implementation of apriori algorithm
8. Implementation of FP – Growth algorithm
9. Implementation of Decision Tree Induction
10. Calculating Information gain measures
11. Classification of data using Bayesian approach
12. Classification of data using K – nearest neighbor approach
13. Implementation of K – means algorithm

14. Implementation of BIRCH algorithm
15. Implementation of PAM algorithm
16. Implementation of DBSCAN algorithm

TEXT BOOKS

1. Data Mining – Concepts and Techniques - JIAWEI HAN &MICHELINE KAMBER, Elsevier.
2. Data Warehousing, Data Mining &OLAP- Alex Berson and Stephen J. Smith- Tata McGraw-Hill Edition, Tenth reprint 2007.

REFERENCE BOOKS

1. Pang-NingTan,MichaelSteinbach,VipinKumar,AnujKarpatne,IntroductiontoDataMining ,PearsonEducation.

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1. https://en.wikibooks.org/wiki/Introduction_to_Software_Engineering

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2. https://www.coursera.org/courses?query=software%20engineering

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

SCRIPTING LANGUAGES LAB (PE – III Lab)

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM608PE	B. Tech	0	0	3	1	30	70	100

COURSE OBJECTIVES

To learn

1. To Understand the concepts of scripting languages for developing web-based projects
2. To understand the applications the of Ruby, TCL, Perl scripting languages

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to understand the differences between Scripting languages and programming languages
2. Able to gain some fluency programming in Ruby, Perl, TCL

LIST OF EXPERIMENTS

1. Write a Ruby script to create a new string which is n copies of a given string where n is a non- negative integer
2. Write a Ruby script which accept the radius of a circle from the user and compute the parameter and area.
3. Write a Ruby script which accept the user's first and last name and print them in reverse order with a space between them
4. Write a Ruby script to accept a filename from the user print the extension of that
5. Write a Ruby script to find the greatest of three numbers
6. Write a Ruby script to print odd numbers from 10 to 1
7. Write a Ruby scirpt to check two integers and return true if one of them is 20 otherwise return their sum
8. Write a Ruby script to check two temperatures and return true if one is less than 0 and the other is greater than 100
9. Write a Ruby script to print the elements of a given array
10. Write a Ruby program to retrieve the total marks where subject name and marks of a student stored in a hash
11. Write a TCL script to find the factorial of a number

12. Write a TCL script that multiplies the numbers from 1 to 10
13. Write a TCL script for Sorting a list using a comparison function
14. Write a TCL script to (i)create a list (ii)append elements to the list (iii)Traverse the list (iv)Concatenate the list
15. Write a TCL script to comparing the file modified times.
16. Write a TCL script to Copy a file and translate to native format.
17. a) Write a Perl script to find the largest number among three numbers.

    b) Write a Perl script to print the multiplication tables from 1-10 using subroutines.
18. Write a Perl program to implement the following list of manipulating functions a)Shift b)Unshift c)Push
19. a) Write a Perl script to substitute a word, with another word in a string.

    b) Write a Perl script to validate IP address and email address.
20. Write a Perl script to print the file in reverse order using command line arguments

TEXT BOOKS

1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pragmatic Programmer's guide by Dabve Thomas Second edition

REFERENCE BOOKS

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning

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1. https://en.wikibooks.org/wiki/Introduction_to_Software_Engineering

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MOOCS COURSES

1. https://www.mooc-list.com/tags/software-engineering
2. https://www.coursera.org/courses?query=software%20engineering

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

MOBILE APPLICATION DEVELOPMENT LAB (PE – III Lab)

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM609PE	B. Tech	0	0	3	1	30	70	100

COURSE OBJECTIVES

1. To learn how to develop Applications in android environment.
2. To learn how to develop user interface applications.
3. To learn how to develop URL related applications.

COURSE OUTCOMES

1. Student understands the working of Android OS Practically.
2. Student will be able to develop user interfaces.
3. Student will be able to develop, deploy and maintain the Android Applications.

LIST OF EXPERIMENTS

1. Create an Android application that shows Hello + name of the user and run it on an emulator.
   (b) Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button.
2. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use
   Linear Layout (b) Relative Layout and (c) Grid Layout or Table Layout.
3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a “Back” button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on right fragment instead of second screen with back button. Use Fragment transactions and Rotation event listener.
4. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.
5. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of

the notification.

6. Create an application that uses a text file to store user names and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login is successful. Otherwise, show the dialog with Login Failed message.
7. Create a user registration application that stores the user details in a database table.
8. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.
9. Create an admin application for the user table, which shows all records as a list and the admin can select any record for edit or modify. The results should be reflected in the table.
10. Develop an application that shows all contacts of the phone along with details like name, phone number, mobile number etc.
11. Create an application that saves user information like name, age, gender etc. in shared preference and retrieves them when the program restarts.
12. Create an alarm that rings every Sunday at 8:00 AM. Modify it to use a time picker to set alarm time.
13. Create an application that shows the given URL (from a text field) in a browser.

TEXT BOOKS

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

REFERENCE BOOKS

1. BeginningAndroid4ApplicationDevelopment, Wei-MengLee,WileyIndia(Wrox),2013.

WEB REFERENCES

1. https://en.wikibooks.org/wiki/Introduction_to_Software_Engineering

E -TEXT BOOKS

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-170-laboratory-in-software-engineering-fall-2005/

MOOCS COURSES

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

CRYPTOGRAPHY AND NETWORK SECURITY LAB (PE – III Lab)

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM610PE	B. Tech	0	0	3	1	30	70	100

COURSE OBJECTIVES

To learn

1. Explain the objectives of information security
2. Explain the importance and application of each of confidentiality, integrity, authentication and availability
3. Understand various cryptographic algorithms.

COURSE OUTCOMES

1. Understand basic cryptographic algorithms, message and web authentication and security issues.
2. Identify information system requirements for both of them such as client and server.
3. Understand the current legal issues towards information security.

LIST OF EXPERIMENTS

1. Write a C program that contains a string (char pointer) with a value ‘Hello world’. The program should XOR each character in this string with 0 and displays the result.

2. Write a C program that contains a string (char pointer) with a value ‘Hello world’. The program should AND or and XOR each character in this string with 127 and display the result.

3. Write a Java program to perform encryption and decryption using the following algorithmsCeaser cipher b. Substitution cipher c. Hill Cipher

4. Write a C/JAVA program to implement the DES algorithm logic.

5. Write a C/JAVA program to implement the Blowfish algorithm logic.

6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.
8. Write a Java program to implement RSA algorithm.
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

TEXT BOOKS

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: AtulKahate, McGraw Hill, 3rd Edition

REFERENCE BOOKS

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: ForouzanMukhopadhyay, McGraw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

WEB REFERENCES

1. https://en.wikibooks.org/wiki/Introduction_to_Software_Engineering

E -TEXT BOOKS

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MOOCS COURSES

1. https://www.mooc-list.com/tags/software-engineering
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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

ENVIRONMENTAL SCIENCE

III B. TECH- II SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
ES608BS	B. Tech	3	0	0	0	30	70	100

COURSE OBJECTIVES

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

.

COURSE OUTCOMES

1. Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I	ECOSYSTEMS	Classes: 12

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II	NATURAL RESOURCES: CLASSIFICATION OF RESOURCES	Classes: 12

Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III	BIODIVERSITY AND BIOTIC RESOURCES	Classes: 12

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV	ENVIRONMENTAL POLLUTION AND CONTROL	Classes: 14

	TECHNOLOGIES	

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V	ENVIRONMENTAL POLICY, LEGISLATION & EIA	Classes: 10

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIAstructure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS

1. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS

1. A. Aditya Prasad, S.Hemambika, A.Rambabu, “Environmental Science”, Spectrum Educational Books., Hyderabad,1st edition(2021)
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
4. Environmental Science by Daniel B. Botkin& Edward A. Keller, Wiley INDIA edition.
5. Environmental Studies by AnubhaKaushik, 4th Edition, New age international publishers.
6. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
7. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

NEURAL NETWORKS AND DEEP LEARNING

IV B. TECH- I SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AIM701PC	**B. Tech**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

1. To introduce the foundations of Artificial Neural Networks
2. To acquire the knowledge on Deep Learning Concepts
3. To learn various types of Artificial Neural Networks
4. To gain knowledge to apply optimization strategies

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to understand the concepts of Neural Networks
2. Ability to select the Learning Networks in modeling real world systems
3. Ability to use an efficient algorithm for Deep Models
4. Ability to apply optimization strategies for large scale applications

UNIT-I	**ARTIFICIAL NEURAL NETWORKS**	**Classes: 12**

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT-II	**UNSUPERVISED LEARNING NETWORK**	**Classes:12**

