CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)
Kandlakoya, Hyderabad – 501 401
B. Tech (AI & DS) Course Structure-21, Regulation-18

Semester –I							
Course Code	**Category**	**Course Title**	**Hours/ Week**			**Credits**	**Total Contact Hours/ Week**
			L	T	P	C	
A30004	BSC	Linear Algebra and Calculus	3	1	0	4	4
A30009	BSC	Applied Physics	3	1	0	4	4
A30501	ESC	Programming for Problem Solving	3	0	0	3	3
A30313	ESC	Engineering Drawing	1	0	3	2.5	4
A30023	BSC	Applied Physics Lab	0	0	3	1.5	3
A30502	ESC	C Programming Lab	0	0	3	1.5	3
A30505	ESC	Basic Internet of Things Lab	0	0	2	1	2
A30020	HSMC	Introduction to Social Innovation	0	0	2	1	2
Total			**10**	**2**	**13**	**18.5**	**25**

Semester –II							
Course Code	**Category**	**Course Title**	**Hours /Week**			**Credits**	**Total Contact Hours/ Week**
			L	T	P	C	
A30005	BSC	Ordinary Differential Equations and Multivariable Calculus	3	1	0	4	4
A30001	HSMC	English	2	0	0	2	2
A30011	BSC	Engineering Chemistry	3	0	0	3	3
A30503	ESC	Data Structures & Algorithms	3	0	0	3	3
A30002	HSMC	English Language Communication Skills Lab	0	0	3	1.5	3
A30012	BSC	Engineering Chemistry Lab	0	0	3	1.5	3
A30504	ESC	Data Structures & Algorithms Lab	0	0	3	1.5	3
A30314	ESC	Engineering Workshop	0	0	3	1.5	3
A30019	BSC	Engineering Exploration &Practice	0	0	3	1.5	3
Total			**11**	**1**	**15**	**19.5**	**27**
Total Credits I year: 38							

Semester –III							
Course Code	**Category**	**Course Title**	**Hours / Week**			**Credits**	**Total Contact Hours/ Week**
			L	T	P	C	
A30007	BSC	Numerical Techniques &Probability Distributions	3	1	0	4	4
A30516	PCC	Operating System	3	0	0	3	3
A30513	*PCC*	*Computer Organization & Architecture*	3	1	0	4	4
A36201	*PCC*	*Object Oriented Programmingthrough Java*	3	0	0	3	3
A30509	PCC	Database Management system	3	1	0	4	4
A30510	PCC	Database Management system lab	0	0	3	1.5	3

A30517	PCC	Operating Systems Lab	0	0	3	1.5	3
A36202	*PCC*	*JAVA Lab*	0	0	3	1.5	3
A30016	MC	Gender Sensitization	0	0	2	0	2
Total			**15**	**3**	**11**	**21.5**	**29**

Semester –IV							
Course Code	**Category**	**Course Title**	**Hours / Week**			**Credits**	**Total Contact Hours/ Week**
			L	T	P	C	
A37302	*PCC*	*Mathematics for Machine Learning*	3	0	0	3	3
A30511	PCC	Design & Analysis of Algorithms	3	1	0	4	4
A30228	ESC	Basic Electrical Engineering	3	0	0	3	3
A37303	PCC	Artificial Intelligence	4	0	0	4	4
A37305	PCC	Python Programming lab	0	0	3	1.5	3
A30229	PCC	Basic Electrical Engineering Lab	0	0	3	1.5	3
A37304	PCC	Artificial Intelligence lab	0	0	3	1.5	3
A30021	HSMC	Social Innovation in Practice	0	0	2	1	2
A30015	MC	Soft Skills & Professional Ethics	0	0	2	0	2
Total			**13**	**1**	**13**	**19.5**	**28**
Total Credits II year: 42							

Semester –V							
Course Code	**Category**	**Course Title**	**Hours/week**			**Credits**	**Total Contact Hours/ Week**
			L	T	P	C	
A30514	PCC	Computer Networks	4	0	0	4	4
A36601	PCC	Machine Learning	4	0	0	4	4
A37201	PCC	Automata and Compiler Design	3	0	0	3	3
A36714	PCC	Predictive Analytics	3	0	0	3	3
PE	PEC	Professional Elective-I	3	0	0	3	3
A30515	PCC	Computer Networks Lab	0	0	3	1.5	3
A36602	PCC	Machine Learning Lab	0	0	3	1.5	3
A30003	HSMC	Advanced English Communication Skills Lab	0	0	3	1.5	3
A30017	MC	Indian Constitution	2	0	0	0	2
A30018		Essence of Indian Traditional Knowledge					
Total			**19**	**0**	**9**	**21.5**	**28**
A37202	MC	Mini Project-I	During Summer Vacations / Non-Credit				
A37203		Summer Internship-I					

Semester –VI							
Course Code	**Category**	**Course Title**	**Hours/Week**			**Credits**	**Total Contact Hours/Week**
			L	T	P	C	
A36704	PCC	Data Science using R	4	0	0	4	4

A36702	PCC	Big Data Processing	4	0	0	4	4
A36705	PCC	Data Mining	3	0	0	3	3
PE	PEC	Professional Elective-II	3	0	0	3	3
A30013	HSMC	Business Management & Financial Analysis	4	0	0	4	4
A36703	PCC	Big Data Processing Lab	0	0	3	1.5	4
A36706	PCC	Data Minig Lab	0	0	2	1	2
A37204	PROJ	Technical Seminar-I	2	0	0	2	2
A30014	MC	Environmental Sciences	2	0	0	0	2
A30556	MC	Cyber Security	2	0	0	0	2
A30022	MC	NCC/NSS	0	0	2	0	2
		Total	**24**	**0**	**7**	**22.5**	**31**
		Total Credits III Year: 44					

Semester –VII							
Course Code	**Category**	**Course Title**	**Hours / Week**			**Credits**	**Total Contact Hours/week**
			L	T	P	C	
PE	PEC	Professional Elective-III	3	0	0	3	3
	PEC	Professional Elective-IV	3	0	0	3	3
	PEC	Professional Elective-V	3	0	0	3	3
OE	OEC	Open Elective-I	3	0	0	3	3
	OEC	Open Elective-II	3	0	0	3	3
A37206	PROJ	Major Project Phase-I	0	0	6	3	6
Total			**15**	**0**	**6**	**18**	**21**
A37208	MC	Mini Project-II	During Summer Vacations / Non-Credit				
A37209		Summer Internship-II					

Semester –VIII							
Course Code	**Category**	**Course Title**	**Hours / Week**			**Credits**	**Total Contact Hours /week**
			L	T	P	C	
PE	PEC	Professional Elective-VI	3	0	0	3	3
OE	OEC	Open Elective-III	3	0	0	3	3
	OEC	Open Elective-IV	3	0	0	3	3
A37211	PROJ	Technical Seminar-II	2	0	0	2	2
A37212	PROJ	Major Project Phase- II	0	0	14	7	14
Total			**11**	**0**	**14**	**18**	**25**
Total Credits IV Year: 36							

*Note: Industrial Oriented Mini Project/ Summer Internship are to be carried out during the summer vacation between 6th and 7th semesters. Students should submit report of Industrial Oriented Mini Project/ Summer Internship for evaluation.

MC – Satisfactory/Unsatisfactory.

Professional Elective-I

A30527	Information Security
A30529	Software Testing Methodologies
A30533	Mobile Computing

Professional Elective - II

A37201	Information Retrieval Systems
A37202	Pattern Recognition
A30534	Design Patterns

Professional Elective - III

A30521	Scripting Languages
A30536	Adhoc & Sensor Networks
A30558	Data Visualization

Professional Elective -IV

A30548	Deep Learning
A30542	Cloud Computing
A30545	Block Chain Technologies

Professional Elective – V

A30541	Computer Vision & Image Processing
A37205	Augmented Reality & Virtual Reality
A36716	Exploratory Data Analysis

Professional Elective – VI

A37209	Speech and Video Processing
A30543	Natural Language Processing
A37210	Cognitive Computing

Open Electives		
Sl.No	Subject Code	Name of the Subject
1	A30554	Java Programming
2	A30531	Python Programming
3	A30555	Introduction to Database Management Systems

4	A30537	Data Analytics with R
5	A30557	Web Programming
6	A30542	Cloud Computing
7	A30538	Deep Learning
8	A30559	Introduction to Data Science
9	A30471	Principles of Electronic Communications
10	A30472	Basic Electronics Engineering
11	A30383	Fundamentals of Engineering Materials
12	A30377	Basics of Thermodynamics
13	A30258	Basics of Power Electronics & Drives
14	A30252	Power Generation Systems
15	A30160	Disaster Management and Mitigation
16	A30161	Remote Sensing and GIS
17	C30161	Logistics and Supply Chain Management
18	C30162	Knowledge Management
19	A30473	Image Processing
20	A30474	Digital Electronics
21	A30357	Fundamentals of Manufacturing Processes
22	A30379	Fundamentals of Automobile Engineering
23	A30259	Electrical & Hybrid Vehicles
24	A30260	Electrical Safety
25	A30162	Green Buildings
26	A30163	Air Pollution and Control
27	C30163	Management of Industrial Relations
28	C30164	Entrepreneurship
29	A30475	Data Communications
30	A30476	Microcontrollers & Applications
31	A30382	Fundamentals of Mechanical Engineering
32	A30378	Waste to Energy
33	A30253	Fuel Cell Technology
34	A30255	Energy Efficiency in Electrical Utilities
35	A30164	Basics of Civil Engineering
36	A30165	Sustainability Concepts in Civil Engineering
37	C30165	Basics of Insurance & Taxation
38	C30166	Business Ethics & Corporate Governance
39	A30477	Fundamentals of Embedded Systems
40	A30478	Sensors & Transducers
41	A30358	Industrial Safety Engineering

42	A30360	Work System Design
43	A30256	Energy Audit & Conservation
44	A30257	Nano Technology
45	A30166	Environmental Protection and Management
46	A30167	Alternate Building Materials
47	C30167	Marketing Management
48	C30168	Intellectual Property Rights

(A30004) LINEAR ALGEBRA AND CALCULUS
(Common to all branches)

B. Tech (AI & DS) I Semester

L	**T**	**P**	**C**
3	**1**	**0**	**4**

UNIT-I
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: Eigen values, Eigen vectors and their properties, Diagonalization of a square matrix, Cayley-Hamilton theorem (without proof) - Inverse and power of a matrix by Cayley-Hamilton theorem, Quadratic forms and nature of the quadratic forms, Reduction of quadratic form to canonical form by linear and orthogonal transformations.

UNIT -III
Sequences &Series:
Sequence: Definition of a sequence, Limit, Convergent, Divergent and oscillatory sequences.
Series: Definition of a series, Convergent, Divergent and Oscillatory Series, Series of positive terms, Comparison test, P-test, D-Alembert's ratio test, Raabe's test, Cauchy's integral test, Cauchy's root test, Logarithmic test. **Alternating series:** Leibnitz test, Alternating convergent series, Absolute and conditionally convergence.

UNIT -IV
Calculus:
Mean value theorems: Rolle's theorem, Lagrange's mean value theorem with their geometrical interpretation and applications, Cauchy's mean value theorem, Taylor's series, Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (only in Cartesian coordinates),
Improper Integral: Beta, Gamma functions and their applications.

UNIT -V
Multivariable calculus (Partial Differentiation and applications): 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.

TEXT BOOKS:
1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010
2. Advanced Engineering Mathematics, (9th Edition), Erwin kreyszig, John Wiley & Sons,2006.

REFERENCE BOOKS:
1. Advanced Engineering Mathematics (3rd edition) by R.K. Jain & S.R.K. Iyengar, Narosa Publishing House, Delhi.
2. Calculus and Analytic geometry, (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.
3. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2008.
4. Higher Engineering Mathematics, (11th Reprint), Ramana B.V., Tata McGraw Hill New Delhi, 2010.
5. Engineering Mathematics – I, T.K.V. Iyengar, B. Krishna Gandhi &Others, EditionS. Chand 2013 Yr.
6. Applied Mathematics for Engineers & Physicists (3rd edition) by Pipes &Harvill, McGraw Hill Internation Book company.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Solve linear system represented by matrices.
2. Obtain eigen values, eigen vectors and diagonalization of a square matrix.
3. Analyse the nature of sequence and series.
4. Verify mean value theorems & evaluation of improper integrals by using Beta and Gamma functions
5. Find maxima & minima of functions of several variables.

(A30009) APPLIED PHYSICS
(ECE, EEE, CSE)

B. Tech (AI & DS) I Semester

L	T	P	C
3	1	0	4

UNIT-I
Principles of Quantum and Statistical Mechanics: Waves and particles, de-Broglie hypothesis-Matterwaves, Davisson and Germer's Experiment, Heisenberg's Uncertainty principle, Physical significance of the wave function- (qualitative treatment) Schrödinger's time dependent and time independent wave equations, Particle in a one dimensional potential box- equations for energy and wave function, Concept of electron gas, Maxwell-Boltzmann, Bose –Einstein and Fermi–Dirac statistics(qualitative treatment). Density of energy states, Estimation of Fermi energy.

UNIT-II
Semiconductor Physics: Classification of materials into Conductors, Semiconductors &Insulators. Intrinsic Semiconductors-Concentration of electrons in the conduction band &concentration of holes in the valance band, Fermi level in intrinsic semiconductors, Law of mass action, Extrinsic semiconductors, N-Type semiconductor, Carrier concentration in N-Type semiconductors, P-Type semiconductors, Carrier concentration in P-Type semiconductors, drift and diffusion current, Hall effect.

UNIT-III
Physics of Semiconductor Devices: Formation of PN junction, Open circuit PN junction, Energy diagram of PN diode, I-V Characteristics of PN junction diode, Zener diode –breakdown mechanism and characteristics.
Radiative and Non-Radiative recombination, LED, Photo diode &Solar cell-working principle & Applications, Semiconductor photo detectors-PIN and Avalanche structure and their characteristics.

UNIT-IV
Lasers: Characteristics of lasers, Absorption, spontaneous and stimulated emission of radiation, Einstein's coefficients and relation between them, Population inversion, Lasing action, Ruby laser, Helium-Neon laser, Semiconductor diode laser, Applications of lasers.

Fiber Optics: Principle of Optical fiber, Construction of optical fiber, acceptance angle and acceptance cone, Numerical Aperture, Types of optical fibers: Single and Multimode fibers, Step Index optical fibers& Pulse dispersion (qualitative treatment)
Graded index optical fibers & Pulse dispersion (qualitative treatment), Attenuation in optical fibers, optical fiber communication, optical fiber sensors.

UNIT-V
Dielectric Properties: Electric dipole, Dipole moment, Relative permittivity, Polarization and polarizability, Electric susceptibility, Displacement vector, Electronic and Ionic polarization, Orientation polarization (qualitative treatment), Internal fields in solids, Clausius–Mossottiequation, Piezo electric and Pyro-electric materials, Ferro electric materials.
Magnetic Properties: Permeability, Field intensity, Magnetic field induction, Magnetization, Magnetic Permeability &Susceptibility, Classification of Dia, Para, Ferro, Ferri and Anti-Ferro magnetic materials on the basis of magnetic moment (qualitative treatment), Explanation of Hysteresis curveon the basis of Domain theory of Ferro magnetism.
Superconductivity: Introduction, Critical field, Meissner effect, Effect of Magnetic field, Type-I and Type-II Superconductors, Cooper pair, BCS Theory of superconductivity (Qualitative treatment), Applications of Superconductors

TEXT BOOKS
1. Engineering Physics by B.K. Pandey,S. Chaturvedi- Cengage Learning India Pvt. Ltd.,1stEdition, 2012.
2. Engineering Physics by PK Palanisamy , SciTech Publications,3rd edition, 2015.

REFERENCES
1. Fundamentals of Physics by Halliday, R. Resnick and J. Walker,John Wiley and Sons,6th edition, 2001.
2. Introduction to Quantum PhysicsbyEisberg and Resnick, John Wiley & Sons, 2nd edition, 1985.
3. Quantum mechanics by D.J Griffiths, Cambridge University press,2nd edition, 2017.
4. Principles of Lasers by O.Svelto, Plenum publishing Corporation,4th edition,1998.
5. Physics of Semiconductor devices by Simon.MSze and Kwok K . Ng, Wiley Student Edition,3rd edition,2006.

COURSE OUTCOMES

On completion of the course students will be able to:

1. Explain the basic concepts of quantum & statistical mechanics.
2. Describe the classification of solids and the properties of semiconductors. for device designing.
3. Understand the different semiconductor devices and circuits for optical communication
4. Interpret the basic properties of lasers and characteristics of optical fibers for modern communication
5. Aquaire knowledge on properties of dieectric,,magnetic materials & illustrate the basic principles of superconductivity.

END

(A30501) PROGRAMMING FOR PROBLEM SOLVING
(Common to all branches)

B. Tech (AI & DS) I Semester

L	T	P	C
3	0	0	3

UNIT -I

Introductory Concepts: Introduction to Computers, Computer Characteristics, Modes of Operation, Types of Programming Languages.
Idea of Algorithm: Steps to solve logical and numerical problems.
Representation of Algorithm: Flowchart/ Pseudo code with examples.
Algorithms to programs: Source code, variables (with data types), variables and memory locations, Syntax and Logical Errors in compilation, object and executable code
Introduction to C: Some Simple C Programs, Desirable Program Characteristics.
C Fundamentals: The C Character Set, Identifiers and Keywords, Data Types, Constants Variables and Arrays Declarations, Expressions, Statements, Symbolic Constants.
Preparing and Running a Complete C Program: Planning a C Program, writing a C Program, Entering the Program into the Computer, Compiling and Executing the Program, Error Diagnostics, Debugging Techniques.
Operators and Expressions: Unary Operators, Arithmetic Operators, Relational and Logical Operators, Bitwise Operators, Conditional Operator, Assignment Operators, Special Operators, Precedence & Associativity of Operators, Evaluation of Expressions.
Data Input and Output: Preliminaries, Single Character Input- The getchar Function, Single Character Output- The putchar Function, Entering Input Data- The scanf Function, More About the scanf Function, Writing Output Data- The printf Function, More About the printf Function, The gets and puts Functions.

UNIT -II

Control Statements: Preliminaries, Branching: The if-else Statements, looping: The while Statement, the do while Statement, the for Statement, Nested Control Structures, the switch Statement, the break Statement, the continue Statement, the goto Statement.
Arrays: Defining an Array, Processing an Array, Multidimensional Arrays.

UNIT -III

Functions: A Brief Overview, defining a Function, accessing a Function, Function Prototypes, Passing Arguments to a Function, Recursion, Passing Arrays to Functions.

Program Structure: Storage Classes- Automatic Variables, External Variables, Static Variables and Register Variables, Multi files Programs, More about Library Functions.
Strings: String Handling Functions, Sample C Programs without using library functions.

UNIT -IV

Pointers: Fundamentals Pointer Declarations, Passing Pointers to Functions, Pointers and One-Dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers, Passing Functions to other Functions, More about Pointer Declarations.
Structures and Unions: Defining a Structure, processing a Structure, User Defined Data Types- typedef & Enumerations, Structures and Pointers, Passing Structures to Functions, Bit fields, Self-Referential Structures and Unions.

UNIT -V

Data Files: Opening and Closing a Data File, creating a Data File, Processing a Data File, Unformatted Data Files and Command Line Parameters.
Searching and Sorting: Linear and Binary Search, Bubble Sort, Selection Sort and Insertion Sort.

Text Books
1. Byron Gottfried, Schaum's Outline series, "Programming with C", McGraw-
Hill.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage
Learning, (3rd Edition)

Reference Books:
1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language,
Prentice Hall of India.
2. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression).
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.

Course Outcomes
The student shall be able
1. Write algorithms and to draw flowcharts for solving problems.
2. Convert the algorithms/flowcharts to C programs.
3. Code and test a given logic in C programming language.
4. Decompose a problem into functions and to develop modular reusable code.
5. Write C programs using arrays, pointers, strings and structures and perform
   searching and sorting the data.

END

(A30313) ENGINEERING DRAWING

B. Tech (AI & DS) I Semester

L	T	P	C
1	0	3	2.5

Unit – I
Introduction to Engineering Drawing: Principles of Engineering Drawing and their Significance; Conic Sections (Using eccentricity method only) Cycloid, Epi cycloid and Hypocycloid.

Unit – II
Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines (Excluding traces of lines) Projections of Plane regular geometric figures. (Excluding Auxiliary Planes and traces of planes)

Unit – III
Projections of Solids: Projection of regular solids- cube, Cylinder, prisms, pyramids, cone (Excluding Auxiliary Planes).

Unit-IV
Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Solids and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts and combinations

Unit-V
Transformation of Projections: Conversion of Isometric Views to Orthographic Views and Vice-versa.

Text Books:
    1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
    2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education.
Reference Books:
    1. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

2. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

Course Outcomes

At the end of the Course, the student will be able to:
1. Understand and apply the use of engineering curves in tracing the part of different machine components.
2. Evaluate the concepts of projections and acquire knowledge of visualization skills and convert it into pictorial representation.
3. Create and analyze the 3-D objects of machine components in real world.
4. Explore and evaluate the internal architecture of product by section and development of surfaces.
5. Create and imagine the solid and real objects in real world with axonometric projection.

END

(A30023) APPLIED PHYSICS LAB

B. Tech (AI & DS) I Semester

L	T	P	C
0	0	3	1.5

(Any 8 experiments are to be performed)

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 solar cell.
3. Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.
4. Stewart – Gee's experiment: Determination of magnetic field along the axis of a current carrying coil.
5. Hall effect: To determine Hall co-efficient of a given semiconductor.
6. Photoelectric effect: To determine work function of a given material.
7. LASER: To study the characteristics of LASER sources.
8. Optical fibre: To determine the Numerical aperture of a given fibre and bending losses of Optical fibres.
9. LCR Circuit: To determine the Quality factor of LCR Circuit.
10. Diffraction grating: Determination of wavelength of a source (LASER).
11. Determination of Planck's constant using LED.
12. R-C Circuit: To determine the time constant of R-C circuit.

LABORATORY MANUAL:
1. Laboratory Manual of Engineering Physics by Dr.Y. Aparna&Dr.K. VenkateswaraRao (V.G.S Publishers).
2. Laboratory Manual of Engineering, Published by CMR College of Engineering & Technology

COURSE OUTCOMES

On completion of the course students will be able to
1. Explain the concept of oscillations and resonance.
2. Determine energy gap of a semiconductor diode, Planck's constant and magnetic fields.
3. Describe the characteristics of semiconductor devices
4. Design new experiments in engineering.
5. Evaluate the basic properties of lasers and optical fibers.

(A30502) C PROGRAMMING LAB
(Common to all branches)

B. Tech (AI & DS) I Semester

L	T	P	C
0	0	3	1.5

Lab 1: Familiarization with programming environment
  i. Write a simple C program to display "Hello, World!" on the screen
  ii Identify various parts in C program.
  iii.Compile & Run the C- Program using various Compilers.
  iv. Identify Syntax Errors and correct them.

Lab 2: Simple computational problems using arithmetic expressions
i.Write a C program to find the roots of a quadraticequation.
ii.Write a C program to convert centigrade toFahrenheit.

Lab 3:
i.Write a C program to find maximum of given threenumbers.
ii.Write a C program to find the factorial of a positiveinteger.

Lab 4:
i.Write a C program to determine if the given number is a prime number or not.
ii.A Fibonacci sequence is defined as follows:
the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
Write a C program to print the Fibonacci sequence up to n^{th}term.

Lab 5:
i.Write a C program to generate all the prime numbers between 1 and n, where n is avalue supplied by the user using Sieve of Eratosthenesalgorithm.
ii.Write a C program to convert a positive integer to a roman numeral. Ex. 11 isconverted toXI.

Lab 6:
i.Write a C program to print the Pascal trianglespyramid
ii.Write a C program to calculate the followingseries
      a) Sin(x)   b) Cos(x)   c)log(x)

Lab 7:
i.Write a C program that reads two matrices and uses functions to perform the following:
a) Addition of two matrices b) Multiplication of two matrices c) Transpose of a Matrix.
ii.Define four pointer variables, one each of type char, short, int, float. Fill these pointers by allocate memory of required size by calling malloc () function. Read data from the user and fill in the memory (allocated using malloc ()). Finally display the data

Lab 8:
Write a C program to read N students data (Rollo, Name, Marks1, Marks2, Marks3)and find the topper (Use array of structures and implement usingfunctions).

Lab 9:
i.Write a C program that reads 15 names each of up to 30 characters, stores them in an array and use an array of pointers to display

them in ascending (ie. alphabetical) order.

ii.Two's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binarynumber.

Lab 10:

i.Write a C program to display the contents of a file to standard outputdevice.

ii.Write a C program which copies one file to another, replacing all

   lowercase characters with their uppercaseequivalents

Lab 11:

i.Write a C program that uses non-recursive functions to count the number of

   palindromes in a givenstring.

ii.Write a C program to replace a substring with another in a given line oftext.

Lab 12:

i.Write C programs for implementing the followingmethods

a) BubbleSort   b) Selection Sort   c) BinarySearch

Additional Programs:

1.Write a C program that implements the Insertion sort method to sort a

   given list of integers in ascendingorder.

2.Write a C program that uses functions to perform the following operations:

   2.1 To insert a sub-string into a given main string from a givenposition.

   2.2 To delete n characters from a given position in a givenstring.

3.Write a C program to compare two files, printing the first line where theydiffer.

4.Write a C program to reverse the first n characters in a file.

   The file name and nare specified on the command line. Use fseek ()

    function

5.Write a C program to merge two files into a third file (i.e., the contents of the firstfile Followed by those of the second are put in the third file)

REFERENCE BOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, CengageLearning, (3rdEdition)
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
4. R.G. Dromey, How to solve it by Computer, Pearson (16thImpression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, PearsonEducation.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4thEdition

Course outcomes

 The student shall be able

1. To test and execute the programs and correct syntax and logical errors.
2. To implement conditional branching, iteration and recursion.
3. To use arrays and structures to formulate algorithms and programs.
4. To apply programming to solve matrix addition and multiplication problems and   searching and sorting problems.
5. Create, read and write to and from simple text and binary files and verifythrough execution.

(A30505) BASIC INTERNET OF THINGS LAB
(Common to all branches)

B. Tech (AI & DS) I Semester

$$\underline{L} \quad \underline{T} \quad \underline{P} \quad \underline{C}$$
$$0 \quad \quad 0 \quad \quad 2 \quad \quad 1$$

Lab Requirements:

Raspberry Pi3 single board Computer, Android SDK, Eclipse IDE, JDK1.8.

Week 1: Introduction to IoT
- Definition of IoT
- History of IoT
- IoT Architecture
- Enabling Technologies for IoT
- Fundamental characteristics of IoT
- Benefits and Applications of IoT
- Introduction to Basic Components

Basic Components				
Jumper wires	LEDs (Light Emitting Diodes)	Resistors	Potentiometer	Diode,
Photo resistor	Buzzer	Temperature Sensor	DC Motor	Push Button
RC Servo	Relays	Breadboard		

Week 2: Programming in python
- Introduction to Python
- Python Installation
- Understanding Python Basics
- Using Arithmetic in your programs
- Learning about Loops

Week 3: Platform Based Development – Raspberry Pi
Introduction to Raspberry Pi
- Why Raspberry Pi?
- Setting up the Raspberry Pi
- Python on Raspberry Pi

Week 4: Basic Experiments Level-1
Demonstration of the following Experiments
Experiment 1: Your First Circuit – To Blink an LED (Light Emitting Diode)
Experiment 2: To Blink an RGB LED

Additional Experiments (optional)

Experiment 1: To read the temperature and display the same in serial monitor.
(use LM35 Temperature sensor)
Experiment 2: To make an LED glow when controller detects a button pressed.

Week 5: Basic Experiments Level -2
Demonstration of the following Experiment

Experiment 1: To control an LED according to the range of analog input sensed using photo resistor. (use Light DependantResistor (LDR))

Additional Experiments (optional)

Experiment 1: To interface the Liquid Crystal Display (LCD) with the Raspberry Pi3 to display the characters on the LCD.

Week 6: Basic Experiments Level -3
Demonstration of the following Experiment

Experiment1: To interface the Ultrasonic Sensor with the Raspberry Pi3 to determine the distance of an object from the sensor.

Additional Experiments (optional)

Experiment1: To interface the Infrared sensor with the Raspberry Pi3 to sense the path is clear/indicate the presence of any obstacles.

Week 7: Introduction to Android
- Introduction to Android
- Explain the structure of Android App.

Experiment 1: Create Hello World application with Android.

Week 8

Experiment 1: Create Application to change the Background Color and Background Image
Experiment 2: Explain simple User interface components in Android and create simple Application

Week 9
Experiment 1: Create an application that display color or image as background when selected the radio buttons or checkboxes
Experiment 2: Create an Application to perform addition, Subtraction, multiplication, division.

Week 10

Explain what is activity, intent and its functions.
Experiment 1: Create an application with Android intent.

Week 11

Experiment 1: Create a simple android application with the following event handlers.

a) On Click
b) On Key Down
c) On Focus changed

Week 12

Experiment 1: Explain about Toast, Create Application with User defined Toast Notifications.
Additional Experiment: Create login page by using login activity

Reference Books:
1. ArshdeepBahga, VijayMadisetti, Internet of Things: A Hands-On Approach, Orient Blackswan Private Limited - New Delhi; First edition (2015)
2. John Horton, Android Programming for Beginners, PACKT publications.

Course Outcomes
At the end of the course the student will be able to:

1. Identify and differentiate various components used in IoT Architecture.
2. Write & execute programs in python programming language
3. Use Python programming language to interface with Raspberry
4. Demonstrate the various real time applications using Raspberry Pi
5. Create and Deploy Mobile applications using Android

**END*

(A30020) INTRODUCTION TO SOCIAL INNOVATION
(Common for all branches)

B. Tech (AI & DS) I Semester

L	T	P	C
0	0	2	1

UNIT 1
Community Study: Types and features of communities- Rural, Suburban, Urban and regional, Service based learning, Aims of community-based projects, Community visits.

UNIT 2
Social Innovation across Four Sectors: The four sectors – the non-profit sector, public sector, the private sector, the informal sector, links between and cross sectors.

UNIT 3
Stages of Social Innovation: Social organizations and enterprises, social movements, politics and government, markets, academia, philanthropy, social software and open source methods, common patterns of success and failure.

UNIT 4
Engineering Ethics: Introduction to ethics, moral values, significance of professional ethics, code of conduct for engineers, identify ethical dilemmas in different tasks of engineering, applying moral theories and codes of conduct for resolution of ethical dilemmas.

UNIT 5
Steps forPatent filing and Startups, poster presentation.

References:
1. Social Entrepreneurship for the 21st Century: Innovation Across the Non Profit, Private and Public Sectors; Georgia Levenson Keohane; Tata McGraw Hill
2. Social Enterprises: An Organizational Perspective edited; Benjamin Gidron, YeheskelHasenfeld; Palgrave Macmillan
3. Engineering Ethics: An Industrial Perspective; Gail Baura; Elsevier
4. Intellectual Property and Financing Strategies for Technology Startups; Gerald B. Halt, Jr., John C. Donch, Jr., Amber R. Stiles, Robert Fesnak; Springer
5. Fundamentals of Intellectual Property (English) 1st Edition (Paperback, Dr. Kalyan C. Kankanala) Publisher: Asia Law House ISBN: 9789381849514, 938184951X Edition: 1st Edition, 2012.
6. Indian Patent Law (English, Paperback, Kalyan C. Kankanala) Publisher: Oxford University Press- New Delhi, ISBN: 9780198089605, 0198089600 Edition: 2012.

Course Outcomes:

On Completion of the course, the students will be able to
1. Identify community issues through community Intearction
2. Illustrate the factors affecting social innovation in various sectors
3. Analyze the stages of scoial innovation for a community problem
4. Adopt the ethical values in implementing the Social innovation
5. Describe the process of property rights and patent filing.

B. Tech (AI & DS) II Semester

L	T	P	C
3	1	0	4

UNIT-I
First Order ODE: Exact, Linear and Bernoulli's differential equations, Applications, Newton's law of cooling, Law of natural growth and decay.
Equations not of first degree: Equations solvable for p, Equations solvable for y, Equations solvable for x and Clairaut's type.

UNIT -II
Ordinary Differential Equations of Higher Order: Second and higher order linear differential equations with constant coefficients, Non-Homogeneous terms of the type $e^{ax}, \sin ax, \cos ax,$ polynomials in x, $e^{ax}V(x)$ and $x\,V(x)$, Method of variation of parameters, Equations reducible to linear ODE with constant coefficients, Legendre's equation, Cauchy-Euler equation.

UNIT -III
Multivariable Calculus (Integration): 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: 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: Line, Surface and volume Integrals. Theorems of Green's, Gauss and Stoke's(without proofs) and their applications
TEXT BOOKS :
1. Higher Engineering Mathematics, (36th Edition), B.S. Grewal, Khanna Publishers, 2010
2. Advanced Engineering Mathematics, (9th Edition), Erwin kreyszig, John Wiley & Sons,2006.

REFERENCE BOOKS:
1. Advanced Engineering Mathematics (3rd edition) by R.K. Jain & S.R.K. Iyengar, Narosa Publishing House, Delhi.
2. Differential Equations with Applications & Historical Notes(2ndEdi) by George F Simmons, Tata Mc. graw Hill Publishing Co Ltd.
3. Advanced Engineering Mathematics(8thEdition) by Kreyszig, John Wiley & Sons Publishers
4. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry(9thEdition), Pearson, Reprint, 2002
5. Mathematics for Engineering and Scientists (6th Edi), by. Alan Jeffrey, 2013, Chapman & Hall / CRC
6. Engineering Mathematics – I by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2012 Yr. Edition S. Chand.
7. Differential Equations (3rd Ed), S. L. Ross Wiley India, 1984.

COURSE OUTCOMES:
On completion of the course students will be able to
1. Determine first order differential equations and obtain solutions.
2. Solve higher order linear differential equations using various methods.
3. Evaluate areas and volumes using multiple integrals.
4. Evaluate Gradient, Divergence, Curl and directional derivatives.
5. Evaluate integrals by converting line to surface integral and surface to volume integrals.

END

(A30001) ENGLISH

B. Tech (AI & DS) II Semester

L	T	P	C
2	**0**	**0**	**2**

UNIT-I:
Reading: On the Conduct of Life: William Hazlittfrom "Language and Life:
A Skills Approach" Published by Orient Black Swan, Hyderabad.
Grammar: Prepositions
Vocabulary: Word Formation I: Introduction to Word Formation
Writing: Clauses and Sentences

UNIT-II:
Reading: The Brook: Alfred Tennyson from "Language and Life: A Skills Approach" Published by Orient Black Swan, Hyderabad.
Grammar: Articles
Vocabulary: Word Formation II: Root Words from Other Languages
Writing: Punctuation
Life Skills: Self Improvement- 'How I Became a Public Speaker': George Bernard Shah

UNIT-III:
Grammar: Noun-Pronoun Agreement, Subject-Verb Agreement
Vocabulary: Word Formation III: Prefixes and Suffixes from Other Languages
Writing: Principles of Good Writing
Life Skills: Time Management- 'On Saving Time': *Seneca*

UNIT-IV:
Grammar: Misplaced Modifiers
Vocabulary: Synonyms and Antonyms
Writing: Essay Writing
Life Skills: Innovation- Muhammad Yunus – A biography

UNIT –V:
Reading: Politics and English Language: George Orwell from "Language and Life: A Skills Approach" Published by Orient Black Swan, Hyderabad.
Grammar: Clichés, Redundancies
Vocabulary: Common Abbreviations
Writing: Writing a Summary

TEXTBOOKS:
1. A Text book entitled **"Language and Life: A Skills Approach"** Published by Orient Black Swan, Hyderabad. ISBN:978-93-5287-422-4

REFERENCES:
1. Practical English Usage. Michael Swan. OUP. 1995
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

COURSE OUTCOME:
At the end of the course the student will be able to:
1. Apply the rules of Noun-Pronoun Agreement, Subject-Verb Agreement in sentence formation.

2. Identify the Root Words from other Languages and describe the methods of word formation in English Language.
3. Employ Synonyms, Antonyms, Affixation and Acronyms in writing and speaking correct English
4. Compose essays and summaries in English and apply time management skills to make best use of time.
5. Apply the public speaking skills in giving presentations and speeches in English

(A30011) ENGINEERING CHEMISTRY

B. Tech (AI & DS) II Semester	L	T	P	C
	3	0	0	3

UNIT-I
Molecular Structure and Theories of Bonding:
Introduction, Concept of atomic and molecular orbitals, Linear combination of atomic orbitals (LCAO), Molecular orbitals of diatomic molecules, Molecular orbital energy level diagrams of diatomic molecules- N_2, O_2 and F_2, π −molecular orbitals of butadiene and benzene.

Crystal Field Theory (CFT):
Salient features of CFT, Crystal field splitting patterns of transition metal ion d-orbitals- tetrahedral, octahedral and square planar complexes.

UNIT-II
Electrochemistry:
Introduction, Conductance- Specific conductance, Equivalentconductance, Molar conductance and their inter relationship, Numerical problems, Electrochemical cell, Electrode potential, Standard electrode potential and E.M.Fof the cell, Nerns't equation- derivation and applications, Types of electrodes- Quinhydrone electrode, Calomel electrode and Glass electrode. Electro chemical series and its applications. Concept of concentration cells, Electrolytic concentration cell and numerical problems, Batteries- primary (Lithium cell), secondary (Lead acid storage battery and Lithium ion battery) and Fuel cells(H_2-$O_2$and methanol-oxygen).

Corrosion:

Causes and effects of corrosion, Theories of chemical and electrochemical corrosion, Mechanism of electrochemical corrosion, Pilling-Bedworth rule, Types of corrosion- Galvanic, Waterline and Pitting corrosion, Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection, Sacrificial anode and Impressed current cathodic methods, Surface coatings- Metallic coatings, hot dipping, galvanizing and tinning,Electroplating- Copper plating andelectrolessplating - Nickel plating.

UNIT –III
Spectroscopic Techniques and Applications:

Principles of spectroscopy and selection rules, Applications of UV-Visible spectroscopy, Vibrational and rotational spectroscopy (IRspectroscopy)-Applications, Nuclear magnetic resonance-Chemical shift, Splitting pattern and Integration, Introduction to magnetic resonance imaging.

UNIT-IV
Water Technology:
Sources of water, Impurities in water, Hardness of water, Temporary and permanent hardness, Units of hardness, Estimation of temporary and permanent hardness of water, EDTA method, Numerical problems, Potable water treatment-Specifications, Steps involved in treatment-Sedimentation, Coagulation, Filtration, Sterilization, Desalination of Brackish Water, Reverse Osmosis and Electro dialysis.

Industrial water treatment, Boiler Troubles-Scales andsludges, Caustic embrittlement, Boiler corrosion, Priming and foaming. Hot lime and cold lime soda process-Numerical problems, Zeolite process and Ion exchange process. Internal conditioning methods like Phosphate, Carbonate, Calgon and Colloidal conditioning.

UNIT-V
Stereochemistry:
Representations of three-dimensional structures, Structural isomers and stereoisomers, Configurations and symmetry, Chirality-Enantiomers, Diastereomers, Optical activity, Absolute configurations and conformational analysis of n-butane.

Organic Reaction Mechanisms and Synthesis of a Drug Molecule:

Introduction, Substitution reactions- Nucleophilic substitution reactions (Mechanisms of SN^1 and SN^2 reactions, Addition Reactions-Electrophilic and nucleophilic addition reactions, Addition of HBr to propene, Mar kownikoff and anti markownikoff'sadditions, Grignard additions on carbonyl compounds, Elimination reactions- Dehydrohalogenation of Alkyl halides, Shetzeff rule.

Oxidation reactions- Oxidation of Alcohols using $KMnO_4$ and chromic acid, Reduction reactions-reduction of carbonyl compounds using $LiAlH_4$, $NaBH_4$, Synthesis of a commonly used drug molecules (Paracetamoland Ibuprofen).

Text Books:
1. "Engineering Chemistry", P.C Jain and Jain Monika,DhanpatRai Publication Company, 16th Edition, 2015.