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT-III	INTRODUCTION TO DEEP LEARNING	Classes:12
Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms		
UNIT-IV	**REGULARIZATION FOR DEEP LEARNING**	**Classes: 12**
Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier		
UNIT-V	**OPTIMIZATION FOR TRAIN DEEP MODELS**	**Classes: 12**
Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second- Order Methods, Optimization Strategies and Meta-Algorithms Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing		
TEXT BOOKS		
1. Deep Learning: An MIT Press Book By Ian Goodfellow and YoshuaBengio and Aaron Courville 2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall.		
REFERENCE BOOKS		
1. Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning, MIT Press,2016. 2. Michael Nielsen, Neural Networks and Deep Learning, Determination Press,2015.		
WEB REFERENCES		
1. https://machinelearningmastery.com/what-is-deep-learning/ 2. https://www.coursera.org/specializations/deep-learning 3. https://towardsdatascience.com/online-deep-learning-odl-and-hedge-back-propagation-277f338a14b2		
E -TEXT BOOKS		
1. https://www.e-booksdirectory.com/listing.php?category=4		
MOOCS COURSE		
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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

REINFORCEMENT LEARNING

IV B. TECH- I SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
AIM702PC	**B. Tech**	**2**	**0**	**0**	**2**	**30**	**70**	**100**

COURSE OBJECTIVES

Knowledge on fundamentals of reinforcement learning and the methods used tocreateagentsthatcansolveavarietyofcomplextasks.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand basics of RL.
2. Understand RL Framework and Markov Decision Process.
3. Analyzing ning through the use of Dynamic Programming and Monte Carlo.
4. Understand TD(0) algorithm, TD(λ) algorithm.

UNIT-I	**ARTIFICIAL NEURAL NETWORKS**	**Classes: 12**

Basics of probability and linear algebra, Definition of a stochastic multi-armed bandit, Definition of regret, Achieving sublinear regret, UCB algorithm, KL-UCB, Thompson Sampling.

UNIT-II	**UNSUPERVISED LEARNING NETWORK**	**Classes:12**

Markov Decision Problem, policy, and value function, Reward models (infinite discounted, total, finite horizon, and average), Episodic & continuing tasks, Bellman's optimality operator, and Value iteration & policy iteration

UNIT-III	INTRODUCTION TO DEEP LEARNING	Classes:12
The Reinforcement Learning problem, prediction and control problems, Model-based algorithm, Monte Carlo methods for prediction, and Online implementation of Monte Carlo policy evaluation		
UNIT-IV	**REGULARIZATION FOR DEEP LEARNING**	**Classes: 12**
Bootstrapping; TD(0) algorithm; Convergence of Monte Carlo and batch TD(0) algorithms; Model-free control: Q-learning, Sarsa, Expected Sarsa.		
UNIT-V	**OPTIMIZATION FOR TRAIN DEEP MODELS**	**Classes: 12**
n-step returns; TD(λ) algorithm; Need for generalization in practice; Linear function approximation and geometric view; Linear TD(λ). Tile coding; Control with function approximation; Policy search; Policy gradient methods; Experience replay; Fitted Q Iteration; Case studies.		

TEXT BOOKS

1. "Reinforcementlearning:Anintroduction,"FirstEdition,Sutton,RichardS.,andAndrew G.Barto,MITpress2020.
2. "Statisticalreinforcementlearning:modernmachinelearningapproaches,"FirstEdition,Sugiyama,Masashi.CRCPress2015.

REFERENCE BOOKS

1. "Bandit algorithms," First Edition, Lattimore, T. and C. Szepesvári. Cambridge University Press. 2020.
2. "Reinforcement Learning Algorithms: Analysis and Applications," Boris Belousov, HanyAbdulsamad, Pascal Klink, Simone Parisi, and Jan Peters First Edition, Springer 2021.
3. Alexander Zai and Brandon Brown "Deep Reinforcement Learning in Action," First Edition, Manning Publications 2020.

WEB REFERENCES

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2. https://www.coursera.org/specializations/deep-learning
3. https://towardsdatascience.com/online-deep-learning-odl-and-hedge-back-propagation-277f338a14b2

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

QUANTUM COMPUTING (Professional Elective – IV)

IV B. TECH- I SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
AIM711PE	**B. Tech**	**3**	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

1. To introduce the fundamentals of quantum computing
2. The problem-solving approach using finite dimensional mathematics

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand basics of quantum computing
2. Understand physical implementation of Qubit
3. Understand Quantum algorithms and their implementation
4. Understand the Impact of Quantum Computing on Cryptography

UNIT-I	INTRODUCTION TO ESSENTIAL LINEAR ALGEBRA	Classes: 12

Introduction to Essential Linear Algebra: Some Basic Algebra, Matrix Math, Vectors and Vector Spaces, Set Theory. Complex Numbers: Definition of Complex Numbers, Algebra of Complex Numbers, Complex Numbers Graphically, Vector Representations of Complex Numbers, Pauli Matrice, Transcendental Numbers.

UNIT-II	BASIC PHYSICS FOR QUANTUM COMPUTING	Classes:12

Basic Physics for Quantum Computing: The Journey to Quantum, Quantum Physics Essentials, Basic Atomic Structure, Hilbert Spaces, Uncertainty, Quantum States, Entanglement.

Basic Quantum Theory: Further with Quantum Mechanics, Quantum Decoherence, Quantum Electrodynamics, Quantum Chromodynamics, Feynman Diagram Quantum Entanglement and QKD, Quantum Entanglement, Interpretation, QKE.

UNIT-III	QUANTUM ARCHITECTURE	Classes:12
Quantum Architecture: Further with Qubits, Quantum Gates, More with Gates, Quantum Circuits, The D-Wave Quantum Architecture. Quantum Hardware: Qubits, How Many Qubits Are Needed? Addressing Decoherence, Topological Quantum Computing, Quantum Essentials.		
UNIT-IV	**QUANTUM ALGORITHMS**	**Classes: 12**
Quantum Algorithms: What Is an Algorithm? Deutsch's Algorithm, Deutsch-Jozsa Algorithm, Bernstein-Vazirani Algorithm, Simon's Algorithm, Shor's Algorithm, Grover's Algorithm.		
UNIT-V	**CURRENT ASYMMETRIC ALGORITHMS**	**Classes: 12**
Current Asymmetric Algorithms: RSA, Diffie-Hellman, Elliptic Curve. The Impact of Quantum Computing on Cryptography: Asymmetric Cryptography, Specific Algorithms, Specific Applications.		

TEXT BOOKS

1. NielsenM.A.,QuantumComputationandQuantumInformation,CambridgeUniversityPress
2. Dr.ChuckEasttom,QuantumComputingFundamentals,Pearson

REFERENCE BOOKS

1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol. Basic Concepts. Vol. Basic Tools and Special Topics, World Scientific.
3. Pittenger A. O., An Introduction to Quantum Computing Algorithms.

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2. https://www.coursera.org/specializations/deep-learning
3. https://towardsdatascience.com/online-deep-learning-odl-and-hedge-back-propagation-277f338a14b2

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

EXPERT SYSTEMS (Professional Elective – IV)

IV B. TECH- I SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AIM712PE	**B. Tech**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

To learn

1. Understand the basic techniques of artificial intelligence.
2. Understand the Non-monotonic reasoning and statistical reasoning.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Apply the basic techniques of artificial intelligence.
2. Discuss the architecture of an expert system and its tools.
3. Understand the importance of building an expert systems.
4. Understand various problems with an expert systems.

UNIT-I	**INTRODUCTION TO AI PROGRAMMING LANGUAGES**	**Classes: 12**

Introduction to AI programming languages, Blind search strategies, Breadth-first – Depth-first – Heuristic search techniques Hill Climbing – Best first – A Algorithms AO* algorithm – game tress, Min- max algorithms, game playing – Alpha-beta pruning.

UNIT-II	**KNOWLEDGE REPRESENTATION**	**Classes:12**

Knowledge representation issues predicate logic – logic programming Semantic nets- frames and inheritance, constraint propagation; Representing Knowledge using rules, Rules-based deduction systems.

UNIT-III	INTRODUCTION TO EXPERT SYSTEMS	Classes:12
Introduction to Expert Systems, Architecture of expert systems, Representation and organization of knowledge, Basics characteristics, and types of problems handled by expert systems.		
UNIT-IV	**EXPERT SYSTEM TOOLS**	**Classes: 12**
Expert System Tools: Techniques of knowledge representations in expert systems, knowledge engineering, system-building aids, support facilities, stages in the development of expert systems.		
UNIT-V	**BUILDING AN EXPERT SYSTEM**	**Classes: 12**
Building an Expert System: Expert system development, Selection of the tool, Acquiring Knowledge, Building process. Problems with Expert Systems: Difficulties, common pitfalls in planning, dealing with domain experts, difficulties during development.		

TEXT BOOKS

1. ElainRichandKevinKnight,"ArtificialIntelligence",TataMcGraw-Hill,NewDelhi.
2. WatermanD.A.,"AGuidetoExpertSystems",AddisonWesleyLongman.

REFERENCE BOOKS

1. Stuart Russel and other Peter Norvig, "Artificial Intelligence – A Modern Approach", Prentice- Hall.
2. Patrick Henry Winston, "Artificial Intelligence", Addison Wesley.
3. Patterson, Artificial Intelligence & Expert System, Prentice Hall India, 1999.
4. Hayes-Roth, Lenat, and Waterman: Building Expert Systems, Addison Wesley.
5. Weiss S.M. and Kulikowski C.A., "A Practical Guide to Designing Expert Systems", Rowman&Allanheld, New Jersey.

WEB REFERENCES

1. https://machinelearningmastery.com/what-is-deep-learning/
2. https://www.coursera.org/specializations/deep-learning
3. https://towardsdatascience.com/online-deep-learning-odl-and-hedge-back-propagation-277f338a14b2

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

CLOUD COMPUTING (PROFESSIONAL ELECTIVE – IV)

IV B. TECH- I SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
AIM713PE	**B. Tech**	**3**	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

1. This course provides an insight into cloud computing
2. Topics covered include- distributed system models, different cloud service models, service- oriented architectures, cloud programming and software environments, resource management.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to understand various service delivery models of a cloud computing architecture.
2. Ability to understand the ways in which the cloud can be programmed and deployed.
3. Understanding cloud service providers

UNIT-I	**COMPUTING PARADIGMS**	**Classes: 12**

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT-II	**CLOUD COMPUTING FUNDAMENTALS**	**Classes:12**

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

UNIT-III	CLOUD COMPUTING ARCHITECTURE AND MANAGEMENT	Classes:12
Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.		
UNIT-IV	**CLOUD SERVICE MODELS**	**Classes: 12**
Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.		
UNIT-V	**CLOUD SERVICE PROVIDERS**	**Classes: 12**
Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform		

TEXT BOOKS

1. Essentialsof cloudComputing:K.Chandrasekhran,CRCpress,2014

REFERENCE BOOKS

1. Cloud Computing: Principles and Paradigms by RajkumarBuyya, James Broberg and Andrzej
2. M. Goscinski, Wiley, 2011.
3. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
4. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, SubraKumaraswamy, ShahedLatif, O'Reilly, SPD, rp 2011.

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2. https://www.coursera.org/specializations/deep-learning
3. https://towardsdatascience.com/online-deep-learning-odl-and-hedge-back-propagation-277f338a14b2

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

GAME THEORY (Professional Elective – IV)

IV B. TECH- I SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
AIM714PE	**B. Tech**	**3**	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

The course will explain in depth the standard equilibrium concepts (such as Nash equilibrium, Subgame-Perfect Nash Equilibrium, and others) in Game Theory.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the basic concepts of game theory and solutions
2. Understand different types of equilibrium interpretations
3. Understand and analyze knowledge and solution concepts
4. Analyze extensive games with perfect information

UNIT-I	INTRODUCTION- GAME THEORY	Classes: 12

Introduction- Game Theory, Games and Solutions Game Theory and the Theory of Competitive Equilibrium, Rational Behavior, The Steady State and Deductive Interpretations, Bounded Rationality Terminology and Notation. Nash Equilibrium- Strategic Games, Nash Equilibrium Examples Existence of a Nash Equilibrium, Strictly Competitive Games, Bayesian Games: Strategic Games with Imperfect Information.

UNIT-II	MIXED, CORRELATED, AND EVOLUTIONARY EQUILIBRIUM	Classes:12

Mixed, Correlated, and Evolutionary Equilibrium - Mixed Strategy Nash Equilibrium, Interpretations of Mixed Strategy Nash Equilibrium, Correlated Equilibrium, Evolutionary Equilibrium, Rationalizability and Iterated Elimination of Dominated Actions - Rationalizability Iterated Elimination of Strictly Dominated Actions, Iterated Elimination of Weakly Dominated Actions.

UNIT-III	KNOWLEDGE AND EQUILIBRIUM	Classes:12
Knowledge and Equilibrium -A Model of Knowledge Common Knowledge, Can People Agree to Disagree? Knowledge and Solution Concepts, The Electronic Mail Game		
UNIT-IV	**EXTENSIVE GAMES WITH PERFECT INFORMATION**	**Classes: 12**
Extensive Games with Perfect Information -Extensive Games with Perfect Information Subgame Perfect Equilibrium Two Extensions of the Definition of a Game The Interpretation of a Strategy, Two Notable Finite Horizon Games, Iterated Elimination of Weakly Dominated, Strategies Bargaining Games - Bargaining and Game Theory, A Bargaining Game of Alternating Offers Subgame Perfect Equilibrium Variations and Extensions.		
UNIT-V	**REPEATED GAMES**	**Classes: 12**
Repeated Games - The Basic Idea Infinitely Repeated Games vs.\ Finitely Repeated Games, Infinitely Repeated Games: Definitions Strategies as Machines Trigger Strategies: Nash Folk, Theorems Punishing for a Limited Length of Time: A Perfect Folk Theorem for the Limit of Means Criterion Punishing the Punisher: A Perfect Folk Theorem for the Overtaking Criterion, Rewarding Players Who Punish: A Perfect Folk Theorem for the Discounting Criterion The Structure of Subgame Perfect Equilibria Under the Discounting Criterion Finitely Repeated Game.		

TEXT BOOKS

1. AcourseinGameTheory,M.J.OsborneandA.Rubinstein,MITPress
2. GameTheory,RogerMyerson,HarvardUniversityPress
3. GameTheory, D.FudenbergandJ.Tirole,MITPress

REFERENCE BOOKS

1. Theory of Games and Economic Behavior, J. von Neumann and O. Morgenstern, New York: John Wiley and Sons.
2. Games and Decisions, R.D. Luce and H. Raiffa, New York: John Wiley and Sons.
3. Game Theory, G. Owen, 2nd Edition, New York: Academic Press.

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2. https://www.coursera.org/specializations/deep-learning
3. https://towardsdatascience.com/online-deep-learning-odl-and-hedge-back-propagation-277f338a14b2

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

MOBILE COMPUTING (Professional Elective – IV)

IV B. TECH- I SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
AIM715PE	**B. Tech**	**3**	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

To make the student understand the concept of mobile computing paradigm, its novel applications and limitations, the typical mobile networking infrastructure through a popular GSM protocol, the issues and solutions of various layers of mobile networks.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the concept of mobile computing paradigm, its novel applications and limitations.
2. Analyze and develop new mobile applications
3. Understand the protocols and platforms related to mobile environment
4. Classify data delivery mechanisms

UNIT-I	INTRODUCTION	Classes: 12

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.

UNIT-II	MEDIUM ACCESS CONTROL	Classes:12

(Wireless) Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT-III	MOBILE TRANSPORT LAYER	Classes:12
Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks. Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process &QoS Issues.		
UNIT-IV	**DATA DISSEMINATION AND SYNCHRONIZATION**	**Classes: 12**
Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols		
UNIT-V	**MOBILE AD HOC NETWORKS**	**Classes: 12**
Mobile Ad hoc Networks (MANETs): Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, Mobile Agents, Service Discovery. Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, JavaCard, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices, Android.		

TEXT BOOKS

1. JochenSchiller,"MobileCommunications",Addison-Wesley,SecondEdition,2009.
2. RajKamal,"MobileComputing",OxfordUniversityPress,2007,ISBN:0195686772

REFERENCE BOOKS

3. Asoke K Talukder, Hasan Ahmed, RoopaYavagal Mobile Computing: Technology, Applications and Service Creation, McGraw Hill Education.

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1. https://machinelearningmastery.com/what-is-deep-learning/
2. https://www.coursera.org/specializations/deep-learning
3. https://towardsdatascience.com/online-deep-learning-odl-and-hedge-back-propagation-277f338a14b2

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

SOCIAL NETWORK ANALYSIS (Professional Elective – V)

IV B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM721PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. It introduces the concepts of social media.
2. It provides the mechanisms for social network analysis.
3. Includes the concepts that allow for better visualization and analysis of widely used services such as email, Wikis, Twitter, flickr, YouTube, etc.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to construct social network maps easily.
2. Gain skills in tracking the content flow through the social media.
3. Use NodeXL to perform social network analysis.

UNIT-I	INTRODUCTION	Classes: 12

Introduction: Social Media and Social Networks. Social Media: New Technologies of Collaboration.

Social Network Analysis: Measuring, Mapping, and Modeling collections of Connections.

UNIT-II	NodeXL	Classes:12

NodeXL, Layout, Visual Design, and Labeling, Calculating and Visualizing Network Metrics, Preparing Data and Filtering, Clustering and Grouping.