2. Text Book of Engineering Chemistry by A.Jaya Shree, Wiley India Pvt. Ltd, New Delhi.

Reference Books:
1. University chemistry, by B. H. Mahan, Narosa Publication.1998.
2. Chemistry: Principles and Applications, by M. J. Sienko and R.A. Plane, McGraw-Hill, 3rd edition, 1980.
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell, McGraw-Hill, 3rd revised edition, 1983.
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S.Krishnan.
5. Physical Chemistry, by P. W. Atkins, W.H. Freeman and Company, 5th Edition, 1994.
6. "Text Book of Engineering Chemistry", B.Rama Devi, Ch. VenkataRamana Reddy and PrasanthRath,Cengage Learning 2017.
7. "Organic Chemistry", Morison and Boyd, Pearson publications, 7th Edition 2011.
8. Organic Chemistry: Structure and Function by K.P.C.Volhardt and N.E.Schore,5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

Course Outcomes:
After completion of the course students will be able to
1. Explain the benefits of treated water as source in steam generation in industrial applications
2. Describe how electrochemical concepts can be used in various practical applications, like batteries,fuel cells etc.Explain the chemical applications of electricity
3. Apply knowledge of corrosion science to problems in materials engineering, explain various methods of prevention of corrosion of metals.
4. Analyze microscopic chemistry in terms of atomic and molecular orbitals
5. List major chemical reactions that are used in the synthesis of drugs.

END

(A30503) DATA STRUCTURES & ALGORITHMS
(Common to ECE, CSE, EEE, IT)

B. Tech (AI & DS) II Semester

$\underline{L}$	$\underline{T}$	$\underline{P}$	$\underline{C}$
3	0	0	3

UNIT - I
Data Structures: Introduction, classification of Data structures, ADT and applications, Over view of List and its operations.
Linked Lists: Representation in memory, Operations of Singly Linked List: Traversing, Searching, Insertion, Deletion and Reverse, Doubly Linked List and its Operations, Circular Linked Lists and its Operations.

UNIT - II
Stacks: Stack ADT and its implementations, Applications of Stacks: Infix to Postfix Conversion and Postfix evaluation – Corresponding algorithms.
Queues: Queue ADT and its implementations, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each type of Queues- Corresponding Algorithms.

UNIT - III
Trees: Basic Tree Terminologies, Representations, types of Binary Trees: Threaded Binary Tree, Binary Search Tree, AVL Tree and their operations: Insertion Deletion, Traversal.

UNIT – IV
Graphs: Basic Terminologies, Representations, Graph traversal algorithms.
Dictionaries: Dictionary as a linear list and its operations-Insertion, Deletion, Searching, Hash tables, Hash Functions, Collision Resolution

Techniques-Linear Probing, Quadratic Probing, and Double Hashing.

UNIT V
Sorting: Quick Sort, Merge Sort, Heap Sort, comparison of techniques.
Pattern Matching Algorithms: Brute-Force Algorithm and Knuth-Morris-Pratt Algorithm.

Text books:
1. Ellis Horowitz, Sartaj Sahni, Fundamentals of Data Structures in C, Second Edition Universities Press.
2. Thomas H. Cormen Charles E. Leiserson, Introduction to Algorithms, PHI Learning Pvt. Ltd. Third edition.

Reference books:
1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. E.Balagurusamy Data Structures Using C, McGraw Hill Education; First edition

Course Outcomes:

On completion of the course students will be able to

1. Use data structure concepts for realistic problems.
2. Identify appropriate data structure for solving computing problems in respective language.
3. Develop algorithms, operations on queues, stacks and Linked Lists.
4. Demonstrate the representation and traversal techniques of graphs and their applications
5. Implement basic operations on binary trees.

END

(A30002) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

B. Tech (AI & DS) II Semester

L	T	P	C
0	0	3	1.5

English Language Communication Skills Lab shall have **two** parts
- **A.   Computer Assisted Language Learning (CALL) Lab**
- **B.   Interactive Communication Skills (ICS) Lab**

INTRODUCTION:
The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

EXERCISE – I
CALL Lab: Introduction to Phonetics – Speech Sounds – Vowels and Consonants
ICS Lab: Ice-Breaking activity and JAM session

EXERCISE – II
CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
ICS Lab: Situational Dialogues – Role-Play- Expressions in Various Situations – Self-introduction and Introducing Others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.

EXERCISE – III
CALL Lab: Minimal Pairs- Word accent and Stress Shifts.
ICS Lab: Descriptions – Place, Person, Object

EXERCISE – IV
CALL Lab: Intonation and Common errors in Pronunciation.
ICS Lab: Extempore- Public Speaking

EXERCISE – V
CALL Lab: Neutralization of Mother Tongue Influence and Conversation Practice
ICS Lab: Giving Directions

COURSE OUTCOMES:

At the end of the lab session, learner comprehends, acquaints and adopts the following.

1. Illustrates How to Work in Teams and demonstrates Soft Skills and Communication Skills well.
2. Minimizes the usage of Mother Tongue and Apprises Neutral Accent
3. Prepares for employability skills
4. Speaks English Confidently and does Presentations with self-confidence
5. Distinguishes between Sympathy and Empathy

END

(A30012) ENGINEERING CHEMISTRY LAB

B. Tech (AI & DS) II semester

L	T	P	C
0	0	3	1.5

1. Estimation of Hardness of water by EDTA method.
2. Estimation of Alkalinity of water.
3. Estimation of Copper by Colorimetric Method.
4. Conductometric Titration of a strong acid vs a strong base.
5. Conductometric Titration of a week acid vs a week base.
6. Potentiometric Titration of a strong acid vs a strong base.
7. Potentiometric Titration of week acid vs a week base.
8. Preparation of Paracetmol and Asprin.
9. Determination of Viscosity of a Liquid.
10. Determination of Surface Tension of a liquid.
11. Adsorption of acetic acid on Activated charcoal.
12. Estimation of iodine in table salt.
13. Thin Layer Chromatography (Ortho-Nitro phenol &Para-Nitro phenol).
14. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate.

Course outcomes:
At the end of the course the student will be able to
1. Predict the extent of hardness range present in water sample and its consequences in industrial operations
2. Prepare drugs like Aspirin and Paracetmol
3. Estimate the strength of solutions, pH of various solutions
4. Evaluate the viscosity and surface tension of liquids
5. Employ the conductometric and potentiometric titrations

REFERENCES:
1.Engineering Chemistry Lab Manual, Glaze Publishers 2018.
2.Engineering chemistry by B. Rama Devi & Ch. VenkataRamana Reddy;
  Cengage Learning, 2012.
3.A Textbook of Engineering Chemistry, SashiChawla, DhanapathRai& Sons.

(A30504) DATA STRUCTURES & ALGORITHMS LAB
(Common to ECE, CSE, EEE, IT)

B. Tech (AI & DS) II Semester

L	T	P	C
0	0	3	1.5

Lab 1: Write a C program to perform the following operations on the givenarray
        (i) insert element in specific position in toarray
        (ii) Delete random element fromarray
        (iii) Reverse the arrayelements
Lab 2: A) Write a C program to implement Single linkedlist
      i) Insertion   ii) Deletion   iii) Display
      B) Write a C program to implement Circular linkedlist
      i) Insertion   ii) Deletion.   iii)Display
Lab 3: A) Write a C program to implement Doubly linkedlist

      i) Insertion   ii) Deletion.   iii)Display
      B)   Write C programs to implement Stack ADTusing
      i)Array   ii) LinkedList
Lab 4:
    A.   Write a C program that uses stack operations to convert a given infix expression in to its postfix equivalent. (Display the role ofstack).
    B.   Write a C program for Evaluation of postfixexpression.
.
Lab 5: Write C programs to implement Queue ADT using
i) Array ii) Linked List

Lab 6: Write a C program to implement Binary search tree
i) Insertionii) deletioniii) Traversals

Lab 7:
Write a C program to implement binary search tree Non - recursively traversals
i) Pre- Order   ii) Post –Order   iii) In-Order

Lab 8:
(A) Write a C Program to Check if a Given Binary Tree is an AVL Tree or Not
(B) Write a C program to find height of a Binary tree
(C) Write a C program to count the number of leaf nodes in a tree.

Lab 9:
Write a C program for implementing Graph traversal
i) DFS   ii) BFS

Lab 10:
A) Write a C program to implement different hash methods

B) Write a C program to implement the following collisionresolving
i) Quadratic probing. ii) Linear Probing

Lab 11:
Write C programs for implementing the following Sorting methods and display the important steps.
i) Quick Sort   ii) Heap sort

Lab 12:
Write a C program for implementing pattern matching algorithms
i) Knuth-Morris-Pratt   ii) Brute Force

Additional

1. Implement the priority queue using Heap
2. Write a C Program to Implement Merge sort
3. Write a C program to implement AVL tree
   i) Creation   ii) Deletion   iii) Traversals
4. Write a function to reverse the nodes of a linked list
5. Write a C program to implement 2-3-4 tree operations
6. Write a C program to implement B tree operations
7. Write a C program to implement B+ tree operations

Reference Books:

1. Ellis Horowitz, Sartaj Sahni, Fundamentals of Data Structures in C, Second Edition Universities Press.
2. Thomas H. Cormen Charles E. Leiserson, Introduction to Algorithms, PHI Learning Pvt. Ltd. Third edition.
3. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
4. E.Balagurusamy Data Structures Using C, McGraw Hill Education; First edition

Course Outcomes
At the end of the course the student will be able to

1. Write and execute C-programs to implement Linked List Data Structures
2. Evaluate postfix expressions by implementing in C-language
3. Implement Non- linear Data Structures in C-language
4. Implement various sorting techniques in C-language
5. Test various pattern matching algorithms by implementing in C-language.

(A30314) ENGINEERING WORKSHOP

B. Tech (AI & DS) II Semester

L	T	P	C
0	0	3	1.5

I Trade for Exercise:

(Two experiments each from any six trades of the following)
1. Carpentry
2. Fitting
3. Tin-smithy
4. House-wiring
5. Foundry
6. Plumbing
7. Welding
8. Black smithy

II Trades for Demonstration and Exposure:
1. Power tools
2. Machine Tools- Turning on Lathe and other Operations on Lathe.,

TEXT BOOK:
1. Workshop Manual, Second edition/ P Kannaiahand K L Narayana/ Scitech publishers

Course Outcomes
On completion of the course students will be able to
1. Design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint. and various basic prototypes in the trade of fitting such as Straight fit, V- fit etc.
2. make various basic prototypes in the trade of Tin smithy such as rectangular tray, and funnel
3. Perform various basic House Wiring techniques such as connecting one lamp with two switch, ceiling fan etc.
4. design and model various basic prototypes in the trade of Welding such as Lap joint, Butt joint etc
5. Design and model various basic prototypes in the trade of blacksmithy, foundry and plumbing.

B. Tech (AI & DS) II Semester

L	T	P	C
0	0	3	1.5

Module 1

Introduction to Engineering and Engineering Study: Introduction to Engineering and Engineering Study: Difference between science and engineering, scientist and engineer needs and wants, various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer.

Module 2

Engineering Design: Engineering Design Process, Multidisciplinary facet of design, Importance of analysis in engineering design, general analysis procedure, Pair wise comparison chart, Introduction to mechatronics system, generation of multiple solution, decision matrix, Concepts of reverse engineering

Module 3

Mechanisms: Basic Components of a Mechanism, Degrees of Freedom or Mobility of a Mechanism, 4 Bar Chain, Crank Rocker Mechanism, Slider Crank Mechanism.

Module 4

Platform based development: Introduction to various platform-based development, programming and its essentials, Introduction to transducers and actuators and its interfacing. Concepts of reverse engineering

Data Acquisition and Analysis: Types of Data, Descriptive Statistics techniques as applicable to different types of data, Types of graphs as applicable to different types of data, Usage of data acquisition tools for descriptive statistics, Data Acquisition, Exporting acquired data to analysis using visual representation

Module 5

Project Management: Introduction, Significance of teamwork, Importance of communication in engineering profession, Project management tools: Checklist, Timeline, Gantt Chart, Significance of documentation

Sustainability: Introduction to sustainability, Sustainability leadership, Life cycle assessment, carbon footprint

References:

1. Engineering Fundamentals: An Introduction to Engineering (MindTap Course List) 5th Edition by Saeed Moaveni
2. Software Project Management (SIE), (Fifth Edition); Bob Hughes, MikeCotterell, Rajib Mall; Published by Tata McGraw-Hill Education Pvt. Ltd (2011) ; ISBN 10: 0071072748 ISBN 13: 9780071072748
3. A Ghosh and AK Malik: Theory of Mechanism and Machine; East West Press (Pvt) Ltd., New Delhi.
4. Arduino Cookbook, 2nd Edition by Michael Margolis: O'Reilly Media
5. Data Acquisition and Analysis - Building an Excel Budget Forecast Workbook by Andrew Greaney (Kindle Edition) ISBN: 1521903468
6. Concepts in Engineering Design – 2016; by Sumesh Krishnan (Author), Dr. Mukul Shukla (Author), Publisher: Notion Press

Course Outcomes:

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

1. Explain the importance of engineering profession in the world.
2. Identify multi-disciplinary approach required in solving an engineering problem
3. Build a mechanism for a given application
4. Design a mechatronic system using arduino and electronic components
5. Analyze engineering solution from sustainability perspectives.

END

(A30007) NUMERICAL TECHNIQUES & PROBABILITY DISTRIBUTIONS
(Common to CE, ME, CSE, IT)

B. Tech (AI & DS) III Semester

$$\frac{L}{3} \quad \frac{T}{1} \quad \frac{P}{0} \quad \frac{C}{4}$$

UNIT-I: NUMERICAL METHODS-I
Solution of polynomial and transcendental equations: Bisection method, Iteration method, Newton-Raphson method and Regula-False method.
Interpolation: Finite differences, Forward differences, Backward differences, Central differences, Symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation, Gauss's forward and backward formulae, Lagrange's method of interpolation.

UNIT-II: NUMERICAL METHODS-II
Numerical integration: Trapezoidal rule, Simpson's 1/3rd and 3/8 rules.
Numerical Solutions of Ordinary Differential Equations -Taylor's series, Picard's method, Euler and modified Euler's methods, Runge-Kutta method of fourth order.

UNIT-III: LAPLACE TRANSFORMS
Laplace transform of standard functions, First shifting theorem, Laplace transforms of functions when they are multiplied and divided by 't'. Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transforms of special functions, Laplace transform of periodic functions. Inverse Laplace transform by different methods, Convolution theorem (without Proof), Solving ODEs by Laplace transform method.

UNIT- IV:
RANDOM VARIABLES & DISTRIBUTIONS
Random Variables: Discrete and continuous random variables.
Distributions: Binomial distribution, Poisson distribution and their Properties, Normal distribution, Sampling distribution of means (σ - known and unknown).

UNIT- V:TEST OF HYPOTHESIS
Test of hypothesis, Null hypothesis, Alternative hypothesis, Type-I & II errors, Critical region, Confidential interval for the mean & proportions. Test of hypothesis for large samples, Single mean, Difference between the means, Single proportion and difference between the proportions. Test of hypothesis for Small
samples, Confidence interval for the t- distribution, Tests of hypothesis t -test, F-test, $\chi2$- test, goodness of fit.

TEXT BOOKS:
1. Higher Engineering Mathematics (36th edition) by B.S. Grewal, Khanna Publishers.
2. Fundamentals of Mathematical Statistics (11th Edition) by S.C. Gupta& VK Kapoor, Sultan Chand & Sons.

REFERENCE BOOKS:
1. Advanced Engineering Mathematics (3rd edition) by R.K. Jain & S.R.K. Iyengar, Narosa Publishing House, Delhi.
2. Introductory Methods of Numerical Analysis, S.S. Sastry, 4h Edition, Prentce Hall of India Pvt. Ltd.
3. Advanced Engineering Mathematics (9th edition) by Erwin Kreyszig John Wiley & Sons Publishers.
4. Probability & Statistics by T.K.V. Iyengar, B. Krishna Gandhi & Others, 2015 Yr. Edition S. Chand.

5. Applied Mathematics for Engineers & Physicists (3rd edition) by Pipes & Harvill, McGraw Hill Internation Book company.

COURSEOUTCOMES:
On completion of the course students will be able to
1.Find the root of given equation and estimate unknown value using interpolation.
2.Find numerical solutions of ordinary differential equations.
3.Solve ordinary differential equations using Laplace transform.
4.Analyse random variables involved in probability models.
5.Test hypothesis for large and small samples.

END

(A30516) OPERATING SYSTEMS

B. Tech (AI & DS) III Semester

$$\begin{array}{cccc} \underline{L} & \underline{T} & \underline{P} & \underline{C} \\ 3 & 0 & 0 & 3 \end{array}$$

UNIT-I
Operating System Introduction, Structures - Simple Batch, Multi-programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls.

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

UNIT –III
Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, 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. Inter process 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- Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT -V
File System Interface and Operations-Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. usage of open, create, read, write, close, lseek, stat, ioctl, system calls.

Text Books:
1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg
Gagne7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R. Stevens, Pearson education.

Reference Books:
1. Operating Systems – Internals and Design Principles, Stallings, 5th Edition,
   Pearson Education/PHI,2005.
2. Operating System A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum 2nd edition, Pearson/PHI.
4. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
5. Unix Internals the New Frontiers, U. Vahalia, Pearson Education.

Course Outcomes
Students shall be able to
1.Describe the components of computer and their respective roles in computing.
2.Explain process concepts and CPU Scheduling Algorithms
3.Demonstrate the Mutual exclusion, deadlock detection and Inter Process
  Communications.
4.Analyze various memory management and allocation methods.
5.Discuss File System Interface and Operations.

END

(A30513) COMPUTER ORGANIZATION & ARCHITECTURE

B. Tech (AI & DS) III Semester

$\underline{L}$	$\underline{T}$	$\underline{P}$	$\underline{C}$
3	1	0	4

Unit-1

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs

Unit-II

Data representation: signed number representation, fixed and floating-point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and-add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.

Unit-III

Introduction to x86 architecture. CPU control unit design: hardwired and micro-programmed design approaches, Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB

Unit-IV

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency

Unit-V

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

Text books:

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer Organization and Embedded Systems", 6th Edition by CarlHamacher, McGraw Hill Higher Education.

Reference books:

1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw- Hill
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

Course Outcomes

On completion of the course students will be able to
1. Describe basic computer organization
2. Explain the design of Control Unit.
3. Illustrate Data representation in computer's memory
4. Describe Input-Output, Memory Organization.
5. Distinguish between RISC and CISC Instruction Set.

END

(A36201) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

B. Tech (AI & DS) III Semester

$$\frac{L}{3} \quad \frac{T}{0} \quad \frac{P}{0} \quad \frac{C}{3}$$

Unit-I
Introduction to Object Oriented Programming: Need for Object Oriented Programming - Characteristics of Object-Oriented Languages, Objects, Overloading, Overriding Functions and Object Polymorphism, Inheritance, Abstraction, Interfaces, java introduction & language fundamentals
Packages: Defining, Creating and Accessing a Package, Understanding Class path, Importing Packages

Unit-II
Inner Classes: Use of Inner Classes, Local Inner Classes, Anonymous Inner Classes, Static Inner Classes, Example.
Exception Handling: Dealing with Errors, Benefits of Exception Handling, The Classification of Exceptions, Exception Hierarchy, Checked Exceptions and Unchecked Exception, Usage of Try, Catch, Throw, Throws, and Finally, Re-Throwing Exceptions, Exception Specification, Built in Exceptions, Creating Own Exception Sub Classes

Unit-III
Multithreading: Difference Between Multiple Processes and Multiple Threads, Thread States, Creating Threads, Interrupting Threads, Thread Priorities, Synchronizing Threads, Inter-Thread Communication, Producer Consumer Pattern.
File I/O: Streams-Byte Streams, Character Streams, Text Input /Output, Binary Input/output, File Management using File Class

Unit-IV
Collection Framework in Java: Introduction to Java Collections, Overview of Java Collection Frame Work, Generics, Commonly used Collection Classes-Array List, Vector, Hash Table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, Calendar and Properties.
Connecting to Database: JDBC Type I To IV Drivers, connecting to a Database, querying a Database and Processing the Results, Updating Data With JDBC.

Unit-V

GUI Programming with Java: Introduction to Scala and Swing, Hierarchy for Swing and Scala Components, ContainersJFrame, JApplet, JDialog, JPanel, Overview of Some Swing Components, JButton, JLabel, JTextfield, JTextarea, Simple Swing Applications, Layout Management- Layout Manager Types- Border Grid and Flow. Event Handling: Events, Event Sources, Event Classes, Event Listeners, Relationship Between Event Sources and Listeners, Delegation Event Model, Examples: Handling a Button Click, Handling Mouse Events, Adapter Classes.

Textbooks
1.Java Fundamentals: A Comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.
2.Programming Development in Java, BarbaraLiskov, Addison-Wesley

References
1. Data Abstraction and Problem Solving with Java: Walls and Mirrors by Frank M. Carrano and Janet J. Prichard
2. Java for Programming, P.J. Dietel Pearson Education
3. Object Oriented Programming through Java, P. Radha Krishna, and Universities
Press.
4. Thinking in Java, Bruce Eckel, Pearson Education
5. Programming in Java, S. Malhotra and S. Choudhary, Oxford University Press

Course Outcomes
On completion of the course students will be able to

1. Describe the characteristics of Object-Oriented Programming Languages.
2. Illustrate Java Exception Handling Mechanism
3. Develop applications using Java Multi-Thread Concept.
4. Use Java Collection Framework
5. Design GUI applications using Java Swings.

END

(A30509) DATABASE MANAGEMENT SYSTEMS

B. Tech (AI & DS) III Sem

L	T	P	C
3	1	0	4

Unit-1:

Database System Applications: Database system vs file system, view of data, data abstraction, instances and schemas, data models, the ER model, relational model, other models, database languages, DDL, DML, database users and administrator, transaction management, database system structure, storage manager, the query processor, data base design and ER diagrams, beyond ER design entities, attributes and entity sets, relationships and relationship sets, additional features of ER model, concept design with the ER Model

Unit-2:
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.
Form of basic SQL query, examples of basic SQL queries, introduction to nested queries, correlated nested queries, set comparison operators, aggregation operators, NULL values, comparison using null values, logical connectivity's, AND, OR and NOT, impact on SQL constructs, outer joins, disallowing NULL values

Unit-3:
Relational Algebra: Selection and projection, set operations, renaming, Joins, Division, Examples of Algebra overviews, Relational calculus, Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus. Schema refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, dependency preserving decomposition, schema refinement in database design, multi valued dependencies, FOURTH normal form, FIFTH normal form.

Unit-4:
Transactions: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation-Based Protocols, Multiple Granularity.

Unit-5:
Storage: Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Text Books:
1."Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.
2." Database Management Systems",3rd Edition by Johannes Gehrke and Raghu Ramakrishnan, McGraw-Hill.

Reference Books:
1 "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science press.
2 "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe,
Pearson Education.
3 "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor
Vianu, Addison-Wesley.

Course Outcomes
On completion of the course students will be able to

1. Explain the significance of Database Management Systems.
2. Write SQL queries to interact with RDBMs
3. Describe various Normal Forms of Relations.
4. Evaluate various concurrency control protocols
5. Classify Indexing Techniques based on prime attributes.

END

(A30510) DATABASE MANAGEMENT SYSTEMS LAB

B. Tech (AI & DS) III Sem

L	**T**	**P**	**C**
0	**0**	**3**	**1.5**

Week-1: Working with DDL, DML, DCL and Key Constraints
(Creation, Altering and Dropping of Tables and Inserting Rows into a Table (Use Constraints While Creating Tables) Examples Using Select Command.)

Week-2: Working with Queries and Nested QUERIES
(Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints)

Week-3: Working **with Queries USING Aggregate Operators & views**
Queries using Aggregate Functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and Dropping of Views

Week-4: Working with Conversion Functions & String Functions
Queries using Conversion Functions (to_char, to_number and to_date), String Functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), Date Functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

Week-5: Working **with Triggers using PL/SQL**
Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

Week-6: Working with PL/SQL Procedures
Programs Development using Creation of Procedures, Passing Parameters IN and OUT of PROCEDURES.

Week-7: Working with LOOPS using PL/SQL and Exception Handling
Program Development using WHILE LOOPS, Numeric FOR LOOPS, Nested Loops using ERROR Handling, BUILT-IN Exceptions, USE Defined Exceptions, RAISE- APPLICATION ERROR

Week-8: Working with Functions Using PL/SQL
Program Development using Creation of Stored Functions, Invoke Functions in SQL Statements and Write Complex Function
Week-9: Working with CURSORS
Develop Programs using Features Parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of Clause and CURSOR Variables

Week-10: Working with PL/SQL Packages
Program development using Packages.

Week-11: Case Study-I
Design & Implementation of Library Management System

Week-12: Case Study-II
Design & Implementation of Hospital Management System

Reference books:
1. Oracle PL/SQL by Example, Benjamin Rosenzweig, Elena Silvestrova, Pearson Education 3rd Edition
2. Oracle Database LogG PL/SQL Programming, Scott Urman, Tata Mc-Graw Hill.
3. SQL and PL/SQL for Oracle 10g, Black Book, Dr .P.S. Deshpande.

Course Outcomes
On completion of the course students will be able to

1. Demonstrate the usage of SQL statements for the creation, manipulation of data in the Database.
2. Write & execute queries on the given Database
3. Write & Execute PL/SQL programs for a given application
4. Develop & Demonstrate the usage of Cursors in PL/SQL
5. Design & Implement a given Enterprise Database

END

(A36202) JAVA LAB
(Common to CSE-CS, CSE-AI&ML)

B. Tech (AI & DS) III Semester

<u>L</u>	<u>T</u>	<u>P</u>	<u>C</u>
0	0	3	1.5

Week 1:

1. Write a java program that works as a simple calculator for the +,-,*,/,%
operations   using classes and objects in java.
2. Write a java program to find result of a given arithmetic expression?
(EX: if you given   arithmetic expression like 10+20-24*4/2-4.5= it should print
7.5)

Week 2:

3. Write a program to demonstrate the following
i) Super, Final ii) Single inheritance iii) Multi –level inheritance
4. Write a program to demonstrate the usage of method overriding, calling super class constructor in derived class.

Week 3:
5. Write a java program to create an abstract class named **shape** that contains two integers and an empty method named printarea (). Provide three classes named Rectangle, Triangle and Circle such that each one of these classes extends the class Shape. Each one of the classes contains only the method printarea () that prints the area of the given shape.

Week 4:
6. Write a program to demonstrate method overloading and constructor overloading.
7. Write a program to demonstrate polymorphism using interface (interface in package P1 and class in package P2)

Week 5: Exception handling in java
8. Implement pre-defined exceptions
9. Implement user defined exceptions

Week 6:
10. Develop a scala and swing component in java that displays a simple message.

11. 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 Num2 is displayed in the result fields when the division button is clicked. If Num1 or Num2 were not an integer, the program should throw a Number Format Exception. If Num2 were Zero the program should throw an Arithmetic Exception. Display the exception in a message dialog box.

Week 7:
12. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second. if the generated value is even, second thread computes the square of the number and prints. If the generated value is odd, the third thread will print the value of cube of the number

Week 8:
13. Write a java program to demonstrate Generic class and generic methods
14. Write a java to perform string operations using sting buffer class and its methods.

Week 9:
15. 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.

Week 10:
16. 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).

Week 11:
17. Write a java program that connects to a data base using JDBC and does add, delete, modify and retrieve operations.

Week12
18. Implement the week 10 program with database instead of a text file.
19. Write a java program that takes tab separated data (one record per line) from a text file and inserts them into a database.

Textbooks
1. Java Fundamentals- A Comprehensive introduction, Herbert schildt and Dale skrien, TMH.
2. Programming Development in Java, Barbara Liskov, Addison-Wesley

References
1. Java for programming, P.J. Dietel Pearson education (OR) Java: How to Program P.J. Dietel and H.M. Dietel, PHI
2. Data Abstraction and Problem Solving with Java: Walls and Mirrors by Frank M. Carrano and Janet J. Prichard
3. Object Oriented Programming through java, P. Radha Krishna, Universities Press.
4. Thinking in Java, Bruce Eckel, Pearson Education
5. Programming in Java, S. Malhotra and S. Choudhary, Oxford University Press

Course Outcomes

On completion of the course students will be able to
1. Write & execute programs using JAVA Programming Language Syntax
2. Use Java API functions to write and execute programs for problem solving.
3. Demonstrate the usage of Java Exception handling mechanisms.
4. Write and execute Java applications using Java String Buffer Class
5. Design Java Applications using JAVA GUI components and test them by
   execution.

END

(A30016) GENDER SENSITIZATION

B. Tech (AI & DS) III Semester	**L**	**T**	**P**	**C**
UNIT-I:	**0**	**0**	**2**	**0**

Understanding Gender
Lesson 1 – Gender: Why should we study it?
Lesson 2 – Socialization: Making Women, Making Men
Lesson 12 – Just Relationships: Being together as Equals

UNIT-II:
Gender and Biology
Lesson 4 – Missing Women: Sex selection and its consequences

Lesson 10 – Gender Spectrum: Beyond the Binary
Lesson 13 – Additional Reading: Our Bodies, Our Health

UNIT-III:
Gender and Labour
Lesson 3 – Housework: The Invisible Labour
Lesson 7 – Women's Work: Its Politics and Economics

UNIT-IV:
Issues of Violence
Lesson 6 – Sexual Harassment: Say No!
Lesson 8 – Domestic Violence: Speaking Out
Lesson 11 – Thinking about Sexual Violence

UNIT-V:
Gender Studies
Lesson 5 – Knowledge: Through the Lens of Gender
Lesson 9 – Who's History? Questions for Historians and Others.

COURSE OUTCOMES
1. Identify realities of gender discrimination prevalent in the society at all levels.
2. Infer and discuss historical evidences, perspective and voices of discrimination against women in all societies and civilizations.
3. Identify, protest and overcome the evils of body shaming.
4. Analyze discrimination and exploitation of women labour in domestic as well as social sphere. Learners infer women's rights, women's wage disparities, women's issues and demonstrate these grievances through law.
5. Identify different types of sexual exploitation; sexual violence and marital violence show empathy towards victims of such violence and generate public opinion in face of any exploitation.

END

(A37302) MATHEMATICS FOR MACHINE LEARNING
(PROFESSIONAL CORE COURSE)
(Common to AI & ML, AI & DS)

B. Tech (AI & DS) IV Sem

L	T	P	C
3	0	0	3

Unit-I
Introduction: System of linear equations, Matrices, Solving system of linear equations, vector spaces, linear independence, basis and rank, linear mapping, affine spaces

Analytic Geometry: Norms, Inner products, lengths and distances, angles, and orthogonality, orthonormal basics, orthogonal complement, inner product of functions, orthogonal projections, rotations.

Unit-II
Matrix Decomposition: Determinant and trace, eigen values and eigen vectors, Cholesky decompositions, Eigen decomposition and Diagonalization, Singular Value Decomposition, Matrix Approximation, Matrix Phylogeny

Vector Calculus: Differentiation of Univariate Functions, Partial Differentiation and Gradients, Gradients of Vector-Valued Functions, Gradients of Matrices, Useful Identities for Computing Gradients, Backpropagation and Automatic Differentiation, Higher-Order Derivatives, Linearization and Multivariate Taylor Series

Unit-III
Probability and Distributions: Construction of a Probability Space, Discrete and Continuous Probabilities, Sum Rule, Product Rule, and Bayes' Theorem, Summary Statistics and Independence, Gaussian Distribution, Conjugacy and the Exponential Family, Change of

Variables/Inverse Transform, Optimization Using Gradient Descent, Constrained Optimization and Lagrange Multipliers, Convex Optimization

Model and Data: Data, models and learning, empirical risk minimization, parameter estimation, probabilistic modelling, and inference, directed graphical model, model selection

Unit-IV
Linear Regression: Problem Formulation, Parameter Estimation, Bayesian linear regression, maximum likelihood as orthogonal projection
Dimensionality Reduction with Principal Component Analysis: Problem setting, Maximum variance perspective, projection perspective, Eigenvector Computation and Low-Rank Approximations, PCA in High Dimensions, Key Steps of PCA in Practice, Latent Variable Perspective

Unit-V
Density Estimation with Gaussian Mixture Models: Gaussian Mixture Model, Parameter Learning via Maximum Likelihood, EM Algorithm, Latent-Variable Perspective
Classification with Support Vector Machines: Separating Hyperplanes, Primal Support Vector Machine, Dual Support Vector Machine, Kernels, Numerical Solution

TEXTBOOK:
Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Mathematics for Machine Learning

REFERENCE BOOKS:
1. ML and Ai Academy, Machine Learning Math: A Complete Guide to Machine Learning for Beginners with Tensorflow. This Book Explains How to Build Artificial Intelli
2. Dirk P. Kroese, Zdravko Botev, Thomas Taimre, Radislav Vaisman, Data Science and Machine Learning Mathematical and Statistical Methods

Course Outcomes

After undergoing this course, the students will be able to:
1. Apply analytical geometrics
2. Solve Vector Calculus, eigen values and vectors
3. Apply probability and distribution and understanding of the data selection.
4. Evaluate linear regression analysis and principal component analysis
5. Apply Density Estimation with Gaussian Mixture Models and Classification with Support Vector Machines

END

(A30511) DESIGN AND ANALYSIS OF ALGORITHMS

	L	**T**	**P**	**C**
B. Tech (AI & DS) IV Sem	**3**	**1**	**0**	**4**

Unit-I
Introduction: Characteristics of algorithm, Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

Unit-II
Fundamental Algorithmic Strategies – I: Divide and Conquer, Greedy, and Dynamic Programming, methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, Strassen's Matrix Multiplication, Bin Packing, job sequencing with deadlines, Huffman codes, Knapsack, OBST, Matrix chain multiplication, TSP.

Unit-III
Fundamental Algorithmic Strategies – II: Branch and Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, N-Queens, 0/1 Knapsack, TSP, Sum of sub sets, Graph coloring, Hamiltonian cycle.

Unit-IV

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

Unit-V

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Game tree, min-max search Standard NP-complete problems and Reduction techniques.

Textbooks:
1. Fundamentals of Algorithms – E. Horowitz et al.
2. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.

Reference books:
1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
3. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

Course Outcomes

On completion of the course students will be able to

1. Explain various asymptotic notations to measures the performance of an algorithm
2. Discuss algorithms design strategies
3. Apply Graph & Tree algorithms for real world applications
4. Describe various computability Classes
5. Illustrate P & NP –Type Problems

END

(A30228) BASIC ELECTRICAL ENGINEERING

B. Tech (AI & DS) IV Semester

L	T	P	C
3	0	0	3

UNIT-1
DC Circuits: Circuit Concept–R-L-C parameters–Voltage and Current sources Ohm's law, Kirchhoff's laws, types of sources, source transformations, V-I relation for passive elements ,series parallel circuits, star- delta and delta –star transformations, mesh and nodal analysis, network theorems –super position, thevenin's, maximum power transfer theorem, simple problems.

UNIT-2
AC Circuits: Representation of sinusoidal waveforms, waveforms and basic definitions, RMS and Average values of the alternating quantity, form factor and peak factor, phasor representation   of alternating quantities, the 'j' operator and phasor algebra, Analysis of AC circuits with single basic network elements. Single phase series circuits. Three phase circuits –phase sequence, star and delta connection, relation between line and phase voltage and currents in a balanced system.

UNIT-3
DC Machines:
DC Generators -Principle and operation, constructional details, types, EMF equation, DC Motor- Principle and operation, Principle and operation, types, Torque equation, Losses and Efficiencyin DC Generators and Motors, Speed control of DC Motors

UNIT-4
Transformer:

Single phase transformer-Principle and operation, construction details, Ideal transformer andpractical transformer, equivalent circuit, losses, OC and SC Test, Efficiency and Regulation, simple problems. Three phase transformer-Classification.

UNIT-5
AC Machines:
Three phase induction Motor: Generation of rotating magnetic field, Principle and operation, constructional details, types, Concept of slip, significance of torque slip

characteristic, problemson slip, rotor frequency, rotor EMF and Torque. Principle and operation of Alternator, Singlephase induction motors – Classification.

TEXT BOOKS:
1. Basic concepts of Electrical Engineering, PS Subramanyam, BS Publications.
2. Basic Electrical Engineering, S.N. Singh, PHI.

REFERENCE BOOKS:
1. Basic Electrical Engineering, Abhijit Chakrabarthi, Sudiptanath, Chandrakumar Chanda, Tata-McGraw- Hill.
2. Principles of Electrical Engineering, V. K Mehta, Rohit Mehta, S. Chand Publications.
3. Basic Electrical Engineering, T.K. Nagasarkar and M.S. Sukhija, Oxford University Press.
4. Fundamentals of Electrical Engineering, RajendraPrasad, PHI.
5. Basic Electrical Engineering by D.P. Kothari, I.J. Nagrath, McGraw-Hill.

Course Outcomes

On completion of the course, students will be able to

1. Apply Kirchoff 's Laws & network reduction techniques.
2. Explain AC fundamentals of single & three phase circuits,
3. Categorize DC machines, operation and its characteristics, with the help of tests
and speed control methods.
4. Acquire the knowledge of operation and performance Analysis of transformers
5. Analyze three phase induction motor operation with their characteristics &
acquire the knowledge of alternators and single-phase Induction motors.

(A37303) Artificial Intelligence
(PROFESSIONAL CORE COURSE)
(Common to AI & ML, AI & DS)

B. Tech (AI & DS) IV Sem

L	T	P	C
3	0	0	3

UNIT 1 Introduction: Definition of AI, History of AI, nature of AI problems, examples of AI problems. Problem solving by search: Uninformed Search: Depth First Search (DFS), Breadth First Search (BFS). Informed Search: Best First Search, A*. Local Search: Hill Climbing. Problem Reduction Search: AO*. Population Based Search: Ant Colony Optimization, Genetic Algorithm. Game Playing: Min Max Algorithm, Alpha-Beta Pruning.

UNIT 2 Knowledge Representation: Types of Knowledge, Knowledge Representation Techniques/schemes: Propositional Logic, Predicate Logic, Semantic nets, Frames. Knowledge representation issues. Rule based systems.

UNIT 3 Reasoning under Uncertainty: Basics of Probability Theory, Probabilistic Reasoning, Bayesian Reasoning, Dempster-Shafer Theory. Planning: Introduction to Planning, Representation of Planning, Partial-order Planning.

UNIT 4 Learning: Introduction to Learning, Types of Learning: Learning by Induction, Rote Learning, Symbol Based Learning, Identification Trees, Explanation Based Learning, Transformational Analogy, Introduction to Neural Networks, Expert Systems, Current trends in Artificial Intelligence

Unit 5: Natural Language Processing, Language Models, Text classification, Information Retrieval, information extraction
Robotics: Introduction, Robot Hardware, Robotic perception, planning to move, moving, robotic software architecture.

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

REFERENCE BOOKS:

1. Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill, 3rd ed.,2009.
2. Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI.,2010.
3. Artificial intelligence, Patrick Henry Winston, 1992, Addition We

Course Outcomes

After undergoing this course, the students will be able to:

1. Display the understanding of the historical perspective of AI and its foundation.
2. Apply basic principles of AI in solutions that require problem solving, inference, knowledge representation and learning.
3. Demonstrate fundamental understanding of various application of AI techniques in Expert systems, Neural Networks.
4. Demonstrate an ability to share in discussion of AI, it's the current trends, limitations, and implications of AI.
5. Explain the natural language processing and robotics automation.

END

(A30229) BASIC ELECTRICAL ENGINEERING LAB

B. Tech (AI & DS) IV Semester

L	T	P	C
0	0	3	1.5

PART A:
1. Verification of KCL and KVL.
2. Verification of Superposition theorem
3. Verification of Maximum power transfer theorem.
4. Verification of Thevenin 's theorem.
5. Time Response of First Order RC/RL Network for periodic, non-sinusoidal inputs- timeconstant and steady state error determination

PART B:
1. Magnetization characteristics of D.C. Shunt generator.
2. Speed control of DC motor.
3. Swinburne 's Test on DC shunt machine.
4. Brake test on DC shunt motor.
5. OC and SC tests on Single-phase transformer.
6. Brake test on 3-phase Induction motor.
7. Load Test on single phase Transformer

Note: Any 10 of the above experiments are to be conducted.