UNIT-III	CASE STUDIES - I	Classes:12
CASE STUDIES - I: Email: The lifeblood of Modern Communication. Thread Networks: Mapping Message Boards and Email Lists. Twitter: Conversation, Entertainment and Information.		
UNIT-IV	**CASE STUDIES - II**	**Classes: 12**
CASE STUDIES - II: Visualizing and Interpreting Facebook Networks, WWW Hyperlink Networks		
UNIT-V	**CASE STUDIES - III**	**Classes: 12**
CASE STUDIES - III: You Tube: Contrasting Patterns of Content Interaction, and Prominence. Wiki Networks: Connections of Creativity and Collaboration		

TEXT BOOKS

1. Hansen,Derek,BenSheiderman,MarcSmith,AnalyzingSocialMediaNetworkswithNodeXL:InsightsfromaConnectedWorld, MorganKaufmann,2011.
2. AvinashKaushik,WebAnalytics2.0:TheArtofOnlineAccountability,Sybex,2009.

REFERENCE BOOKS

1. Marshall Sponder, Social Media Analytics: Effective Tools for Building, Interpreting and Using Metrics, 1st Edition, MGH, 2011.

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3. https://towardsdatascience.com/online-deep-learning-odl-and-hedge-back-propagation-277f338a14b2

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

FEDERATED MACHINE LEARNING (Professional Elective – V)

IV B. TECH- I SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
AIM722PE	**B. Tech**	**3**	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

To learn

1. Understand the key concepts and issues behind Federated Learning
2. Get familiar with key theoretical results of Federated Learning

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Knowledge of the basic concepts, architecture, and applications of FL.
2. Understanding of new research and application trends in FL.
3. Analyze horizontal federated learning
4. Understand the significanceofFederated Learning for Vision, Language,and Recommendation

UNIT-I	INTRODUCTION	Classes: 12

Introduction: Motivation, Federated Learning as a Solution, The Definition of Federated Learning, Categories of Federated Learning, Current Development in Federated Learning, Research Issues in Federated Learning, Open-Source Projects, Standardization Efforts, The Federated AI Ecosystem Background: Privacy-Preserving Machine Learning, PPML and Secure ML, Threat and Security Models, Privacy Threat Models, Adversary and Security Models, Privacy Preservation Techniques, Secure Multi-Party Computation, Homomorphic Encryption, Differential Privacy.

UNIT-II	DISTRIBUTED MACHINE LEARNING	Classes:12

Distributed Machine Learning: Introduction to DML, The Definition of DML, DML Platforms, Scalability- Motivated DML, Large-Scale Machine Learning, Scalability-Oriented DML Schemes, Privacy-Motivated DML, Privacy-Preserving Decision Trees, Privacy-Preserving Techniques, Privacy-Preserving DML Schemes, Privacy-Preserving Gradient Descent, Vanilla Federated Learning, Privacy-Preserving Methods.

UNIT-III	HORIZONTAL FEDERATED LEARNING	Classes:12

Horizontal Federated Learning: The Definition of HFL, Architecture of HFL, The Client- Server Architecture, The Peer-to-Peer Architecture, Global Model Evaluation, The Federated Averaging Algorithm, Federated Optimization, The FedAvg Algorithm, The Secured FedAvg Algorithm, Improvement of the FedAvg Algorithm, Communication Efficiency, Client Selection Vertical Federated Learning: The Definition of VFL, Architecture of VFL, Algorithms of VFL, Secure Federated Linear Regression, Secure Federated Tree-Boosting.

UNIT-IV	FEDERATED TRANSFER LEARNING	Classes: 12

Federated Transfer Learning: Heterogeneous Federated Learning, Federated Transfer Learning, The FTL Framework, Additively Homomorphic Encryption, The FTL Training Process, The FTL Prediction Process, Security Analysis, Secret Sharing-Based FTL Incentive Mechanism Design for Federated Learning: Paying for Contributions, Profit-Sharing Games, Reverse Auctions, A Fairness-Aware Profit Sharing Framework, Modeling Contribution, Modeling Cost, Modeling Regret, Modeling Temporal Regret, The Policy Orchestrator, Computing Payoff Weightage.

UNIT-V	FEDERATED LEARNING FOR VISION	Classes: 12

Federated Learning for Vision, Language, and Recommendation: Federated Learning for Computer Vision, Federated CV, Federated Learning for NLP, Federated NLP, Federated Learning forRecommendation Systems, Recommendation Model, Federated Recommendation System Federated Reinforcement Learning: Introduction to Reinforcement Learning, Policy, Reward, Value Function, Model of the Environment, RL Background Example, Reinforcement Learning Algorithms, Distributed Reinforcement Learning, Asynchronous Distributed Reinforcement Learning, Synchronous Distributed Reinforcement Learning, Federated Reinforcement Learning, Background and Categorization

TEXT BOOKS

1. FederatedLearning, QiangYang,YangLiu,Yong Cheng,YanKang,TianjianChen,andHanYu-SynthesisLectures onArtificialIntelligenceandMachine Learning2019.

REFERENCE BOOKS

1. FederatedLearning, QiangYang, YangLiu, YongCheng, YanKang, TianjianChen, and HanYu-Synthesis Lectures on Artificial Intelligence and Machine Learning2019.

WEB REFERENCES

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2. https://www.coursera.org/specializations/deep-learning
3. https://towardsdatascience.com/online-deep-learning-odl-and-hedge-back-propagation-277f338a14b2

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

AUGMENTED REALITY AND VIRTUAL REALITY (Professional Elective – V)

IV B. TECH- I SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
AIM723PE	**B. Tech**	**3**	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

To learn

1. The objective of this course is to provide a foundation to the fast-growing field of AR and make the students aware of the various AR devices.
2. To give historical and modern overviews and perspectives on virtual reality. It describes the fundamentals of sensation, perception, technical and engineering aspects of virtual reality systems.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Describe how AR systems work and list the applications of AR.
2. Understand and analyze the hardware requirement of AR.
3. Describe how VR systems work and list the applications of VR.
4. Understand the design and implementation of the hardware that enables VR systems tobe built.

UNIT-I	INTRODUCTION TO AUGMENTED REALITY	Classes: 12

Introduction to Augmented Reality: What Is Augmented Reality - Defining augmented reality, history of augmented reality, The Relationship Between Augmented Reality and Other Technologies-Media, Technologies, Other Ideas Related to the Spectrum Between Real and Virtual Worlds, applications of augmented reality Augmented Reality Concepts-How Does Augmented Reality Work? Concepts Related to Augmented Reality, Ingredients of an Augmented Reality Experience.

UNIT-II	AR DEVICES & COMPONENTS	Classes:12

AR Devices & Components: AR Components – Scene Generator, Tracking system, monitoring system, display, Game scene. AR Devices – Optical See- Through HMD, Virtual retinal systems, Monitor bases systems, Projection displays, Video see-through systems.

UNIT-III	INTRODUCTION TO VIRTUAL REALITY	Classes:12
Introduction to Virtual Reality: Defining Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays, Applications of Virtual Reality		
UNIT-IV	**REPRESENTING THE VIRTUAL WORLD**	**Classes: 12**
Representing the Virtual World: Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR, Case Study: GHOST (General Haptics Open Software Toolkit) software development toolkit.		
UNIT-V	**VISUAL PERCEPTION & RENDERING**	**Classes: 12**
Visual Perception & Rendering: Visual Perception - Perception of Depth, Perception of Motion, Perception of Color, Combining Sources of Information, Visual Rendering -Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates.		

TEXT BOOKS

1. Allan Fowler-AR Game Development‖, 1st Edition, A press Publications, 2018, ISBN 978-1484236178
2. Augmented Reality: Principles & Practice by Schmalstieg / Hollerer, Pearson Education India;Firstedition(12October2016),ISBN-10:9332578494

REFERENCE BOOKS

1. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016.
2. Understanding Virtual Reality: Interface, Application and Design, William R Sherman andAlan B Craig, (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002.
3. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig,William R Sherman and Jeffrey D Will, Morgan Kaufmann, 2009.
4. Designing for Mixed Reality, Kharis O'Connell Published by O'Reilly Media, Inc., 2016, ISBN: 9781491962381.
5. SanniSiltanen- Theory and applications of marker-based augmented reality. Julkaisija – Utgivare Publisher. 2012. ISBN 978-951-38-7449-0.
6. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.

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1. https://machinelearningmastery.com/what-is-deep-learning/
2. https://www.coursera.org/specializations/deep-learning
3. https://towardsdatascience.com/online-deep-learning-odl-and-hedge-back-propagation-277f338a14b2

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

WEB SECURITY (Professional Elective – V)

IV B. TECH- I SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
AIM724PE	**B. Tech**	**3**	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

To learn

1. Give an Overview of information security
2. Give an overview of Access control of relational databases

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the Web architecture and applications
2. Understand client side and service side programming
3. Understand how common mistakes can be bypassed and exploit the application
4. Identify common application vulnerabilities

UNIT-I	**WEB SECURITY**	**Classes: 12**

The Web Security, The Web Security Problem, Risk Analysis and Best Practices.

Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification.

UNIT-II	**WEB SERVER SECURITY**	**Classes:12**

The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications.

UNIT-III	DATABASE SECURITY	Classes:12
Database Security: Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems.		
UNIT-IV	**SECURITY RE-ENGINEERING FOR DATABASES**	**Classes: 12**
Security Re-engineering for Databases: Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities and Future Trends.		
UNIT-V	**PRIVACY IN DATABASE PUBLISHING**	**Classes: 12**
Privacy in Database Publishing: A Bayesian Perspective, Privacy-enhanced Location-based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment.		

TEXT BOOKS

1. WebSecurity,PrivacyandCommerceSimsonGArfinkel,GeneSpafford,O'Reilly.
2. HandbookonDatabasesecurityapplicationsandtrendsMichaelGertz,SushilJajodia

REFERENCE BOOKS

1. Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning, MIT Press,2016.
2. Michael Nielsen, Neural Networks and Deep Learning, Determination Press,2015.

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2. https://www.coursera.org/specializations/deep-learning
3. https://towardsdatascience.com/online-deep-learning-odl-and-hedge-back-propagation-277f338a14b2

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

AD-HOC & SENSOR NETWORKS (Professional Elective - V)

IV B. TECH- I SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
AIM725PE	**B. Tech**	**3**	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

To learn

1. To understand the concepts of sensor networks.
2. To understand the MAC and transport protocols for ad hoc networks.
3. To understand the security of sensor networks.
4. To understand the applications of adhoc and sensor networks

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks.
2. Ability to solve the issues in real-time application development based on ASN.
3. Ability to conduct further research in the domain of ASN.

UNIT-I	INTRODUCTION TO AD HOC NETWORKS	Classes: 12

Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.

Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topology- based routing algorithms-Proactive: DSDV; Reactive: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-Location Services-DREAM, Quorum-based; Forwarding Strategies: Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

UNIT-II	DATA TRANSMISSION	Classes:12

Data Transmission - Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR.

UNIT-III	GEOCASTING	Classes:12
Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR. TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc		
UNIT-IV	**BASICS OF WIRELESS**	**Classes: 12**
Basics of Wireless, Sensors and Lower Layer Issues: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.		
UNIT-V	**UPPER LAYER ISSUES OF WSN**	**Classes: 12**
Upper Layer Issues of WSN: Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.		

TEXT BOOKS

1. AdHocandSensorNetworks–TheoryandApplications,CarlosCorderioDharmaP.Aggarwal,WorldScientificPublications,March2006,ISBN–981–256–681–3.
2. WirelessSensorNetworks:AnInformationProcessingApproach,FengZhao,Leonidas Guibas,ElsevierScience,ISBN–978-1-55860-914-3(MorganKauffman).

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1. AdHoc and SensorNetworks–Theory and Applications, Carlos Corderio Dharma P.Aggarwal, WorldScientificPublications,March2006,ISBN–981–256–681–3.

WirelessSensorNetworks:AnInformationProcessingApproach,FengZhao,LeonidasGuibas,ElsevierScience,ISBN–978-1-55860-914-3(MorganKauffman).

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING(AI & ML)

INTRODUCTION TO NATURAL LANGUAGE PROCESSING (Open Elective - II)

IV B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM716OE	B. Tech	0	0	0	3	30	70	100

COURSE OBJECTIVES

- Introduction to some of the problems and solutions of NLP and their relation to linguistics andstatistics.

COURSE OUTCOMES

- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
- Able to manipulate probabilities, construct statistical models over strings and trees, andestimate parameters using supervised and unsupervised training methods.
- Able to design, implement, and analyze NLP algorithms Able to design different languagemodeling Techniques.
- Able to design different language modeling Techniques.

UNIT-I	FINDING THE STRUCTURE OF WORDS	Classes: 13

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models.
Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches.

UNIT-II	SYNTAX ANALYSIS:	Classes: 12

Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms.

UNIT-III	SEMANTIC PARSING:	Classes: 12

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems.

UNIT-IV	PREDICATE-ARGUMENT STRUCTURE	Classes: 12

Predicate-Argument Structure, Meaning Representation Systems

UNIT-V	LANGUAGE MODELING	Classes: 13

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, bayesian parameterestimation, Language Model Adaptation, Language Models- class based, variable length, bayesian topic based, Multilingual and Cross Lingual Language Modeling.

TEXT BOOKS

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M.Bikel and Imed Zitouni, Pearson Publication

REFERENCE BOOKS

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, PearsonPublications
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

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2. https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing-NLP
3. tutorialspoint.com/artificial_intelligence/artificial_intelligence_natural_language_processing.htm

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2. https://www.london.ac.uk/sites/default/files/study-guides/introduction-to-natural-language-processing.pdf

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2. https://www.udemy.com/topic/natural-language-processing/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING(AI & ML)

AI APPLICATIONS (Open Elective - II)

IV B. TECH- I SEMESTER

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM717OE	B. Tech	0	0	0	3	30	70	100

COURSE OBJECTIVES

- To give deep knowledge of AI and how AI can be applied in various fields to makelife easy.

COURSE OUTCOMES

After completion of course, students would be able to:

- To correlate AI and solutions to modern problems.
- To decide when to use which type of AI technique.
- Understand Robotic Processes Automation
- Analyze AI-Optimized Hardware

UNIT-I	LINGUISTIC ASPECTS OF NATURAL LANGUAGE PROCESSING	Classes: 13

Linguistic aspects of natural language processing, A.I. And Quantum Computing, Applications ofArtificial Intelligence (AI) in business.

UNIT-II	EMOTION RECOGNITION USING HUMAN FACE AND BODY LANGUAGE	Classes: 12

Emotion Recognition using human face and body language, AI based system to predict diseases early,Smart Investment analysis, AI in Sales and Customer Support.

UNIT-III	ROBOTIC PROCESSES AUTOMATION	Classes: 12

Robotic Processes Automation for supply chain management.

UNIT-IV	AI-OPTIMIZED HARDWARE	Classes: 12

AI-Optimized Hardware, Digital Twin i.e. AI Modeling, Information Technology & Security using AI.

UNIT-V	RECENT TOPICS IN AI/ML	Classes: 13

Recent Topics in AI/ML: AI/ML in Smart solutions, AI/ML in Social Problems handling, Block chain andAI.

TEXT BOOKS

1. Sameer Dhanrajani, AI and Analytics, Accelerating Business Decisions, John Wiley & Sons.
2. Artificial Intelligence in Practice: How 50 Successful Companies Used AI and Machine Learning to Solve Problems, Bernard Marr, Matt Ward, Wiley.

REFERENCE BOOKS

1. Life 3.0: Being Human in the Age of Artificial Intelligence by Max Tegmark, 2018.
2. Homo Deus: A Brief History of Tomorrow by Yuval Noah Harari, 2017.

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2. https://link.springer.com/book/10.1007/978-3-030-60032-7

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2. https://www.amazon.in/Data-Analytics-AI-Applications-ebook/dp/B08D2R7K84

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

DEEP LEARNING LAB

IV B. TECH- I SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM703PC	B. Tech	0	0	2	1	30	70	100

COURSE OBJECTIVES

1. Toimplement the basic machine learning techniques.
2. To implement the convolution neural network architecture.
3. To solve the challenging research problems in the area of Speech and Image processing.

COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. Understand the basic concepts of machine learning.
2. Devise and implement the classification, clustering and regression algorithms.
3. Implement the deep learning architectures.
4. Design and implement methods for solving real life problems using a suitable machine learning technique.
5. Apply the machine learning algorithms in real life problems.

LIST OF EXPERIMENTS

1. Setting up the Spyder IDE Environment and Executing a Python Program
2. Installing Keras, Tensorflow and Pytorch libraries and making use of them
3. Applying the Convolution Neural Network on computer vision problems
4. Image classification on MNIST dataset (CNN model with Fully connected layer)
5. Applying the Deep Learning Models in the field of Natural Language Processing
6. Train a sentiment analysis model on IMDB dataset, use RNN layers with LSTM/GRU notes
7. Applying the Autoencoder algorithms for encoding the real-world data
8. Applying Generative Adversial Networks for image generation and unsupervised tasks.

TEXT BOOKS

1. DeepLearningbyIanGoodfellow,YoshuaBengioandAaronCourville,MITPress.
2. TheElementsofStatisticalLearningbyT.Hastie,R.Tibshirani,andJ.Friedman,Springer.
3. ProbabilisticGraphicalModels.Koller,andN.Friedman,MITPress.

REFERENCE BOOKS

1. Bishop, C.M., Pattern Recognition and Machine Learning, Springer, 2006.
2. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
3. Golub, G.H., and Van Loan, C.F., Matrix Computations, JHU Press, 2013.
4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw Hill Education, 2004.