Course Outcomes

On Completion of the course, students will be able to

1. Verify KCL & KVL.
2. Verify different theorems.
3. Analyze time response of RC/RL networks.
4. Acquire the knowledge of different tests conducted on DC machines
5. Acquire the knowledge of performance of single-phase transformers and Three
Phase Induction Motors

END

(A37304) Artificial Intelligence lab
(PROFESSIONAL CORE COURSE)
(Common to AI & ML, AI & DS)

B. Tech (AI & DS) IV Sem

L	**T**	**P**	**C**
0	**0**	**3**	**1.5**

1. Write a Program to Implement Breadth First Search using Python.
2. Write a Program to Implement Depth First Search using Python.
3. Write a Program to Implement Tic-Tac-Toe game using Python.
4. Write a Program to Implement 8-Puzzle problem using Python.
5. Write a Program to Implement Water-Jug problem using Python.
6. Write a Program to Implement Travelling Salesman Problem using Python.
7. Write a Program to Implement Tower of Hanoi using Python.
8. Write a Program to Implement Monkey Banana Problem using Python.
9. Write a Program to Implement Missionaries-Cannibals Problems using Python.
10. Write a Program to Implement 8-Queens Problem using Python.
11. Write a program to Implement speech conversion into English text.
12. Write a program for simple chatbot for college information enquire.

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

REFERENCE BOOKS:

   1. Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill, 3rd ed.,2009.
   2. Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI.,2010.
   3. Artificial intelligence, Patrick Henry Winston, 1992,

Course Outcomes

After undergoing this course, the students will be able to:

   1. Display the understanding of the historical perspective of AI and its foundation.
   2. Apply basic principles of AI in solutions that require problem solving, inference, knowledge representation and learning.
   3. Demonstrate fundamental understanding of various application of AI techniques in Expert systems, Neural Networks.
   4. Demonstrate an ability to share in discussion of AI, it's the current trends, limitations, and implications of AI.
   5. Explain the natural language processing and robotics automation.

END

(A30021) SOCIAL INNOVATION IN PRACTICE
(Common for all branches)

B. Tech (AI & DS) IV Sem

L	T	P	C
0	0	2	1

UNIT 1
Identify community issues to be addressed, Requirements Analysis: Extensive User requirements analysis, Generating effective System Requirement document.

UNIT 2
Social Innovation – Case Studies Presentation of the case studies with a focus on impact and vision on society.

UNIT 3
Process of Social Innovation Prompts – identifying needs, Proposals – generating ideas, Prototyping – testing the idea in practice,

UNIT 4
Sustaining-developing a business model, Scaling and diffusion-growing social innovations, Systematic change.

UNIT 5
Report writing, Documentation and Panel presentation

Reference Books:
1. Requirements Analysis: From Business Views to Architecture; David C. Hay; Prentice Hall Professional
2. Social Enterprises: An Organizational Perspective edited; Benjamin Gidron, YeheskelHasenfeld; Palgrave Macmillan
3. Social Enterprise Law: Trust, Public Benefit and Capital Markets By Dana Brakman Reiser & Steven A. Dean

Course Outcomes:
On Completion of the course, the students will be able to
1. Identify several social issues to be addressed
2. Analyse the impact of social innovations on the society
3. Analyze the process of scoial innovation for a community problem
4. Develop a scalable business model.
5. Analyse the feasibility and economical factors

<center>**END**</center>

(A30015) SOFT SKILLS & PROFESSIONAL ETHICS

B. Tech (AI & DS) IV Sem

L	T	P	C
0	0	2	0

UNIT-I:
Business Communication Skills:
English Language Enhancement the Art of Communication.

UNIT-II:
Intrapersonal & Interpersonal Relationship Skills:
- Intrapersonal Relationships
- Interpersonal Relationships – To be an Effective Team Player

UNIT-III:
Campus to Company:
- Corporate Dressing
- Corporate Grooming
- Business Etiquette
- Communication Media Etiquette

UNIT-IV:
Group Discussions, Interviews and Presentations:
- Group Discussions
- Interviews
- Presentations

UNIT-V:
Entrepreneurial Skills Development:
- Goal Setting
- Entrepreneurial Skills – Awareness and Development

REFERENCES
1. UNLEASH the power within Soft Skills – Training Manual (Infosys Campus Connect)

Course Outcomes

At the end of the course, the students will be able to
1. Express themselves with proper pronunciations and sentence construction
2. Demonstrate a strong teamwork and be a team player
3. Develop a strong personal etiquette
4. Demonstrate good leadership qualities
5. Recognize and identify basic English grammar

(A30514) COMPUTER NETWORKS

B.Tech. III Year I Sem.

L	T	P	C
0	0	4	4

Prerequisites:
- A course on "Programming for problem solving".
- A course on "Data Structures".

UNIT - I

Introduction: Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.
Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.

UNIT - II

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: 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.

UNIT - IV
Transport Layer: Transport Services, Elements of Transport protocols, Connectionmanagement, TCP and UDP protocols.

UNIT - V
Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP,Streaming audio and video.

TEXT BOOK:
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, PearsonEducation
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

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 subnetting and routing mechanisms.
4. Familiarity with the essential protocols of computer networks, and how they can beapplied in network design and implementation.

(A36601) MACHINE LEARNING

B.Tech. III Year I Sem.

L	T	P	C
4	0	0	4

Prerequisites
1. Data Structures.
2. Knowledge on statistical methods.

UNIT - I

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 fordecision 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-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, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT - III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance-Based Learning- Introduction, *k*-nearest neighbor algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT- IV

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis 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, inverting resolution.

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

UNIT - V

Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG- EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

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

Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

TEXT BOOK:

    1. Machine Learning – Tom M. Mitchell, - MGH.

REFERENCE BOOK:

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

Course Outcomes

- Understand the concepts of computational intelligence like machine learning.
- Ability to get the skill to apply machine learning techniques to address the real timeproblems in different areas.
- Understand the Neural Networks and its usage in machine learning application.

(A37201) AUTOMATA AND COMPILER DESIGN

B.Tech. III Year I Sem.   **L T P C**

                                                                    3 0 0 3

UNIT - I

Formal Language and Regular Expressions: Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to lexical analysis, lex tools.
Context Free grammars and parsing: Context free grammars, derivation, parse trees, ambiguity LL(K)grammars and LL(1) parsing.

UNIT - II

Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification.
Semantics: Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code – abstract syntax tree, translation of simple statements and control flow statements.

UNIT - III

Context Sensitive features – Chomsky hierarchy of languages and recognizers. Type checking, type conversions, equivalence of type expressions, overloading of functions and operations.

UNIT - IV

Run time storage: Storage organization, storage allocation strategies scope access to now local names, parameters, language facilities for dynamics storage allocation.
Code optimization: Principal sources of optimization, optimization of basic blocks, peephole optimization, flow graphs, Data flow analysis of flow graphs.

UNIT - V

Code generation: Machine dependent code generation, object code forms, generic code generation algorithm, Register allocation and assignment. Using DAG representation of Block.

TEXT BOOKS:

1. Introduction to Theory of computation. Sipser, 2nd Edition, Thomson.
2. Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education.

REFERENCE BOOKS:

1. Modern Compiler Construction in C , Andrew W.Appel Cambridge University Press.
2. Compiler Construction, LOUDEN, Cengage Learning.
3. Elements of Compiler Design, A.Meduna, Auerbach Publications, Taylor and FrancisGroup.
4. Principles of Compiler Design, V.Raghavan, TMH.
5. Engineering a Compiler, K.D.Cooper, L.Torczon, ELSEVIER.
6. Introduction to Formal Languages and Automata Theory and Computation –KamalaKrithivasan and Rama R, Pearson.
7. Modern Compiler Design, D.Grune and others,Wiley-India.
8. A Text book on Automata Theory, S.F.B.Nasir, P.K.Srimani, Cambridge Univ. Press.
9. Automata and Languages, A.Meduna, Springer.

Course Outcomes:

1. Graduates should be able to understand the concept of abstract machines and theirpower to recognize the languages.
2. Attain the knowledge of language classes & grammar relationship among them withthe help of Chomsky hierarchy.
3. Ability to understand the design of a compiler given features of the languages.
4. Ability to implement practical aspects of automata theory.
5. Gain Knowledge of powerful compiler generation tools.

(A36714) PREDICTIVE ANALYTICS

B.Tech. III Year I Sem.

L T P C
3 0 0 3

UNIT - I

Linear Methods for Regression and Classification: Overview of supervised learning, Linear regression models and least squares, Multiple regression, Multiple outputs, Subset selection, Ridge regression, Lasso regression, Linear Discriminant Analysis, Logistic regression, Perceptron learning algorithm.

UNIT - II

Model Assessment and Selection: Bias, Variance, and model complexity, Bias-variance trade off, Optimism of the training error rate, Estimate of In-sample prediction error, Effective number of parameters, Bayesian approach and BIC, Cross- validation, Boot strap methods, conditional or expected test error.

UNIT - III

Additive Models, Trees, and Boosting: Generalized additive models, Regression and classification trees, Boosting methods-exponential loss and AdaBoost, Numerical Optimization via gradient boosting, Examples (Spam data, California housing, New Zealand fish, Demographic data).

UNIT - IV

Neural Networks (NN), Support Vector Machines (SVM), and K-nearest Neighbor: Fitting neural networks, Back propagation, Issues in training NN, SVM for classification, Reproducing Kernels, SVM for regression, K-nearest – Neighbor classifiers (Image Scene Classification).

UNIT - V

Unsupervised Learning and Random forests: Association rules, Cluster analysis, Principal Components, Random forests and analysis.

TEXT BOOK:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning-Data Mining, Inference, and Prediction, Second Edition, Springer Verlag, 2009.

REFERENCE BOOKS:

1. C.M.Bishop –Pattern Recognition and Machine Learning, Springer, 2006.
2. L. Wasserman-All of statistics.
3. Gareth James. Daniela Witten. Trevor Hastie Robert Tibshirani. An Introduction toStatistical Learning with Applications in R.

Course Outcomes

1. Understand prediction-related principles, theories and approaches.
2. Learn model assessment and validation.
3. Understand the basics of predictive techniques and statistical approaches.
4. Analyze supervised and unsupervised algorithms.

(A30527) INFORMATION SECURITY
(PROFESSIONAL ELECTIVE-I)

B.Tech. III Year I Sem
L T P C
3 0 0 3

UNIT -I

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security.
Classical Encryption Techniques, DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operation, Blowfish, Placement of Encryption Function, Traffic Confidentiality, key Distribution, Random Number Generation.

UNIT –II

Public key Cryptography Principles, RSA algorithm, Key Management, Diffie- Hellman Key Exchange, Elliptic Curve Cryptography. Message authentication and Hash Functions, Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs Hash and MAC Algorithms SHA-512, HMAC.

UNIT –III

Digital Signatures, Authentication Protocols, Digital signature Standard, Authentication Applications, Kerberos, X.509 Directory Authentication Service.Email Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT –IV

IP Security:
Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.
Web Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

UNIT -V

Intruders, Viruses and Worms Intruders, Viruses and related threats Firewalls: Firewall Design Principles, Trusted Systems, Intrusion Detection Systems

Text Books:

1. Cryptography and Network Security (principles and approaches), WilliamStallings, 4th Edition, Pearson Education.

Reference Books:

1. Network Security Essentials (Applications and Standards), William StallingsPearson Education.
2. Principles of Information Security, Whitman, Thomson.

Course Outcomes Students shall be able to

1. Demonstrate the knowledge of cryptography, network security concepts andapplications.
2. Apply security principles in system design.
3. Identify and investigate vulnerabilities and security threats and mechanisms tocounter them.

4. Describe IP, WEB security mechanisms.
5. Explain Intrusion Detection Systems

(A30529) SOFTWARE TESTING METHODOLOGIES
(PROFESSIONAL ELECTIVE-I)

B.Tech. III Year I Sem

L	T	P	C
3	0	0	3

UNIT-I

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

UNIT–II
Transaction Flow Testing: -transaction flows, transaction flow testingtechniques.
Data flow testing: Basics of dataflow testing, strategies in dataflow testing,application of dataflow testing.

UNIT–III
Domain Testing: -domains and paths, Nice & ugly domains, domain testing,domains and interfaces testing.
Paths, Path products and Regular expressions: - path products & path expression, reduction procedure, applications, regular expressions & flow anomalydetection.

UNIT-IV
Logic Based Testing: - overview, decision tables, path expressions.
State, State Graphs and Transition testing: - state graphs, good & bad stategraphs, state testing, Testability tips.

UNIT–V
Graph Matrices and Application: -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 – Boris Beizer, 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, 3rd edition, P.C. Jorgensen, Aurbach Publications
3. Software Testing, N. Chauhan, Oxford University Press.

Course Outcomes

Students shall be able to
1. Apply the process of testing and various methodologies in testing fordeveloped software.
2. Write test cases for given software to test it before delivery to the customer.3.Explain and perform Domain Testing.
4. Explain and perform path Testing.
 5. Describe Graph based Testing

(A30533) MOBILE COMPUTING
(PROFESSIONAL ELECTIVE-I)

B.Tech. III Year I Sem.   **L   T   P   C**
                                                                   3   0   0   3

UNIT-I
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

UNIT–II

(Wireless) Medium Access Control (MAC)
Motivation for a specialized MAC (Hidden and exposed 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
Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, OtherTransport Layer Protocols for Mobile Networks.
Database Issues

Database Hoarding & Caching Techniques, Client-Server Computing &adaptation, Transactional Models.

UNIT-IV

Data Dissemination and Synchronization
Communications Asymmetry, Classification of Data Delivery Mechanisms, DataDissemination,

Broadcast Models, Selective Tuning and Indexing Methods

UNIT–V

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.

Text Books:

1. Mobile Communications, Jochen Schiller, Addison-Wesley, 2nd Edition, 2009.
2. Mobile Computing, Raj Kamal, Oxford University Press, 2007, ISBN:0195686772

Reference Books:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition,
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and MobileComputing", Wiley,
3.Principles of Mobile Computing, 2/e, Hansmann, Merk, Nicklous, Stober,Springer, 2003.

Course Outcomes

Students shall be able to

1. Describe mobile system architecture
2. Explain wireless MAC layer protocols
3. Describe the functionalities of mobile transport layer
4. Explain wireless synchronization mechanisms.
5. Illustrate Routing algorithms

(A30515) COMPUTER NETWORKS LAB

B.Tech. III Year I Sem.   **L T P C**
                                                                                       0 0 3 1.5

List of Experiments

1. Implement the data link layer framing methods such as character, character-stuffingand bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRCCCIP
3. Develop a simple data link layer that performs the flow control using the slidingwindow 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 techniques 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 BOOK:

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, PearsonEducation
2. Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition, TMH.

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

(A36602) MACHINE LEARNING LAB

B.Tech. III Year I Sem.   **L T P C**
                                                                    0   0 3 1.5

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 VAR1and 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 lowcredit-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

Course Outcomes: After the completion of the course the student can able to:
- understand complexity of Machine Learning algorithms and their limitations;
- understand modern notions in data analysis-oriented computing;
- be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
- Be capable of performing experiments in Machine Learning using real-world data.

(A30003) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

B.Tech. III Year I Sem
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UNIT-I:
Functional English: Starting a conversation, responding appropriately andrelevantly, using the right body language, Role play in Different Situations.

UNIT-II:
Vocabulary Building: Synonyms and antonyms, word roots, one-word substitutes,prefixes and suffixes, study of word origin, analogy, idioms andphrasal verbs.

UNIT-III:
Group Discussion: Dynamics of group discussion, intervention, summarizing, modulation of voice, body languages, relevance, fluency and coherence.

UNIT-IV:
Interview Skills: Concept and process, pre-interview planning, opening strategies, answering strategies, Interview through tale and video- conferencing.

UNIT-V:
Resume` and Technical Report Writing: Structure and presentation, planning, definingthe career objective, projecting one's strengths and skill-sets, summary, formats and styles, Letter-writing.
Reading Comprehension: Reading for facts, guessing meanings from context, scanning, skimming, inferring meaning and critical reading.

COURSE OUTCOMES
Students shall be able to:
1. Explain the rules of formal and informal situational dialogues and develop verbal & non-verbal communication skills.
2. Build academic vocabulary, use a variety of accurate sentence structures andutilize digital literacy tools to develop writing and grammar skills.
3. Express thoughts with clarity and hold discussions with everyone to developanalytical thinking.
4. Develop the skills required for attending different types of interviews.
5. Illustrate the report writing and summarize the main ideas of report; apply key elements of structure and style in drafting loner documents and read an increasing range of text.

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(A30017) INDIAN CONSTITUTION
(MANDATORY COURSE)

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B.Tech. III Year I Sem   **L T P C**
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UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution- Sources and constitutional history, Features- Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions; State Government and its Administration Governor: Role and Position, CM and Council of ministers, State Secretariat: Organization, Structure and Functions

UNIT-III

A: Local Administration District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of MunicipalCorporation,
B:Pachayati raj: Introduction, PRI: ZilaPachayat, Elected officials and their roles, CEO ZilaPachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT-IV

Concept and Development of Human Rights: Meaning Scope and Development of Human Rights, United Nations and Human Rights – UNHCR, UDHR 1948, ICCPR 1996 and ICESCR 1966, Human Rights in India: Protection of Human Rights Act, 1993 (NHRC andSHRC), First, Second and Third Generation Human Rights, Judicial Activism and Human Rights.

UNIT-V

Election Commission: Election Commission- Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women

REFERENCE BOOKS:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall ofIndia Pvt. Ltd. NewDelhi

2. SubashKashyap, Indian Constitution, National BookTrust
3. J.A. Siwach, Dynamics of Indian Government &Politics
4. D.C. Gupta, Indian Government andPolitics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes(UniversalLaw Publication)
6. J.C. Johari, Indian Government and PoliticsHans

E-Resources:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian- constitution

Course Outcomes

At the end of the course, the student will be able to:

1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State government and its administration.
3. Get acquainted with Local administration and Pachayati Raj.
4. Be aware of basic concepts and developments of Human Rights.
5. Gain knowledge on roles and functioning of Election Commission

(A30018) ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE
(MANDATORY COURSE)

B.Tech. III Year I Sem   **L T   P C**
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UNIT I

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

UNIT II

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

UNIT III

Legal frame work and TK:
A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act);
B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

UNIT IV

Traditional knowledge and intellectual property:

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledgeprotection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT V

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

REFERENCE BOOKS

1. Traditional Knowledge System in India, by Amit Jha,2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
3. Traditional Knowledge System in India by AmitJha Atlanticpublishers,2002

E-RESOURCES

1. https://www.youtube.com/watch?v=LZP1StpYEPM
2. http://nptel.ac.in/courses/121106003/

Course Outcomes

After completion of the course, students will be able to:

1. Understand the concept of Traditional knowledge and its importance.
2. Know the need and importance of protecting traditional knowledge.
3. Know the various enactments related to the protection of traditional knowledge.
4. Understand the concepts of Intellectual property to protect the traditionalknowledge
5. Compare and contrast the basics of Indian Traditional knowledge with modernscientific perspectives.

(A36708) DEVOPS

B.Tech. III Year II Sem.

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UNIT - I

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: 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: 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: 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: 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. Wileypublications. ISBN: 9788126579952

REFERENCE BOOK:

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

Course Outcomes:
On successful completion of this course, students will be able to:
1. Identify components of Devops environment
2. Describe Software development models and architectures of DevOps
3. Apply different project management, integration, testing and code deployment tool
4. Investigate different DevOps Software development models
5. Assess various Devops practices

(A36702) BIG DATA PROCESSING

	L	T	P	C
B.Tech. III Year II Sem.	4	0	0	4

Unit 1

Overview of Big Data: Defining Big Data, Big Data Types, Analytics, Industry Examples of Big Data, Benefits of Big Data, Crowd Sourcing Analytics, Indian Big Data companies.

Unit-2

NoSQL Data Management-1: Introduction to NoSQL, aggregate data models, aggregates, key, value and document data models, relationships, graph databases, schema less databases, materialized views, distribution models, sharding, version, Map reduce, partitioning and combining, composing map- reduce calculations

Unit-3

NoSQL Data Management-2: Key Value Databases, Document Databases, Column Family Stores,Graph Databases.

Unit-4

Basics of Hadoop: Understanding Hadoop features, Learning the HDFS and MapReduce architecture, Introducing Hadoop MapReduce, Understanding the Hadoop MapReduce fundamentals

Unit-5

Hbase and Cassandra: Introduction to HBase, Row-Oriented vs Column-Oriented data stores, HBase Architecture, Understanding HBase Data Model, Casandra: Introduction, Features of Cassandra, Data Replication in Cassandra, Cassandra Query language (CQL), Cassandra Data Model.

Text Books:
1. V K Jain, "BIG DATA and HADOOP", 2017 edition, Khanna Book Publishing. ISBN:978-93-82609-13-1
2. Pramod J. Sadalage, Martin Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World ofPolyglot Persistence", Addison-Wesley. ISBN: 9780133036121
3. Vignesh Prajapati, "Big data analytics with R and Hadoop", 2013, SPD.

Reference Books:
1. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
2. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.

Course outcomes.

On completion of this course, the students are able to:
1. Describe big data, types, and benefits and used cases from selected business domains.
2. Explain NoSQL big data using data models.
3. Use various databases like Key value, documents, etc.
4. Explain Hadoop, perform map-reduce analytics using Hadoop
5. Use Hadoop related tools such as HBase, Cassandra

(A36705) DATA MINING

B.Tech. III Year II Sem.   **L T P C**
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Pre-Requisites:
- A course on "Database Management Systems"
- Knowledge of probability and statistics

UNIT - I

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: 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: Classification and Prediction – Basic concepts–Decision tree induction– Bayesian classification, Rule–based classification, Lazy learner.

UNIT - IV

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: 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 & Micheline Kamber, 3rd EditionElsevier.
2. Data Mining Introductory and Advanced topics – Margaret H Dunham, PEA.

REFERENCE BOOK:
1.   Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools andTechniques(Second Edition), Morgan Kaufmann, 2005.

Course Outcomes:
- 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.
- Apply preprocessing methods for any given raw data.
- Extract interesting patterns from large amounts of data.
- Discover the role played by data mining in various fields.
- Choose and employ suitable data mining algorithms to build analytical applications
- Evaluate the accuracy of supervised and unsupervised models and algorithms.

INFORMATION RETRIEVAL SYSTEMS

(Professional Elective – II)

B.Tech. III Year II Sem.   **L   T   P   C**

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Prerequisites: Data Structures

UNIT - I

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives ofInformation 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: 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 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: 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: 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 BOOK:

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.

Course Outcomes:

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

PATTERN RECOGNITION

(Professional Elective – II)

B.Tech. III Year II Sem.
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Prerequisites

- Students are expected to have knowledge basic linear algebra, basic probability theory and basic programming techniques;
- A course on "Computational Mathematics"
- A course on "Computer Oriented Statistical Methods"

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

UNIT - II: 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: 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: 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: Why is Clustering Important, Hierarchical Algorithms, Partitional Clustering, 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 BOOK:

      1. Pattern Recognition: An Algorithmic Approach: Murty, M. Narasimha, Devi, V.Susheela, Springer Pub, 1ˢᵗ Ed.

REFERENCE BOOKS:

      1.   Machine Learning - Mc Graw Hill, Tom M. Mitchell.
      2.   Fundamentals Of Speech Recognition: Lawrence Rabiner and Biing- Hwang Juang.Prentice-Hall Pub.

Course Outcomes

- Understand the theory, benefits, inadequacies and possible applications of various machine learning and pattern recognition algorithms
- Identify and employ suitable machine learning techniques in classification, pattern recognition, clustering and decision problems.

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(A30534) Design Patterns
(PROFESSIONAL ELECTIVE-II)

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B.Tech. III Year II Sem   **L   T   P   C**
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UNIT-I

    Introduction: What is a design pattern? design patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT–II

    Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary.

UNIT–III

    Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

UNIT-IV

Structural Pattern: Adapter, Bridge, Composite, Decorator, Facade, Flyweight, Proxy.

UNIT–V

Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor.

TEXT BOOKS:

1. Design Patterns, Erich Gamma, Pearson Education

REFERENCES:

1. Pattern's in Java, Vol –I, Mark Grand, Wiley DreamTech.
2. Pattern's in Java, Vol-II, Mark Grand, Wiley DreamTech
3. Java Enterprise Design Patterns Vol-III, Mark Grand, Wiley DreamTech.
4. Head First Design Patterns, Eric Freeman, O'reily publications

COURSE OUTCOMES:

Student shall be to

1. Explain Object-Oriented concepts for creating truly OOP programs
2. Use creational design patterns in software design for class instantiation
3. Describe structural design patterns for better class and object composition
4. Use behavioral patterns for better organization and communication betweenthe objects
5. Use refactoring to compose the methods for proper code packaging

END

(A30013) BUSINESS MANAGEMENT & FINANCIAL ANALYSIS

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B.Tech. III Year I Sem	4	0	0	4

UNIT – I Introduction of Management Concepts: Concept, Origin, Growth, Nature, Characteristics, Scope and Principles of Management. Functions of Management: Planning, Organizing, Staffing, Directing, Coordinating, Reporting and Budgeting. Scientific Management- FW Taylor Contributions to Management Modern Management- Henry Fayol Contributions to Management Human Relations Approach to Management: Theories of Motivation and Leadership

UNIT – I Functional areas of Management: Production Management: Systems of Production, PPC functions & Plant Layout. Financial Management: Objectives, Goals, & Functions of Financial Management. Marketing Management: Recent Trends in Marketing & Marketing Mix. Human Resources Management: Nature, Objectives, Scope & Functions of HR Management

UNIT – III Introduction to Managerial Economics & Business Environment: Definition, Nature, Scope and Functions Managerial Economics, Difference between Micro & Macro Economics Internal & External Scanning of Business Environment, Importance of National Income, Inflation, Deflation, Stagflation, Business Cycle & Product Life Cycle Concepts. Concept & Law of Demand, Factors Influencing and Limitations. Concept of

Elasticity of Demand, Types of Elasticity, Methods of Measuring Elasticity. Introduction to Demand Forecasting, Objectives, Scope, Types and Methods.

UNIT –IV Theory of Production, Cost, Price & Markets: Production Function, Assumptions, Limitations & Types Cost Concepts, Cost-Output Relationship, Break Even Analysis Assumptions, Limitations & Applications (Simple Problems). Theory of Pricing, Objectives, Situations & Types. Introductions Markets, Demand- Supply Schedule for Equilibrium Price, Nature & Types of Competition.

UNIT – V Introduction to Financial Statement Analysis: Types & Objectives of Business Enterprises, Conventional & Non-Conventional Sources of Financing Business Enterprise. Identification of Financial Statement Formats-Manufacturing A/c, Trading A/c, Profit & Loss A/c, Balance Sheet. Techniques of Analyzing Financial Statements: Analysis & Interpretation through Liquidity, Leverage, Coverage, Activity, Turnover,Profitability Ratios-Simple Problems on Liquidity, Leverage and Activity Ratios

Text Books:

1. Varshney, Maheswari (2003), Managerial Economics, Sultan Chand, New Delhi,India.
2. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education, New Delhi,2004.

Reference Books:

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI, 2005
2. Koontz &Weihrich: Essentials of Management, 6/e, TMH, 2005 Thomas N. Duening&John M. Ivancevich Management—Principles and Guidelines, Biztantra, 2003.
3. Ambrish Gupta (2004), Financial Accounting for Management, Pearson Education,New Delhi, India.
4. Domnick Salvatore (2011), Managerial Economics in a Global Economy, 7th edition,Oxford University Press, United States of America.
5. Narayanaswamy (2005), Financial Accounting, A Managerial Perspective, PrenticeHall of India private Ltd, New Delhi, India.
6. Aryasri (2005), Managerial Economics and Financial Analysis, 2nd edition, TataMcGraw Hill, New Delhi, India.

Course Outcomes:

Students shall be able to

1. Float different forms of business enterprises and generate capital from varioussources.
2. Analyze financial stability of an enterprise in view of cut-throat competitionfrom rivals.
3. Tune Enterprise in accordance with changes in surround economicenvironment.
4. Forecast demand, production, cost, capital, price under different marketsituationsfor various products of business enterprise in general.
5. Employ various functions of management in different functional areas ofenterprise.

B.Tech. III Year II Sem.

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Note: Use open-source software wherever required

Hadoop Installation
1. Install and configure Hadoop
2. Installing Hadoop in its three operating modes.
     i. Standalone. ii. Pseudo distributed. iii. Fully distributed
3. Use web-based tools to monitor Hadoop setup.

HDFS
1. Review the commands available for the Hadoop Distributed File System:
2. Copy file foo.txt from local disk to the user's directory in HDFS
3. Get a directory listing of the user's home directory in HDFS
4. Get a directory listing of the HDFS root directory
5. Display the contents of the HDFS file user/fred/bar.txt 6.Move that file to the local disk, named as baz.txt
7. Create a directory called input under the user's home directory
8. Delete the directory input old and all its contents
9. Verify the copy by listing the directory contents in HDFS:

MapReduce
1. Create a JOB and submit to cluster
2. Track the job information
3. Terminate the job
4. Counters in MR Jobs with example
5. Map only Jobs and generic map examples
6. Distributed cache example
7. Combiners, Secondary sorting and Job chain examples

MapReduce (Programs)
Using movie lens data
1. List all the movies and the number of ratings
2. List all the users and the number of ratings they have done for a movie
3. List all the Movie IDs which have been rated (Movie Id with at least one user rating it)
4. List all the Users who have rated the movies (Users who have rated at least one movie)
5. List of all the User with the max, min, average ratings they have given against any movie
6. List all the Movies with the max, min, average ratings given by any user.

Course outcomes
Students shall be able to

1.Install and configure Hadoop Software
2.Work with HDFS file system commands
3.Create and process files in HDFS
4.Develop MapReduce programs for processing BigData in Distributed environment.
5.Design Distributed applications to process BigData.

END

(A36706) DATA MINING LAB

B.Tech. III Year II Sem.   **L T P C**
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Prerequisites: A course on "Database Management System".

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 neighbour 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 BOOK:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Anuj Karpatne, Introduction to DataMining,Pearson Education.

Course Outcomes:

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 patternsfrom large amounts of data.
4. Apply OLAP operations on data cube construction.

B.Tech. III Year II Sem.

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UNIT-I

Environmental Studies:
Introduction, Definition, scope and importance, Ecosystems: Introduction, types, characteristic features, structure and functions of ecosystems. Bio geo chemical cycle, Classification of Eco system.

UNIT-II

Natural Resources: Classification of Resources, Land resources, Land as resource, Common property resources, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer –pesticide problems, Forest resources, Use and over- exploitation.
Mining and dams – their effects on forest and tribal people, Water resources, Use and over- utilization of surface and groundwater, Floods, droughts, Water logging and salinity, Dams –benefits and costs, Conflicts over Water, Energy resources.

UNIT-III

Bio-diversity and its conservation, Value of bio-diversity -consumptive and productive use, social, ethical, aesthetic and option values, Bio-geographical classification of India – India as a mega diversity habitat, Threats to bio-diversity – Hot-spots, habitat loss, poaching of wild life, loss of species, seeds, etc. Conservation of bio-diversity – Insitu and Ex-situ conservation.

UNIT-IV

Environmental Pollution –Local and Global Issues, Nature of thermal pollution and nuclear hazards, Global warming, Acid rain, Ozone depletion. Environmental case studies.

UNIT-V

Environmental Problems in India, Drinking water, sanitation and public health, Effects of the activities on the quality of environment, Water scarcity and groundwater depletion, Controversies on major dams – resettlement and rehabilitation of people: problems and concerns, Rain water harvesting, cloud seeding and watershed management. Economy and Environment, The economy and environment interaction, Economics of development, preservation and conservation, Sustainability: theory and practices, Limits to growth, Equitable use of resources for sustainable life styles, Environmental Impact Assessment.

Text Books
1. Environmental Science - Y. Anjaneyulu, B S Publications.
2. Environmental studies-Deekshadave, Cengage learning India Pvt. Ltd.,
3. Environmental sciences and Engineering - P. Venugopal Rao, PHI learning Pvt.Ltd.,
4. Environmental Science and Technology by M. Anji Reddy, B S Publications.

Reference Books
1. Clark, R.S., Marine Pollution, Clanderson Press, Oxford, 2002.
2. Cunningham, W.P., et al. Environmental Encyclopedia, Jaico Publishing House, Mumbai, 2003.

Course Outcomes:
On successful completion of this course, students shall be able to
1. Acquire the knowledge on environment
2. Acquire the knowledge of various Natural Resources

3. Develop skills in understanding of various environmental problems
4. Develop skills to protect the Environment
5. To understand various environmental issues in India.

(A30556) CYBER SECURITY

(Common to all branches-Mandatory Course)

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B.Tech. III Year II Sem.	3	0	0	0

Unit-I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIATriad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

Unit-II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber SecurityRegulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

Unit-III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

Unit-IV

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Unit-V

Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skillsof hackers and other cyber criminals.
Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains-medical, financial, etc.

TEXT BOOK:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes,Computer Forensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCES:
1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRCPress.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&FGroup.

Course Outcomes

Students shall be able to
1. Explain cyber-crimes and how they are planned
2. Describe vulnerabilities of mobile and wireless devices
3. Illustrate the crimes in mobile and wireless devices
4. Be able to use cyber security, information assurance, and cyber/computerforensicssoftware/tools.
5. Identify various crimes.

(A30521) SCRIPTING LANGUAGES

(Professional Elective – III)

B.Tech. IV Year I Sem

L	T	P	C
3	0	0	3

UNIT -I

Introduction: Ruby, Rails, The structure and Execution 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: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

UNIT –III

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
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 Issues.

UNIT –V

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 up level 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 Programming language by David Flanagan and Yukihiro MatsumotoO'Reilly
3. "Programming Ruby" The Pragmatic Programmers guide by Dabve ThomasSecond 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.

Course Outcomes

Students shall be able to
1. Differentiate a program & script, and expalin python basics
2. Write applications using python datastructures and functions
3. Explain OOPs in python and Build User defined modules
4. Develop programs using fundamentals of perl
5. Design applications using advanced perl

END

(A30536) ADHOC & SENSOR NETWORKS

(Professional Elective – III)

B.Tech. IV Year I Sem   **L   T   P   C**

                                                                                         3   0   0   3

UNIT-I

Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications ofMANETs 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 - Broadcast Storm Problem, Rebroadcasting Schemes- Simple-flooding, Probability based Methods, Area-based Methods, NeighborKnowledge-based: SBA, Multipoint Relaying, AHBP.
Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP;Hybrid: AMRoute, MCEDAR.

UNIT–III

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, 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
Transport layer, High-level application layer support, Adapting to the inherentdynamic nature of WSNs, Sensor Networks and mobile robots

TEXT BOOKS:

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006.

REFERENCE BOOKS:

1. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao,Leonidas Guibas, Elsevier Science.
2. Wirelss Communications & Networks 2/e, William Stallings, PEA , 2007. 3.Handbook of Wireless Networks and Mobile Computing, Ivan Stojmenovic,Wiley, 2007.

Course Outcomes:

Students shall be able to
1. Appraise the importance of Adhoc networks such as MANET
2. Explain the design considerations for deploying the wireless networkinfrastructure.
3. Describe the state-of-the-art research in the emerging subject of Ad Hocand Wireless Sensor Networks
4. Solve the issues in real-time application development based on ASN.
5. Conduct further research in the domain of ASN

(A30558) DATA VISUALIZATION
(PROFESSIONAL ELECTIVE-III)

	L	T	P	C
B.Tech. IV Year I Sem.	3	0	0	3

Unit-I
Introduction: What Is Visualization? History of Visualization, Relationship between Visualization and Other Fields, The Visualization Process, The Role of Cognition, Pseudocode Conventions, The Scatterplot.
Data Foundations: Types of Data, Structure within and between Records, Data Preprocessing
Visualization Foundations: The Visualization Process in Detail, Semiology of Graphical Symbols, The Eight Visual Variables, Taxonomies

Unit-II
Visualization Techniques for Spatial Data: One-Dimensional Data, Two- Dimensional Data, Three-Dimensional Data, Dynamic Data, Combining Techniques
Visualization Techniques for Geospatial Data: Visualizing Spatial Data, Visualization of Point Data, Visualization of Line Data, Visualization of Area Data

Unit-III
Visualization Techniques for Time-Oriented Data: Introduction, Definitions: Characterizing Time-Oriented Data, Visualizing Time-Oriented Data **Visualization Techniques for Multivariate Data:** Point-Based Techniques, Line-Based Techniques, Region-Based Techniques, Combinations of Techniques

Unit-IV

Visualization Techniques for Trees, Graphs, and Networks: Displaying Hierarchical Structures, Displaying Arbitrary Graphs/Networks.

Text and Document Visualization: Introduction, Levels of Text Representations, The Vector Space Model, Single Document Visualizations, Document Collection Visualizations, Extended Text Visualizations.

Unit-V

Designing Effective Visualizations: Steps in Designing Visualizations, Problems in Designing Effective Visualizations,

Visualization Systems: Systems Based on Data Type, Systems Based on Analysis Type, Text Analysis and Visualization, Modern Integrated Visualization Systems, Toolkits, Libraries.

TEXT BOOK:

1. Ward, Grinstein Keim, Interactive Data Visualization: Foundations, Techniques, and Applications. Natick: A K Peters, Ltd. CRC Press

REFERENCE BOOKS:

1. E. Tufte, The Visual Display of Quantitative Information, Graphics Press

Course Outcomes:

After completion of the course student shall be able to
1. Explain the basic and advanced techniques of information visualization and scientific visualization.
2. Explain key techniques of the visualization process.
3. Describe a detailed view of visual perception, the visualized data and the actual visualization, interaction and distorting techniques
4. Design visualizations for hierarchical structures.
5. Design effective visualizations

(A30538) DEEP LEARNING

(PROFESSIONAL ELECTIVE-IV)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

UNIT -I
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 –II
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 –III

Optimization for Training Deep Models:
How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

UNIT –IV

Convolutional Networks
The Convolution Operation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuroscientific Basis for Convolutional Networks, Convolutional Networks and theHistory of Deep Learning.

UNIT –V

Applications: Large-Scale Deep Learning, Computer Vision, Speech recognition, Natural Language Processing, Other Applications.

Text Books:

1. Deep Learning, Ian Goodfellow, YoshuaBengio and Aaron Courville, InPreparation for MIT Press.
2. Artificial Neural Networks. Yegnanarayana, Prentice- Hall of India, 1999

Reference Books:

1. Neural Networks and Learning Machines. Haykin, Prentice Hall of India, 2010

2. Pattern Recognition and Machine Learning, C.M. Bishop, Springer, 2006

Course Outcomes

The students shall be able to
1. Explain Deep Feed-forward networks, Gradient-Based learning, 2.Describe regularization techniques for Deep learning 3.Differentiate learning and optimization in Deep learning.
4.State the significance of Convolutional Networks
5.State the applications of Deep Learning.

END

(A30542) CLOUD COMPUTING

(PROFESSIONAL ELECTIVE – IV)

B.Tech. IV Year I Sem.   **L T P C**
                                                                                                                    3   0   0   3

      Pre-requisites:
         1. A course on "Computer Networks"
         2. A course on "Operating Systems"
         3. A course on "Distributed Systems"

UNIT - I

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: 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: 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: 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: 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, Manjrasoft, Aneka Platform

TEXT BOOK:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg andAndrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra,Elsevier,2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather,Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

Course Outcomes:
- Ability to understand various service delivery models of a cloud computing architecture.
- Ability to understand the ways in which the cloud can be programmed and deployed.
- Understanding cloud service providers.

(A30545) BLOCKCHAIN TECHNOLOGY

(Professional Elective – IV)

B.Tech. IV Year I Sem.

	L	T		P	C
	3	0		0	3

Prerequisites:
1. Knowledge in security and applied cryptography.
2. Knowledge in distributed databases.

UNIT-I

Introduction: Overview of Block chain, Public Ledgers, Bitcoin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public vs Private Block chain, Understanding Crypto currency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain Basic Crypto Primitives: Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic cryptocurrency.