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

ORGANIZATIONAL BEHAVIOUR

IV B. TECH- II SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
SM801MS	**B. Tech**	**3**	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

The objective of the course is to provide the students with the conceptual framework and the theories underlying Organizational Behaviour

.COURSE OUTCOMES

1. Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.
2. Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.
3. Analyze the complexities associated with management of the group behavior in the organization.
4. Demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization

UNIT-I	INTRODUCTION TO OB	Classes: 12

Introduction to OB - Definition, Nature and Scope – Environmental and organizational context – Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organizational Behaviour. Cognitive Processes-I: Perception and Attribution: Nature and importance of Perception – Perceptual selectivity and organization – Social perception – Attribution Theories – Locus of control –Attribution Errors –Impression Management.

UNIT-II	COGNITIVE PROCESSES-II	Classes:12

Cognitive Processes-II: Personality and Attitudes – Personality as a continuum – Meaning of personality

- Johari Window and Transactional Analysis - Nature and Dimension of Attitudes – Job satisfaction and organizational commitment-Motivational needs and processes- Work-Motivation Approaches Theories of Motivation- Motivation across cultures - Positive organizational behaviour: Optimism – Emotional intelligence – Self-Efficacy.

UNIT-III	DYNAMICS OF OB-I	Classes:12
Dynamics of OB-I: Communication – types – interactive communication in organizations – barriers to communication and strategies to improve the follow of communication - Decision Making: Participative decision-making techniques – creativity and group decision making. Dynamics of OB –II Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra- individual conflict - strategies to cope with stress and conflict.		
UNIT-IV	**DYNAMICS OF OB –III**	**Classes: 12**
Dynamics of OB –III Power and Politics: Meaning and types of power – empowerment - Groups Vs. Teams – Nature of groups – dynamics of informal groups – dysfunctions of groups and teams – teams in modern work place.		
UNIT-V	**LEADING HIGH PERFORMANCE**	**Classes: 12**
Leading High performance: Job design and Goal setting for High performance- Quality of Work Life- Socio technical Design and High-performance work practices - Behavioural performance management: reinforcement and punishment as principles of Learning –Process of Behavioural modification - Leadership theories - Styles, Activities and skills of Great leaders.		

TEXT BOOKS

1. Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
2. McShane: Organizational Behaviour, 3e, TMH, 2008

REFERENCE BOOKS

1. Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
2. McShane: Organizational Behaviour, 3e, TMH, 2008
3. Nelson: Organizational Behaviour, 3/e, Thomson, 2008.
4. Newstrom W. John & Davis Keith, OrganisationalBehaviour-- Human Behaviour at Work, 12/e, TMH, New Delhi, 2009.
5. Pierce and Gardner: Management and OrganisationalBehaviour: An Integrated perspective, Thomson, 2009.
6. Robbins, P. Stephen, Timothy A. Judge: OrganisationalBehaviour, 12/e, PHI/Pearson, New Delhi, 2009.
7. PareekUdai: Behavioural Process at Work: Oxford & IBH, New Delhi, 2009.
8. Schermerhorn: Organizational Behaviour 9/e, Wiley, 2008.
9. Hitt: Organizational Behaviour, Wiley, 2008.

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2. https://www.coursera.org/specializations/deep-learning
3. https://towardsdatascience.com/online-deep-learning-odl-and-hedge-back-propagation-277f338a14b2

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

SPEECH AND VIDEO PROCESSING (Professional Elective – VI)

IV B. TECH- II SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
AIM811PE	**B. Tech**	**3**	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

Knowledge on speech and video processing techniques

COURSE OUTCOMES

1. Describe the mechanisms of human speech production systems and methods for speech feature extraction.
2. Understand basic algorithms of speech analysis and speech recognition.
3. Explain basic techniques in digital video processing, including imaging characteristics and sensors.
4. Apply motion estimation and object tracking algorithms on video sequence.

UNIT-I	**SPEECH PROCESSING CONCEPTS**	**Classes: 12**

Speech processing concepts: The speech production mechanism, Discrete time speech signals, Pole-Zero modeling of speech, relevant properties of the fast Fourier transform for speech recognition, convolution, linear and nonlinear filter banks, spectral estimation of speech using DFT. Linear Prediction analysis of speech.

UNIT-II	**SPEECH RECOGNITION**	**Classes:12**

Speech recognition: Real and Complex Cepstrum, application of cepstral analysis to speech signal, feature extraction for speech, static and dynamic feature for speech recognition, robustness issues, discrimination in the feature space, feature selection, MFCC, LPCC, Distance measures, vector quantization models. Gaussian Mixture model, HMM.

UNIT-III	BASICS OF VIDEO PROCESSING	Classes:12
Basics of Video Processing: Video formation, perception and representation: Principle of color video, video cameras, video display, pinhole model, CAHV model, Camera motion, Shape model, motion model, Scene model, two-dimensional motion models. Three-Dimensional Rigid Motion, Approximation of projective mapping.		
UNIT-IV	**MOTION ESTIMATION TECHNIQUES**	**Classes: 12**
Motion estimation Techniques: Optical flow, motion representation, motion estimation criteria, optimization methods, pixel-based motion estimation, Block matching algorithm, gradient Based, Intensity matching, feature matching, frequency domain motion estimation, Depth from motion. Motion analysis applications: Video Summarization, video surveillance.		
UNIT-V	**OBJECT TRACKING AND SEGMENTATION**	**Classes: 12**
object tracking and segmentation: 2D and 3D video tracking, blob tracking, kernel based counter tracking, feature matching, filtering Mosaicing, video segmentation, mean shift based, active shape model, video shot boundary detection. Interframe compression, Motion compensation		

TEXT BOOKS

1. FundamentalsofSpeechrecognition– L.RabinerandB.Juang,PrenticeHallsignalprocessingseries.
2. DigitalVideoprocessing,AMuratTekalp,PrenticeHall.
3. Discrete-timespeechsignalprocessing:principlesandpractice,ThomasF.Quatieri,Coth.
4. VideoProcessingandCommunications,YaoWang,J.OsternannandQinZhang,Pearsoneducation.

REFERENCE BOOKS

1. "Speech and Audio Signal Processing", B.Gold and N. Morgan, Wiley.
2. "Digital image sequence processing, Compression, and analysis", Todd R. Reed, CRC Press.
3. "Handbook of Image and Video processing", Al Bovik, Academic press, second Edition

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1. https://machinelearningmastery.com/what-is-deep-learning/
2. https://www.coursera.org/specializations/deep-learning
3. https://towardsdatascience.com/online-deep-learning-odl-and-hedge-back-propagation-277f338a14b2

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

ROBOTIC PROCESS AUTOMATION (Professional Elective – VI)

IV B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM812PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

Aim of the course is to make learners familiar with the concepts of Robotic ProcessAutomation.

COURSE OUTCOMES

1. Describe RPA, where it can be applied and how it's implemented.
2. Identify and understand Web Control Room and Client Introduction.
3. Understand how to handle various devices and the workload.
4. Understand Bot creators, Web recorders and task editors.

UNIT-I	INTRODUCTION TO ROBOTIC	Classes: 12

Introduction to Robotic Process Automation & Bot Creation Introduction to RPA and Use cases – Automation Anywhere Enterprise Platform – Advanced features and capabilities – Ways to create Bots.

UNIT-II	WEB CONTROL ROOM AND CLIENT INTRODUCTION	Classes:12

Web Control Room and Client Introduction - Features Panel - Dashboard (Home, Bots, Devices, Audit, Workload, Insights) - Features Panel – Activity (View Tasks in Progress and Scheduled Tasks) - Bots (View Bots Uploaded and Credentials).

UNIT-III	VIEW DEVELOPMENT AND RUNTIME CLIENTS	Classes:12
Devices (View Development and Runtime Clients and Device Pools) - Workload (Queues and SLA Calculator) - Audit Log (View Activities Logged which are associated with Web CR) - Administration (Configure Settings, Users, Roles, License and Migration) - Demo of Exposed API's – Conclusion – Client introduction and Conclusion.		
UNIT-IV	**BOT CREATOR INTRODUCTION**	**Classes: 12**
Bot Creator Introduction – Recorders – Smart Recorders – Web Recorders – Screen Recorders - Task Editor – Variables - Command Library – Loop Command – Excel Command – Database Command - String Operation Command - XML Command		
UNIT-V	**TERMINAL EMULATOR COMMAND**	**Classes: 12**
Terminal Emulator Command - PDF Integration Command - FTP Command - PGP Command - Object Cloning Command - Error Handling Command - Manage Windows Control Command - Workflow Designer - Report Designer.		

TEXT BOOKS

1. Learning Robotic Process Automation: Create Software robots and automate businessprocesses with the leading RPA tool - UiPath: Create Software robots. with the leading RPAtool—UiPathKindleEdition.