UNIT–II

Bitcoin and Block chain: Creation of coins, Payments and double spending, Transaction in Bitcoin Network, Block Mining. Working with Consensus in Bitcoin: Distributed consensus in open environments, Consensus in a Bitcoinnetwork, Proof of Work (PoW) – basic introduction, HashcashPoW, Bitcoin PoW, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.

UNIT–III

Enterprise application of Block chain: Cross border payments, Know Your Customer (KYC), Food Security, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, and Identity on Block chain.

UNIT-IV

Attacking the Blockchain with a Framework Approach:

Technical Challenges, Market/Business Challenges, Legal /Regulatory Barriers and Behavioral/Educational Challenges, Blockchain in Financial Services: Blockchain Applications in Financial Services, Strategic Questions for Financial Services

UNIT–V

Hyperledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Transaction Validation**,** Bitcoin Security, Limitations and How to Overcome Blockchains, Reinventing the Blockchain, The Ten Rules to Never Breakon the Blockchain

TEXT BOOKS:

1.   Melanie Swan, "Block Chain: Blueprint for a New Economy", O'Reilly, 2015
2. Josh Thompsons, "Block Chain: The Block Chain for Beginners- Guide toBlock chain Technology and Leveraging Block Chain Programming"
3.   Daniel Drescher, "Block Chain Basics", Apress; 1stedition, 2017
4. Anshul Kaushik, "Block Chain and Crypto Currencies", Khanna PublishingHouse, Delhi.

REFERENCE BOOKS:

1. Blockchain for Dummies by Manav Gupta, John Wiley & Sons publication
2. Mastering Bitcoin Unlocking Digital Crypto currencies‖, by Andreas M. Antonopoulos, O 'Reilly Publication, 1st Edition.
3. Ritesh Modi, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Block Chain", Packt Publishing
4. Imran Bashir, "Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Packt Publishing

5. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, "Hands-On Block Chain with Hyperledger:
6. Building Decentralized Applications with Hyperledger Fabric and Composer",Import, 2018

Course Outcomes:

At the end of this course, the students will be able to:
1. Describe Block chain Technology
2. Explain Block chain with Crypto currency
3. Build and deploy block chain applications
4. List the obstacles, challenges of Blockchain
5. Analyze hashing applications in real time scenarios

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(A30541) COMPUTER VISION & IMAGE PROCESSING
(PROFESSIONAL ELECTIVE-V)

</div>

B.Tech. IV Year I Sem.

L	T	P	C
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UNIT-I
Introduction: Image Formation and Coordinate Transformations, Camera Matrix, Motion/Stereo Pin-hole model, Human eye cognitive aspects of colour and 3D space; illumination; Sampling and Quantization, Coordinate transformations and camera parameter, 3D transformations problem, Introduction to OpenCV : Image Data Structure, Coding format

UNIT–II

Image Processing & Motion Estimation: Image Processing - Noise Removal, Blurring, Edge Detection: Canny, Gaussian, Gabor, Texture Edges, Curvature, Corner Detection. Motion Estimation: Horn-Schunk Optical Flow Formulation, Euler-Lagrange formulation: Calculus of variations theory. Structure Recovery from Motion [Kanade]

UNIT–III

Segmentation: Concept of Figure vs. Ground, Watershed, Change Detection, Background Subtraction, Texture Segmentation Gaussian Mixture Models - Applications in Color/Motion based Image Segmentation, Background Modeling and Shape Clustering

UNIT-IV

Machine Learning techniques in Vision & Object Tracking: Bayesian Classification, Maximum Likelihood Methods, Neural Networks; Non-parametric models; Manifold estimation, Support Vector Machines; Temporal sequence learning
Object Tracking: Exhaustive vs. Stochastic Search, Shapes, Contours, and Appearance Models. Mean-shift tracking; Contour-based models

UNIT–V

Object Modeling & Detection**:** Exhaustive vs. Stochastic Search Shapes, Contours, and Appearance Models. Mean-shift tracking; Contour-based models, Fundamental matrix / Epipolar geometry Adaboost approaches: Face Detection / Recognition Large Datasets; Attention models. Applications: Surveillance, Object detection, etc.

Text Books:
1. David Forsyth and Jean Ponce, Computer Vision: A modern Approach,Prentice Hall India 2004:
2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer,2008

Reference Books:
1. E.R. Davies, Machine Vision, Theory Algorithms Practicalities, Elsevier2005
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing,Analysis, and Machine Vision. Brooks/Cole / Thomson 1999

3. Russell and Norvig: AI: A modern Approach, Prentice Hall 2000.
4. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Cambridge Univ Press 2000
5. Richard O. Duda, Peter E. Hart, and David G. Stork, Pattern Classification,2nd ed., Wiley Asia, 2002.
6. Rafael C. Gonzalez and Richard E. Woods "Digital Image Processing",Pearson
7. Rafael C. Gonzalez, Richard E. Woods and Steven L. Eddins "Digital Image Processing Using MATLAB", McGraw Hill Education

Course Outcomes

Students shall be able to

1.Explain Sampling, Quantization, techniques
2.Describe Edge detection techniques
3.Apply Machine learning techniques for object tracking
4.Perform Object Modelling
5.Explain Contour based models

END

(A37205)AUGMENTED REALITY AND VIRTUAL REALITY
(Professional Elective – V)

B.Tech. IV Year I Sem.   **L   T   P   C**
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UNIT - I:

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: 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: 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: 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: 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;First edition (12 October 2016), 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,WilliamR 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. Sanni Siltanen- 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.

Course Outcomes:

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 to be built.

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(A36716) EXPLORATORY DATA ANALYSIS

(Professional Elective – V)

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B.Tech. IV Year I Sem.

L	T	P	C
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UNIT - I:

Introduction to Exploratory Data Analysis: Data Analytics lifecycle, Exploratory Data Analysis (EDA)– Definition, Motivation, Steps in data exploration, The basic data types DataType Portability.

UNIT - II:

Preprocessing - Traditional Methods and Maximum Likelihood Estimation: Introduction to Missing data, Traditional methods for dealing with missing data, Maximum Likelihood Estimation – Basics, Missing data handling, Improving the accuracy of analysis. **Preprocessing Bayesian Estimation:** Introduction to Bayesian Estimation, Multiple Imputation-Imputation Phase, Analysis and Pooling Phase, Practical Issues in Multiple Imputation, Models for Missing Notation Random Data.

UNIT - III:

Data Summarization & Visualization: Statistical data elaboration, 1-D Statistical data analysis, 2-D Statistical data Analysis, N-D Statistical data analysis.

UNIT - IV:

Outlier Analysis: Introduction, Extreme Value Analysis, Clustering based, Distance Based and Density Based outlier analysis, Outlier Detection in Categorical Data. **Feature Subset Selection:** Feature selection algorithms: filter methods, wrapper methods and embedded methods, Forward selection backward elimination, Relief, greedy selection, genetic algorithms for features selection.

UNIT - V

Dimensionality Reduction: Introduction, Principal Component Analysis (PCA), Kernel PCA, Canonical Correlation Analysis, Factor Analysis, Multidimensional scaling, Correspondence Analysis.

TEXT BOOKS:

1. Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, byGlenn J. Myatt.

REFERENCE BOOKS:

1. Charu C. Aggarwal, "Data Mining The Text book", Springer, 2015.
2. Craig K. Enders, "Applied Missing Data Analysis", The Guilford Press, 2010.
3. Inge Koch, "Analysis of Multivariate and High dimensional data", CambridgeUniversity Press,2014.
4. Michael Jambu, "Exploratory and multivariate data analysis", Academic Press Inc., 1990.
5. Charu C. Aggarwal, "Data Classification Algorithms and Applications", CRC press, 2015.

Course Outcomes:

1. Handle missing data in the real-world data sets by choosing appropriate methods.
2. Summarize the data using basic statistics. Visualize the data using basic graphs and plots.
3. Identify the outliers if any in the data set.
4. Choose appropriate feature selection and dimensionality reduction.
5. Techniques for handling multi-dimensional data.

B.Tech. IV Year II Sem.   **L T P C**
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UNIT - I:

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 speechusing DFT. Linear Prediction analysis of speech.

UNIT - II:

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: 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, Approximationof projective mapping.

UNIT - IV:

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: 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. Fundamentals of Speech recognition – L. Rabiner and B. Juang, Prentice Hall signalprocessing series.
2. Digital Video processing, A Murat Tekalp, Prentice Hall.
3. Discrete-time speech signal processing: principles and practice, Thomas F. Quatieri, Coth.
4. Video Processing and Communications, Yao Wang, J. Osternann and Qin Zhang,Pearson Education.

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, CRCPress
3. "Handbook of Image and Video processing", Al Bovik, Academic press, second Edition

Course Outcomes:

1. Describe the mechanisms of human speech production systems and methods forspeech feature extraction.
2. Understand basic algorithms of speech analysis and speech recognition.
3. Explain basic techniques in digital video processing, including imaging characteristicsand sensors.
4. Apply motion estimation and object tracking algorithms on video sequence.

(A30543) NATURAL LANGUAGE PROCESSING

(Professional Elective – VI)

B.Tech. IV Year II Sem   **L T   P C**
                                                                  3 0   0 3

Prerequisites: Data structures, finite automata and probability theory

UNIT -I

Finding the Structure of Words: Words and Their Components, Issues andChallenges, Morphological Models.
Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches.

UNIT –II

Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approachto Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT –III

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms,Word Sense Systems, Software.

UNIT –IV

Predicate-Argument Structure, Meaning Representation Systems, Software.

UNIT –V

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 Cross lingual 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, Tanvier Siddiqui,
U.S. Tiwary

Reference Books:

1. Speech and Natural Language Processing, Daniel Jurafsky& James HMartin, Pearson Publications

Course Outcomes:

The student shall be able to
1.   Infer knowledge about model and functional Units of Artificial NeuralNetworks
2.   Illustrate different types of Feed forward Networks
3.   Apply different Deep Neural Networks in real world problems
4.   Apply different Convolutional Neural Networks in real world problems
5.   Illustrate different types of Recurrent Neural Networks

(A37210) COGNITIVE COMPUTING

(Professional Elective – VI)

B.Tech. IV Year II Sem.

L T P C

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Prerequisites: Probability theory

UNIT - I

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 of memory and language, computational models of episodic and semantic memory, modeling psycholinguistics.

UNIT - III

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, 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, Unstructured Information Management Architecture (UIMA), Structured Knowledge, Business Implications, Building Cognitive Applications, Application of Cognitive Computing and Systems.

TEXT BOOKS:

1. The Cambridge Handbook of Computational Psychology by Ron Sun (ed.), Cambridge University Press.
2. Formal Approaches in Categorization by Emmanuel M. Pothos, Andy J. Wills, Cambridge University Press.

REFERENCE BOOKS:

1. Judith S. Hurwitz, Marcia Kaufman, Adrian Bowles Cognitive Computing andBig Data Analytics, Wiley
2. Vijay V Raghavan, Venkat N. Gudivada, Venu Govindaraju, Cognitive Computing: Theory and Applications: Volume 35 (Handbook of Statistics), North Holland.

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.

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(A30554) JAVA PROGRAMMING
(OPEN ELECTIVE)

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B.Tech. IV YR SEM II   **L T P C**
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UNIT-I

Introduction: Java Essentials, JVM, Java Features, Creation and Execution of Programs, Data Types, Type Conversion, Casting, Conditional Statements, Loops,Branching Mechanism, Classes, Objects, Class Declaration, Creating Objects, Method Declaration and Invocation, Method Overloading, Constructors– Parameterized Constructors, Constructor Overloading, Cleaning-up unused Objects, Class Variables & Methods-static Keyword, this Keyword.

UNIT–II

Arrays: One-Dimensional Arrays, Two-Dimensional Arrays, Command-Line Arguments, Inner Class. **Inheritance**: Introduction, Types of Inheritance, extends Keyword, Examples, Method Overriding, super, final Keywords, Abstract classes, Interfaces, Abstract Classes Verses Interfaces.

UNIT–III

Packages–Creating and Using Packages, Access Protection, Wrapper Classes, String Class, StringBuffer Class. **Exception**: Introduction, Types, Exception Handling Techniques, User-Defined Exception.

UNIT-IV

Multithreading: Introduction, Main Thread, Creation of New Threads – By Inheriting the Thread Class or Implementing the Runnable Interface, Thread Lifecycle, Thread Priority, Synchronization.

UNIT–Vjava.io Package**, File Class, FileInputStream Class, FileOutputStream Class, Scanner Class, BufferedInputStream Class, BufferedOutputStream Class,RandomAccessFile Class.**

Text Books:

1.Sachin Malhotra, Saurabh Choudhary, Programming in Java (2e),Oxford publications.

Reference Books:

1.Herbert Schildt, Java: The Complete Reference (9e), McGraw Hill Education;
2. C. Thomas Wu, An introduction to object-oriented programming with Java(5e), McGraw-Hill Education;

Course Outcomes

The student shall be able to:
1. Explain the OOPs concepts.
2. Describe various types of Inheritance in Java.
3. Develop robust Java applications using Packages, Exceptions.
4. Implement Java applications using Java Threads.
5. Design Java applications with various modes of Input and output

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END

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(A30555) INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

(OPEN ELECTIVE)

B.Tech.   **L T P   C**
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UNIT-I

Introduction to Databases: Introduction, Traditional File-Based Systems, Database Approach, Roles in the Database Environment, Advantages and Disadvantages of DBMS, The Three-Level ANSI-SPARC Architecture,
Database Languages, Data Models, Functions of a DBMS, Components of DBMS. Relational Model: Introduction, Terminology, Integrity Constraints, Views. The Relational Algebra: Unary Operations, Set Operations, Join Operations, Division Operation, Aggregation and Grouping Operations.

UNIT–II

SQL: The ISO SQL Data Types, Integrity Enhancement Feature–Domain Constraints, Entity Integrity, Referential Integrity, General Constraints, Data Definition–Creating a Database, creating a Table, Changing a Table Definition, removing a Table, Creating an Index, Removing an Index, Views–Creating a View, Removing a View, View Resolution, Restrictions on Views, View Updatability 'WITH CHECK OPTION', Advantages and Disadvantages of Views, View Materialization.

UNIT–III

SQL: Introduction, Data Manipulation–Simple Queries, Sorting Results, Using the SQL Aggregate Functions, Grouping Results, Sub-queries, ANY and ALL, Multi- table Queries, EXISTS and NOT EXIST, Combining Result Tables, Database Updates.

UNIT-IV

Advanced SQL: The SQL Programming Language–Declarations, Assignments, Control Statements, Exceptions, Cursors, Subprograms, Stored Procedures,Functions, and Packages, Triggers, Recursion.

UNIT–V

Normalization: The Purpose of Normalization, How Normalization Supports Database Design, Data Redundancy and Update Anomalies, Functional Dependencies in brief, The Process of Normalization,1NF, 2NF, 3NF, BCNF.

Text Books:

1.Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems,McGraw-Hill Education, 2003
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database SystemConcepts, McGraw-Hill Education

Reference Books:

1.Thomas M. Connolly, Carolyn E. Begg, Database Systems–A Practical Approach to Design, Implementation, and Management (6e), Pearson publisher
2. RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems,Pearson publisher

Course Outcomes Students shall be able to

1.Describe Database Management System Architecture. 2.Create, update, modify Relational
Database Objects. 3.Manipulate data in Relational Database
4.Develop PL/SQL programs using Cursors, Subprograms, Stored Procedures,Functions, and Packages, Triggers.
5.Explain the purpose of normalization and types Normal forms.

END

(A30471) PRINCIPLES OF ELECTRONIC COMMUNICATIONS

(OPEN ELECTIVE)

B.Tech.   **L T P C**

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Unit- I: Introduction to Communication System

Block diagram of Communication system, Radio communication: Types of communications, Analog, Pulse, and Digital, Types of Signals, Fourier Transform for various signals, Fourier Spectrum, Power spectral density, Correlation, Convolution, Time Division Multiplexing, Frequency Division Multiplexing.

Unit- II: Amplitude Modulation

Need for modulation, Types of Amplitude modulation: AM, DSBSC, SSBSC, Power and BW requirements, Generation of AM, DSBSC, SSBSC, Demodulation of AM: Diode detector, Coherent detection of DSBSC& SSBSC.

Unit- III: Angle Modulation

Frequency & Phase Modulation, Advantages of FM over AM, Bandwidthconsideration, Narrow band FM, Wide band FM, Comparison of FM and PM. **Pulse Modulation**
Sampling, Sampling Theorem for Band limited signals, Types of Pulse modulation: PAM, PWM, PPM, Generation and demodulation of PAM, PWM, and PPM.

Unit- IV: Digital communication

Advantage, Block diagram of PCM, Quantization error, DPCM, Adaptive DPCM, DM and Comparison.
Digital Modulation: ASK, FSK, PSK, DPSK, QPSK, coherent and Non-coherentreception.

Unit- V: Information Theory

Concept of Information, Rate of Information and entropy, Source coding foroptimum rate of information, Coding efficiency, Shannon Fano coding, Huffman Coding.
Error Control Coding: Introduction, Error detection and Correction codes, Blockcodes, Convolution codes.

Textbooks:

1. Communication Systems Analog and Digital–R. P. Singh, SD Sapre,TMH, 20th reprint, 2004.
2. Principles of Communication Systems – H Taub& D. Schilling,GautamSahe, TMH, 3rd Edition, 2007.
3. Communication Systems – B.P. Lathi, BS Publication, 2004.

References:

1. Analog and Digital Communication – K. Sam Shanmugam, Willey, 2005.
2. Electronics & Communication System – George Kennedy and BernardDavis, TMH 2004.
3. Digital Communications- John G. Proakis, MasoudSalehi- 5th Edition,Mcgarw- Hill,2008.

Course Outcomes

At the end of the course the student should be able to:
1. Explain the concept of Communication systems.
2. Describe the concept of AM and FM transmission and Reception.
3. Analyze the concepts of digital communication systems.
4. Compare the different digital modulation techniques.
5. Discuss about different error detecting and error correcting codes like blockcodes, cyclic codes and convolution codes.

END

(A30383) FUNDAMENTALS OF ENGINEERING MATERIALS
(OPEN ELECTIVE)

B.Tech.
                                                     L T P C
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UNIT – I

Structure of Metals: Crystallography, Miller's indices, Packing Efficiency, Density calculations. Grains and Grain Boundaries. Effect of grain size on the properties. Determination of grain size by different methods. Constitution of Alloys: Necessity of alloying, Types of solid solutions, Hume - Rothery rules, Intermediate alloy phases.

UNIT –II

Phase Diagrams: Construction and interpretation of phase diagrams, Phase rule. Lever rule. Binary phase Diagrams, Isomorphous, Eutectic and Eutectoid transformations with examples.

UNIT – III

Steels: Iron-Carbon Phase Diagram and Heat Treatment: Study of Fe-Fe3C phase diagram. Construction of TTT diagrams. Annealing, Normalizing, Hardening andTempering of steels, Hardenability. Alloy steels.

UNIT – IV

Cast Irons: Structure and properties of White Cast iron, Malleable Cast iron, Grey cast iron. Engineering Materials-III: Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminium and its alloys, Al-Cu phase diagram, Titanium and its alloys.

UNIT – V

Ceramics, Polymers and Composites: Crystalline ceramics, glasses, cermets: structure, properties and applications. Classification, properties and applications ofcomposites. Classification, Properties and applications of Polymers.

TEXT BOOKS:

1. Material Science and Metallurgy/ Kodgire
2. Essentials of Materials Science and engineering / Donald R. Askeland /Thomson.

REFERENCE BOOKS:

1. Introduction to Physical Metallurgy / Sidney H. Avner.
2. Materials Science and engineering / William and callister.
3. Elements of Material science / V. Rahghavan

Course Outcomes:

At the end of the course the students are able to:
1. Identify the crystalline structure of steel.
2. Understand the theory of time temperature and transformation
3. Determine of different uses of heat treatment in steel.
4. Distinguish between the various forms of steel.
5. Understand the properties of non-ferrous alloys and uses of compositematerials.

END

(A30377) BASICS OF THERMODYNAMICS
(OPEN ELECTIVE)

B.Tech.   **L   T   P   C**
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UNIT – I

Introduction: Basic Concepts: System, Control Volume, Surrounding, Boundaries, universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Exact & Inexact Differentials, Cycle, Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility.