REFERENCE BOOKS

1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition.

WEB REFERENCES

1. https://www.redhat.com/en/engage/executives-guide-automation-s-202101280545?sc_cid=7013a0000034oAPAAY&gclid=CjwKCAjw_YShBhAiEiwAMomsEEFbUOBRKo41wpJ7sEjwFn9alVL0ZDXfjnRYdnggkFwOL1eKuv1MyhoCYRUQAvD_BwE
2. https://www.icsanalytics.com/wp-content/uploads/2019/02/robotic_process_automation_for_dummies.pdf
3. https://www.redhat.com/en/engage/executives-guide-automation-s-202101280545?sc_cid=7013a0000034oAPAAY&gclid=CjwKCAjw_YShBhAiEiwAMomsEEFbUOBRKo41wpJ7sEjwFn9alVL0ZDXfjnRYdnggkFwOL1eKuv1MyhoCYRUQAvD_BwE

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

RANDOMIZED ALGORITHMS (Professional Elective – VI)

IV B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM813PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To introduce the power of randomization in the design and analysis of algorithms.

COURSE OUTCOMES

1. Appreciate the fundamentals of randomized algorithm design.
2. Understand the fundamentals of Markov chains and the Monte Carlo method.
3. Apply high probability analysis to selected randomized algorithms.
4. Understand the Comparison of Fingerprinting Techniques and Pattern Matching

UNIT-I	INTRODUCTION	Classes: 12

Introduction, A Min – Cut algorithm, Las Vegas and Monte Carlo, Binary Planar Partitions, A Probabilistic Recurrence. Game – Theoretic Techniques: Game Tree Evaluation, The Minimax Principle

UNIT-II	MOMENTS AND DEVIATIONS	Classes:12

Moments and Deviations: Occupancy Problems, The Markov and Chebyshev Inequalities, Randomized Selection. Markov Chains and Random Walks: A 2-SAT example, Markov Chains, Random Walks on Graphs, Graph Connectivity

UNIT-III	ALGEBRAIC TECHNIQUES	Classes:12
Algebraic Techniques: Fingerprinting and Freivald's Technique, Verifying Polynomial Identities, Perfect Matching in Graphs, Verifying Equality of Strings, A Comparison of Fingerprinting Techniques, Pattern Matching		
UNIT-IV	**DATA STRUCTURES**	**Classes: 12**
Data Structures: The Fundamental Data-structuring Problem, Random Treaps, Skip Lists, Hashtables, Hashing with O(1) Search Time. Graph Algorithms: All Pairs Shortest Paths, The Min- Cut Problem, Minimum Spanning Trees		
UNIT-V	**GEOMETRIC ALGORITHMS**	**Classes: 12**
Geometric Algorithms: Randomized Incremental Construction, Convex Hulls in the Plane, Duality, Half- Space Intersections, Dalaunay Triangulations, Trapezoidal Decompositions. Parallel and Distributed Algorithms: The PRAM Model, Sorting on a PRAM, Maximal Independent Sets, Perfect Matchings		

TEXT BOOKS

1. RandomizedAlgorithms:RajeevMotwani,PrabhakarRaghavan.
2. ProbabilityandComputing:RandomizationandProbabilisticTechniquesinAlgorithmsand DataAnalysisbyEliUpfalandMichaelMitzenmacher.

REFERENCE BOOKS

1. Rajeev Motwani, PrabhakarRaghavan, Randomized Algorithms, Cambridge University Press.

WEB REFERENCES

1. https://www.geeksforgeeks.org/randomized-algorithms/
2. https://www.educative.io/answers/what-are-randomized-algorithms

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

COGNITIVE COMPUTING (Professional Elective – VI)

IV B. TECH- II SEMESTER

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AIM814PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To provide an understanding of the central challenges in realizing aspects of human cognition.
2. To provide a basic exposition to the goals and methods of human cognition.
3. To develop algorithms that use AI and machine learning along with human interaction and feedback to help humans make choices/decisions.
4. To support human reasoning by evaluating data in context and presenting relevant findings along with the evidence that justifies the answers.

COURSE OUTCOMES

1. Understand what cognitive computing is, and how it differs from traditional approaches.
2. Plan and use the primary tools associated with cognitive computing.
3. Plan and execute a project that leverages cognitive computing.
4. Understand and develop the business implications of cognitive computing.

UNIT-I	INTRODUCTION TO COGNITIVE SCIENCE	Classes: 12

Introduction to Cognitive Science: Understanding Cognition, IBM's Watson, Design for Human Cognition, Augmented Intelligence, Cognition Modeling Paradigms: Declarative/ logic-based computational cognitive modeling, connectionist models of cognition, Bayesian models of cognition, a dynamical systems approach to cognition.

UNIT-II	COGNITIVE MODELS	Classes:12

Cognitive Models of memory and language, computational models of episodic and semantic memory, modeling psycholinguistics.

UNIT-III	COGNITIVE MODELING	Classes:12
Cognitive Modeling: modeling the interaction of language, memory and learning, Modeling select aspects of cognition classical models of rationality, symbolic reasoning and decision making.		
UNIT-IV	**FORMAL MODELS OF INDUCTIVE GENERALIZATION**	**Classes: 12**
Formal models of inductive generalization, causality, categorization and similarity, the role of analogy in problem solving, Cognitive Development Child concept acquisition. Cognition and Artificial cognitive architectures such as ACT-R, SOAR, OpenCog, CopyCat, Memory Networks.		
UNIT-V	**DEEPQA ARCHITECTURE**	**Classes: 12**
DeepQA Architecture, Unstructured Information Management Architecture (UIMA), Structured Knowledge, Business Implications, Building Cognitive Applications, Application of Cognitive Computing and Systems.		

TEXT BOOKS

1. TheCambridgeHandbookofComputationalPsychologybyRonSun(ed.),CambridgeUniversityPress.
2. FormalApproachesinCategorizationbyEmmanuelM.Pothos,AndyJ.Wills,CambridgeUniversityPress

REFERENCE BOOKS

1. Judith S. Hurwitz, Marcia Kaufman, Adrian Bowles Cognitive Computing and Big Data Analytics, Wiley
2. Vijay V Raghavan, Venkat N. Gudivada, VenuGovindaraju, Cognitive Computing: Theory and Applications: Volume 35 (Handbook of Statistics), North Holland.

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1. https://www.techtarget.com/searchenterpriseai/definition/cognitivecomputing#:~:text=Cognitive%20computing%20is%20an%20attempt,neural%20network
2. https://towardsdatascience.com/what-is-cognitive-computing-how-are-enterprises-benefitting-from-cognitive-technology-6441d0c9067b
3. https://www.techtarget.com/searchenterpriseai/definition/cognitive-computing#:~:text=Cognitive%20computing%20is%20an%20attempt,neural%20networks

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1.https://www.coursera.org/lecture/introduction-to-ai/cognitive-computing-perception-learning-reasoning-UBtrp

2. https://www.koenig-solutions.com/cognitive-computing-training-courses

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

SEMANTIC WEB (Professional Elective – VI)

IV B. TECH- II SEMESTER								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
AIM815PE	**B. Tech**	**3**	**0**	**0**	**3**	**30**	**70**	**100**

COURSE OBJECTIVES

1. To learn Web Intelligence.
2. To learn Knowledge Representation for the Semantic Web.
3. To learn Ontology Engineering.
4. To learn Semantic Web Applications, Services and Technology.

COURSE OUTCOMES

1. Understand the characteristics of Semantic Web.
2. Apply SOAP and UDDI to web services.
3. Handle multiple web services using Orchestration.
4. Create documents using XML.
5. Construct and use Ontologies.

UNIT-I	**INTRODUCTION**	**Classes: 12**

Introduction: Introduction to Semantic Web, the Business Case for the Semantic Web, XML and Its Impact on the Enterprise.

UNIT-II	**WEB SERVICES**	**Classes:12**

Web Services: Uses, Basics of Web Services, SOAP, UDDI, Orchestrating Web Services, Securing Web Services, Grid Enabled and Semantic Web of Web Services.

UNIT-III	RESOURCE DESCRIPTION FRAMEWORK	Classes:12

Resource Description Framework: Features, Capturing Knowledge with RDF.

XML Technologies: XPath, The Style Sheet Family: XSL, XSLT, and XSL FO, XQuery, XLink, XPointer, XInclude, XMLBase, XHTML, XForms, SVG.

UNIT-IV	TAXONOMIES AND ONTOLOGIES	Classes: 12

Taxonomies and Ontologies: Overview of Taxonomies, Defining the Ontology Spectrum, Topic Maps, Overview of Ontologies, Syntax, Structure, Semantics, and Pragmatics, Expressing Ontologies Logically, Knowledge Representation.

UNIT-V	SEMANTIC WEB APPLICATION	Classes: 12

Semantic Web Application: Semantic Web Services, e-Learning, Semantic Bioinformatics, Enterprise Application Integration, Knowledge Base. Semantic Search Technology: Search Engines, Semantic Search, Semantic Search Technology, Web Search Agents, Semantic Methods, Latent Semantic Index Search, TAP, Swoogle.

TEXT BOOKS

1. Thinking ontheWeb-BernersLee,GodelandTuring,WileyInterscience.

REFERENCE BOOKS

1. The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management by Michael C. Daconta, Leo J. Obrst, Kevin T. Smith, Wiley Publishing, Inc.
2. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, R.Studer, P.Warren, John Wiley & Sons.
3. Semantic Web and Semantic Web Services - Liyang Lu Chapman and Hall/CRC Publishers, (Taylor & Francis Group)
4. Information Sharing on the semantic Web –HeinerStuckenschmidt; Frank Van Harmelen, Springer Publications.
5. Programming the Semantic Web, T.Segaran, C.Evans,J.Taylor, O'Reilly,SPD.

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1. https://www.ontotext.com/knowledgehub/fundamentals/what-is-the-semantic-web/
2. https://www.techtarget.com/searchcio/definition/Semantic-Web

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

CHATBOTS (Open Elective - III)

IV B.TECH- II SEMESTER

CourseCode	Programme	Hours/Week			Credits	MaximumMarks		
		L	T	P	C	CIE	SEE	Total
AIM816OE	B.Tech	3	0	0	3	30	70	100

COURSEOBJECTIVES

1. Knowledge on concepts of chatbots and understanding the developer environmentbot framework.

COURSEOUTCOMES

1. Understandbasicconceptsofchatbots
2. Analyzedifferententitiesinbuildingbots
3. Understandtheconceptsofadvancedbotbuilding
4. Discussdifferenttypesofchatbotusecases

UNIT-I	INTRODUCTION TO CHATBOTS	**Classes:13**

Introduction to Chatbots: Definition of chatbots, Journey of Chatbots, Rise of Chatbots, MessagingPlatforms.

UNIT-II	SETTING UP THE DEVELOPER ENVIRONMENT BOTFRAMEWORK	**Classes:12**

SettingUptheDeveloperEnvironmentBotframework:LocalInstallation,InstallingNodeJS,Following theDevelopment Pipeline,StoringMessagesinDatabase

UNIT-III	BASICS OF BOT BUILDING	**Classes:12**

BasicsofBotBuilding-Intents,Entities

UNIT-IV	ADVANCED BOT BUILDING	**Classes:12**

Advanced Bot Building: Design Principles, Showing Product Results, Saving Messages, BuildingYourOwnIntentClassifier.

UNIT-V	BUSINESS AND MONETIZATION	**Classes:13**

Business and Monetization: Analytics, Chatbot Use Cases- Modes of Communication- Business-to-Business(B2B),ChapBusiness-to-Consumer(B2C)Consumer-to-Consumer(C2C)Business-to-Employee(B2E), Employee-to-Employee(E2E),Chatbots by IndustryVertical.

TEXTBOOKS

1. RashidKhan,AnikDas,BuildBetterChatbots:ACompleteGuidetoGettingStartedwithChatbots,Apress.

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1. https://cdn2.hubspot.net/hubfs/202339/Chatbot%20Ebook.pdf
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1. https://www.ibm.com/in-en/topics/chatbots 2. https://www.wordstream.com/blog/ws/chatbots#:~:text=Chatbots%20%E2%80%93%20also%20known%20as%20%E2%80%9Cconversational,based%20applications%20or%20standalone%20apps.
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1. https://www.researchgate.net/publication/322855718_Chatbots_-_An_Interactive_Technology_for_Personalized_Communication_Transactions_and_Services
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1. https://in.coursera.org/courses?query=chatbot 2. https://www.udemy.com/topic/chatbots/

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI & ML)

GENETIC ALGORITHMS & FUZZY LOGIC (Open Elective - III)

IV B.TECH- II SEMESTER

CourseCode	Programme	Hours/Week			Credits	MaximumMarks		
		L	T	P	C	CIE	SEE	Total
AIM817OE	B.Tech	3	0	0	3	30	70	100

COURSEOBJECTIVES

1. Knowledge on concepts of fundamentals of genetic algorithms, genetic technologyandfuzzylogic

COURSEOUTCOMES

1. UnderstandtheFundamentalsofgeneticalgorithm.
2. DiscussKnowledgebasedtechniquesinGeneticAlgorithmandtechniquesingeneticsearch
3. Understandgenetics-basedmachinelearning.
4. AnalyzeandUnderstandClassicalRelationsandFuzzyRelations.

UNIT-I	FUNDAMENTALS OF GENETIC ALGORITHM	Classes:13

Fundamentalsofgeneticalgorithm:Abriefhistoryofevolutionarycomputation,biologicalterminology, search space encoding, reproduction elements of genetic algorithm genetic modeling,comparisonofGAandtraditionalsearchmethods.TheFundamentalTheorem,SchemaProcessingatwork, Two-armed andk-armedBanditproblem,TheBuildingblock hypothesis.

UNIT-II	GENETIC TECHNOLOGY: STEADY STATE ALGORITHM	Classes:12

Genetic Technology: steady state algorithm, fitness scaling, inversion. Genetic Programming: GeneticAlgorithm in problem solving, Implementing a Genetic Algorithm: computer implementation, operator(reproduction, crossover and Mutation, Fitness Scaling, Coding, Discretization). Knowledge basedtechniques in Genetic Algorithm. Advanced operators and techniques in genetic search: Dominance,DiploidyandAbeyance.Inversionandother reorderingoperators,Nicheandspeciation.

UNIT-III	INTRODUCTION TO GENETICS	Classes:12

Introduction to genetics - based machine learning: Classifier system, Rule and Message system,Apportionmentofcredit,KnowledgebasedTechniques,GeneticAlgorithmsandparallel.processors.

UNIT-IV	STATISTICS AND RANDOM PROCESSES	Classes:12

Introduction: Background, Uncertainty and imprecision, Statistics and random processes, Uncertaintyin information, Fuzzy sets and membership, Chance versus ambiguity, Classical sets - operations onclassical sets to functions, Fuzzy sets-fuzzy set operations, Properties of fuzzy sets, sets as points inhypercube.

UNIT-V	CLASSICAL RELATIONS AND FUZZY RELATIONS	Classes:13

Classical Relations And Fuzzy Relations: Cartesian product, Crisp relations-cardinality of crisprelations, Operations on crisp relations, Properties of crisp relations, Compositions, Fuzzy relationscardinality of fuzzy relations, Operations on fuzzy relations, Properties of fuzzy relations, FuzzyCartesian product and composition, Non interactive fuzzy sets, Tolerance and equivalence relations-crisp equivalence relation, Crisp tolerance relation, Fuzzy tolerance, Max-min Method, other similaritymethods.

TEXTBOOKS

1. DavidE.Goldberg,"GeneticAlgorithmsinsearch,Optimization&MachineLearning".
2. NeuralNetworksandFuzzyLogicSystembyBartKosko,PHIPublications

REFERENCEBOOKS

1. WilliamB.Langdon,RiccardoPoli,"FoundationsofGeneticProgramming".
2. P.J.Fleming,A.M.S.Zalzala"GeneticAlgorithmsin EngineeringSystems".
3. DavidA.Coley,"AnIntroductiontoGeneticAlgorithmsforScientistsandEngineers".
4. MelanieMitchell-'AnintroductiontoGeneticAlgorithm'-Prentice-HallofIndia.
5. NeuralNetworks,Fuzzylogic,Geneticalgorithms:synthesisandapplicationsbyRajasekharanandRai—PHI Publication.
6. FuzzySets,FuzzyLogic,andFuzzySystemsbyLotfiA.ZadehFuzzylogicwithengineeringapplicationbyTimothyJ. Ross-wiley.

WEBREFERENCES

1. https://www.worldscientific.com/worldscibooks/10.1142/2896#t=aboutBook
2. https://www.hindawi.com/journals/mpe/2014/708275/?utm_source=google&utm_medium=cpc&utm_campaign=HDW_MRKT_GBL_SUB_ADWO_PAI_DYNA_JOUR_X_X0000_WileyFlipsBatch2&gclid=CjwKCAjw_YShBhAiEiwAMomsECzHop6sROXeKzQBDfKsPR_thyqxBB8aV0vY0UV7ytBLJUMh1s2k5BoCzmUQAvD_BwE

E-TEXTBOOKS

1. https://www.researchgate.net/publication/305302846_Introduction_to_Neural_NetworksFuzzy_LogicGenetic_Algorithms_Theory_Applications
2. https://link.springer.com/book/10.1007/3-540-60607-6

MOOCSCOURSES

1. https://www.udemy.com/topic/fuzzy-logic/
2. https://onlinecourses.nptel.ac.in/noc21_ge07/preview