UNIT - II

Types, Displacement & Other forms of Work, Heat, Point and Path functions, Zeroth Law of Thermodynamics – Concept of Temperature – Principles of Thermometry – Reference Points – Const. Volume gas Thermometer – Scales of Temperature, Ideal Gas Scale.

UNIT – III

First and Second Laws of Thermodynamics: First Law: Cycle and Process, Specific Heats (cpand cv), Heat interactions in a Closed System for various processes, Limitations of First Law, Concept of Heat Engine (H.E.) and Reversed H.E. (Heat Pump and Refrigerator), Efficiency/COP, Second Law: Kelvin-Planck and Clausius Statements, Carnot Cycle, Carnot Efficiency, Statement of Clausius Inequality, Property of Entropy, T-S and P-V Diagrams

UNIT - IV

Mixtures of perfect Gases – Mole Fraction, Mass friction Gravimetric and volumetric Analysis – Dalton's Law of partial pressure, Avogadro's Laws of additive volumes – Mole fraction, Volume fraction and partial pressure, Equivalent Gas const. Atmospheric air - Psychrometric Properties – Dry bulb Temperature, Wet Bulb Temperature, Dew point Temperature, , Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation ,Psychrometric chart

UNIT - V

Power Cycles: Otto, Diesel cycles - Description and representation on P–V and T- S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis **Refrigeration Cycles:** Bell-Coleman cycle, Vapour compression cycle-performance Evaluation.

TEXT BOOKS:

1. Basic Engineering Thermodynamics / PK Nag / Mc Graw Hill
2. Engineering Thermodynamics / chattopadhyay/ Oxford

REFERENCE BOOKS:

1. Thermodynamics for Engineers / Kenneth A. Kroos, Merle C. Potter/ Cengage
2. Thermodynamics /G.C. Gupta /Pearson

COURSE OUTCOMES:
After completing this course, the students will be able to
1. Apply energy balance to systems and control volumes, in situations involving heat and work interactions.
2. Evaluate changes in thermometric properties of substances.
3. Apply the laws of thermodynamics to different systems.
4. Understand the psychrometric properties of air
5. Compare different air standard cycles.

END

(A30258) BASICS OF POWER ELECTRONICS & DRIVES
(OPEN ELECTIVE)

B.Tech.   **L T P C**
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UNIT I: POWER SEMICONDUCTOR DEVICES

Power Semiconductor Devices Construction and Characteristics of Power diodes, Power Transistors, Power MOSFET, Insulated Gate Bipolar transistors (IGBTs) Introduction to Thyristor family: SCR, DIACs, TRIACs.

UNIT II: PHASE CONTROLLED (AC TO DC) CONVERTERS

Principle of phase-controlled converter operation; Operation of 1-phase half wave converter with R, RL and RLE load; 1- phase full wave converter, Bridge Configuration; Operation with R, RL, RLE load; Operation of 1-phase Semi- converter/ Half controlled converter:

UNIT III: THREE -PHASE CONVERTERS

Operation of half wave converter; Full wave fully controlled converters: Semi- controlled converter; Dual Converter: Principle and operation; Applications of AC-DC converters

UNIT IV: DC TO DC CONVERTERS

The chopper, Basic principle of DC chopper, Classification of DC choppers, Control strategies Basic DC-DC converter (switch regulator) topologies: Principle, operation Step-down (Buck), Step-up (Boost), Step up/down (Buck-Boost), Continuous conduction and Discontinuous conduction operation, Two zone operation, Four quadrant operation (Operating modes),

UNIT V: POWER CONVERTERS FED DRIVES

Single phase separately excited drives: Half Wave converter, Semiconverter and Fully Controlled converter based drives; Braking operation of separately excited drive Semi-converter and Fully Controlled converter based drives 3-phase separately excited drives: Half Wave converter, Semi-converter and Fully Controlled converter based drives; Principle of power control (motoring control) of separately excited and series motor with DC-DC Converter;

Text books:

1. M D Singh and K B Khanchandani, "Power electronics", TMH, NewDelhi, 2nd ed., 2007.
2. P.S. Bimbhra, "Power Electronics", Khanna Publishers, New Delhi, 2012..
3. Muhammad H. Rashid, "Power Electronics - Circuits, Devices and Applications", Prentice Hall of India, 3rd ed., 2003.

Reference Books:

1. VedamSubramanyam, "Power Electronics – Devices, Converters and Applications", New Age International Publishers Pvt. Ltd., Bangalore, 2nded. 2006.
2. Ned Mohan, Undeland and Robbins, "Power Electronics – Converters, Applications and Design", John Willey & sons, Inc., 3rd ed., 2003.
3. V.R.Moorthi, "Power Electronics", Oxford University press, 2005.
4. G..K. Dubey, S.R. Doradla, A. Joshi, and R.M.K. Sinha, "Thyristorised Power Controllers", New Age International Ltd. Publishers, 1986 (Reprint2008).
5. P.T. Krein, "Elements of Power Electronics", Oxford University Press, 1998.
6. G..K. Dubey, " Fundamentals of Electrical Drives", Narosa Publishing House, New Delhi, 2nd ed. 2001

Course Outcome:

After learning the course, the students should be able to:
1. Explain the construction and characteristics of Power semiconductordevices
2. Analyze the operation of single phase and three phase ac-to-dc converters.
3. Analyze various three phase converters
4. Compare the various types of dc-to-dc converters.
5. Apply the knowledge of power electronic converter for variousapplications.

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(A30252) POWER GENERATION SYSTEMS
(OPEN ELECTIVE)

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B.Tech.   **L T P C**
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UNIT I: THERMAL POWER PLANTS

Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers, FBC Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants - Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogeneration systems.

UNIT II: NUCLEAR POWER PLANTS

Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors: Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANada-Deuterium- Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.

UNIT III: SOLAR ENERGY

Principles of solar radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, instruments for measuring solar radiation and sun shine, solar radiation data. Photo-voltaic energy conversion.
Solar energy collection: Flat plate and concentrating collectors,
Storage and applications: solar ponds. Solar Applications - solar heating/cooling technique, solar distillation and drying.

UNIT-IV: WIND&BIO-MASS ENERGY:

Wind: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria
Bio-mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

UNIT-V: GEOTHERMAL &OCEAN ENERGY:

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

TEXT BOOK:

1. Nag. P.K., "Power Plant Engineering", Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008.
2. Non-Conventional Energy Sources /G.D. Rai
3. Renewable Energy Technologies /Ramesh & Kumar /Narosa

REFERENCE BOOKS:

1. El-Wakil. M.M., "Power Plant Technology", Tata McGraw – Hill Publishing Company Ltd.,2010.

2. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.
3. Thomas C. Elliott, Kao Chen and Robert C. Swanekamp, "Power Plant Engineering", Second Edition, Standard Handbook of McGraw – Hill, 1998
4. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
5. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
6. Solar Energy /Sukhame

Course Outcomes:

After learning the course, the students should be able to:
1. Explain the construction and operation of thermal power plants
2. Analyze the operation of diesel, gas turbine and combined cycle powerplants.
3. Illustrate the construction, operation and safety aspects of nuclear powerplants.
4. Compare the power derived from renewable energy sources
5. Identify the economic aspects of power plants

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(A30160) DISASTER MANAGEMENT AND MITIGATION

(OPEN ELECTIVE)
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B.Tech.   **L T P C**

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UNIT - I:

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of EnvironmentalHazards, Environmental stress & Environmental Disasters. Different approaches &relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical reserches.

UNIT - II:

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man indeced hazards & Disasters - Natural Hazards - Planetary Hazards / Disasters -Extra Planetary Hazards / disasters - Planetary Hazards - Endongenous Hazards -Exogenous Hazards

UNIT - III:

Endogenous Hazards - Volcanic eruption - Earthquakes - landslides - Volcanic Hazards / Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards / disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - Human adjusment, perception & mitigation of earthquake.

UNIT - IV:

Exogenous hazards / disasters - Infrequent events - Cumulative atmospheric hazards/ disasters
Infrequent events: Cyclones - Lightning – Hailstorms
Cyclones: Tropical cyclones & Local stroms - Destruction by tropical cyclones & local stroms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters :- Floods - Droughts - Cold waves - Healwaves Floods :- Causes of floods - Flood hazards India - Flood control measures (Human adjustment, perception & mitigation) Droughts :- Impacts of droughts - Drought hazards in India - Drought control measures - Extra Planetary Hazards /Disasters - man induced Hazards / Disasters - Physical hazards / Disasters - Soil erosion

Soil Erosion: Mechanics & forms of Soil Erosion - Factors 7 causes of Soil Erosion Conservation measures of Soil Erosion.

Chemical hazards / disasters: Release of toxic chemicals, nuclear explosion - Sedimentation processes Sedimentation processes: - Global Sedimentation problems - Regional Sedimentation problems - Sedimentation & Environmental problems - Corrective measures of Erosion & Sedimentation

Biological hazards / disasters: Population Explosion.

UNIT - V:

Emerging approaches in Disaster Management - Three stagesPre-disaster Stage (preparedness)
1. Emergency Stage
2. Post Disaster stage - Rehabilitation

TEXT BOOKS:

1. Manual on Disaster Management, National Disaster Management, Agency Govtof India.
2. Disaster Management by Mrinalini Pandey Wiley 2014.
3. Disaster Science and Management by T. Bhattacharya, McGraw HillEducation (India) Pvt Ltd Wiley 2015

REFERENCE BOOKS:

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan,BS Publications 2009.
2. National Disaster Management Plan, Ministry of Home affairs, Government of India (http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

Course outcomes Students shall be able to
1. Understand to describe the basic typesof Environmental hazards and disasters. Understand how to react effectively to natural, manmade, andtechnological threats.

2. Understand how to react effectively to natural, manmade, and planetaryhazards.
3. Explore the history of the field and comprehend how past events areearthquake, landslides and volcanicazards.
4. Describe the basic concepts of the emergency management cycle mitigation, preparedness, response, and recovery.
5. Recognizes the stakeholders in disaster management system, theirjurisdiction and responsibilities.

END

(A30161) REMOTE SENSING AND GIS
(OPEN ELECTIVE)

B.Tech.

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UNIT – I

Introduction to Photogrammetric: Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement,Fundamentals of stereoscopy, fiducial points, parallax measurement using fiducial line.

UNIT – II

Remote Sensing: Basic concept of remote sensing, Data and Information, Remote sensing data Collection, Remote sensing advantages & Limitations, Remote Sensing process. Electro-magnetic Spectrum, Energy interactions with atmosphereand with earth surface features (soil, water, vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

UNIT – III

Geographic Information Systems: Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data-Attribute data – Joining Spatial and Attribute data; GIS Operations: Spatial Data Input- Attribute data Management –Data display- Data Exploration-Data Analysis. COORDINATE SYSTEMS: GeographicCoordinate System: Approximation of the Earth, Datum; Map Projections: Types of Map Projections-Map projection parameters commonly used Map Projections - Projected coordinate Systems

UNIT – IV Vector Data Model: **Representation of simple features- Topology and its importance; coverage and its data structure, Shape file; Data models for composite features Object Based Vector Data Model; Classes and their Relationship; The geo- base data model; Geometric representation of Spatial Feature and data structure, Topology rules**

UNIT – V

Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data Conversion, Integration of Raster and Vector data.

Data Input: Metadata, Conversion of Existing data, creating new data; Remote Sensing data, Field data, Text data, Digitizing, Scanning, on screen digitizing, importance of source map, Data Editing.

TEXT BOOKS:

1. Remote Sensing and GIS Lillesand and Kiefer, John Willey 2008.
2. Remote Sensing and GIS B. Bhatta by Oxford Publishers 2015.
3. Introduction to Geographic Information System – Kang-Tsung Chang, McGraw-Hill-2015

REFERENCES:

1. Concepts & Techniques of GIS by C. P. Lo Albert, K.W. Yonng, Prentice Hall(India)Publications.
2. Principals of Geo physical Information Systems – Peter A Burragh and RachaelA.Mc Donnell, Oxford Publishers 2004.
3. Basics of Remote sensing & GIS by S. Kumar, Laxmi Publications.

Course Outcomes:
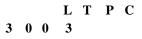
At the end of the course, the student will be able to:
1. Understand the basic concept of GIS and its applications; know different types of data representation in GIS.
2. Understand the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies.
3. Apply knowledge of GIS software and able to work with GIS software in various application fields.
4. Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinates systems.
5. Apply knowledge of GIS and understand the integration of Remote Sensing and GIS.

END

(C30161) LOGISTICS AND SUPPLY CHAIN MANAGEMENT

(OPEN ELECTIVE)

B.Tech.   **L T P C**
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Unit – 1

Understanding the Supply Chain: Objective and Importance of Supply ChainProcess View of Supply Chain. Competitive and Supply Chain Strategies, Achieving Strategic Fit, Expanding Strategic Scope. Logistics: The Logistical value preposition, The Work of Logistics, Logistical operations, Logistical operating arrangements, Supply chain Synchronization, Supply Chain Drivers and Metrics: Drivers for Supply Chain Performance, Framework for Structuring drivers. Facilities, inventory, transportation, information, sourcing and pricing. Obstacles toAchieving fit, Supply chain performance in India. Case studies.

Unit – 2

Designing the Supply Chain Network : Role of distribution in the Supply Chain,Factors influencing Distribution network design, Design options for Distribution network, The role of network design in the Supply Chain, Frame work for Networkdesign decisions, Models for facility location and capacity allocation, Planning Demand and Supply in a Supply Chain: Demand Forecasting in Supply Chain: Components of forecast and forecasting methods, Aggregate Planning in Supply Chain: Role of aggregate planning, Aggregate planning Strategies , Inventory planning and economic theory aberrations. Case studies

Unit – 3

Planning and Managing inventories in Supply Chain: Managing Economies of Scale in Supply Chain, Managing Uncertainty in a Supply Chain, Determining optimal level of product inventory. Designing and Planning Transportation Networks: Transportation in a Supply Chain. Case studies

Unit – 4

Managing Cross Functional Drivers in a Supply Chain: Sourcing decisions in aSupply Chain and procurement strategies, Pricing and Revenue Management in a Supply Chain, Information Technology and Coordination in a Supply chain. Case studies

Unit- 5

Logistics and Supply chain relationships: Identifying logistics performance indicators –Channel structure – Economics of distribution –channel relationships –logistics servicealliances. Managing Global logistics and Global supply chains: Logistics in a global economy – views of global logistics- global operating levels –interlinked global economy - The Global supply chains, Supply Chain Management in Global environment–Global strategy – Global purchasing – Global logistics– Global alliances –Issues and Challenges in Global supply chain Management – Casestudies

REFERENCE BOOKS
1. Sunil Chopra and Peter Meindl: Supply chain Management: Strategy, Planning and Operation, Third edition, Pearson, 2009.
2. Donald J. Bowersox and David J. Closs: Logistical Management: The Integrated Supply Chain Process, TMH, 2006.
3. Rajasekhar &Acharyulu: Logistics and Supply Chain Management, Excel,2009.
4. Sridhara Bhat: Logistics and supply chain management, Himalaya, 2009.
5. John T Mentzer: Supply Chain Management, Sage Publications, 2008
6. Donal Waters: Global Logistics, Kogan Page, 2009
7. Christain schuh et al: The purchasing chess board, Springer link,2009.
8. Philip B.Schary, TageSkjott-Larsen: Managing the Global Supply Chain,Viva, 2008.

COURSE OUTCOMES

On completion of the course students will be able to
1. Analyze growing importance of Supply Chain Management.
2. Identify Principles of SCM Costs and customer Profitability analysis.
3. Explain importance of Benchmarking in SCM
4. Outline CRM, Sourcing and factors considered for transportation
5. Evaluate Global aspects in SCM

END

(C30162) KNOWLEDGE MANAGEMENT
(OPEN ELECTIVE)

B.Tech.   **L T P C**

                                                               3 0 0 3

Unit 1

The Knowledge Economy: Leveraging Knowledge, Data-Information-knowledge- Wisdom relationship, organizational knowledge, characteristics and components oforganizational knowledge –Building knowledge societies- Measures for meeting the challenges of implementing KM programmes.

Unit 2

Knowledge Management and Information Technology: Role Information Technology in Knowledge Management Systems, Knowledge Management tools, Creative effective Knowledge Management Systems through Information Technology, ERP and BPR, Data Warehousing and Data Mining.

Unit 3: Future of Knowledge Management and Industry perspective: Companies on the road to knowledge management, Knowledge Management inManufacturing and service industry, challenges and future of Knowledge Management.

Unit 4

The Knowledge Process: Universal appeal, Stages of KM Process, Knowledge Capital vs physical capital, Customer Relationship Management, Business Ethics And KM, The Promise of Internet and the Imperatives of the new age.

Unit 5

Implementation of Knowledge Management: Discussion on Roadblocks to success,10-step KM Road Map of Amrit Tiwana, Business Intelligence and Internet platforms, web Portals, Information Architecture: A three-way Balancing Act, KM, the Indian experience, Net Banking in India. –Role of knowledge Management in Organisational Restructuring. -The Mystique of a Learning Organisation.

REFERENCES BOOKS:
1. Mattison: Web Warehousing & Knowledge Management, Tata McGraw-Hill,2009
2. Becerra Fernandez: Knowledge management: An Evolutionary view, PHI,2009
3. Fernando: Knowledge Management, Pearson, 2009
4. B. Rathan Reddy: Knowledge management, Himalaya, 2009
5. Tapan K Panda: Knowledge Management, Excel, 2009.
6. Barnes: Knowledge Management systems, Cengage, 2009.
7. Tiwana: The Knowledge Management tool kit, 2/e, Pearson Education,2009.
8. Warier: Knowledge Management, Vikas Publishing House, 2009
9. Sislop: Knowledge Management, Oxford University Press, New Delhi,2009
10. Debowski: Knowledge Management, Wiley Student Edition, Wiley India,2007

Course Outcomes:
On completion of the course students will be able to:
1. Understanding the key theories and models in knowledge management.
2. Critically apply theory to organisations in order to identify and justifyeffective knowledge management strategies and activities.
3. Access and evaluate information research findings relating to knowledgemanagement.
4. Communicate clearly and effectively incorporating various knowledgemanagement formats and technologies.
5. Implementing the ethical implications in managing knowledge.

END

(A30473) IMAGE PROCESSING
(OPEN ELECTIVE)

B.Tech.
                                                         L T P C
                                                            3 0 0 3

Unit- I: Digital Image Fundamentals
Digital Image fundamentals, Components of Digital Image Processing, SamplingandQuantization, Relationship between pixels.
Image Transforms: 2-D FFT, Properties, Walsh transform, Hadamard Transform,Discrete Cosine Transform, Haar Transform.

Unit-II: Image Enhancement (Spatial Domain)
Introduction, Image Enhancement in Spatial domain, Enhancement through point Processing, Types of point Processing, Histogram manipulation, Linear and nonlinear gray level Transformation, Local or neighborhood operation, Median filter, image Smoothing & Sharpening

Image Enhancement (Frequency Domain)
Filtering in Frequency domain, low pass filter (smoothing) and high pass filter (Sharpining), image Smoothing & Sharpening.

Unit- III: Image Restoration
Degradation model, Algebraic approach to restoration, Inverse filtering, least mean square filters, Constrained Least Squares Restoration.

Unit- IV: Image Segmentation
Detection of discontinuities, Edge linking and boundary detection, Thresholding,Region oriented segmentation.
Morphological Image Processing: Dilation and Erosion, Structuring ElementDecomposition, Opening and Closing, the Hit or Miss Transformation.

Unit-V: Image Compression
Redundancies and their removal methods, Fidelity criteria, Image compression models, Huffman and Arithmetic Coding, Error free compression, Lossycompression, Lossy and Lossless Predictive Coding, Transform based Compression, JPEG 2000 Standards.

TEXT BOOKS:
1. Digital Image Processing – Rafael C. Gonzalez, Rechard E. Woods, 3rdedition. Pearson, 2008
2. Digital Image Processing – S. Jayaraman, S Esakkirajan, T Veerakumar-TMH, 2010

REFERENCE BOOKS:
1. Digital Image Processing using MATLAB – Rafael C. Gonzalez, RichardE woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
2. Fundamentals of Digital Image Processing – A. K. Jain, PHI, 1989.
3. Digital Image processing and Computer vision – Somka, Hlavac, BoyleCengage learning (Indian edition) 2008.
4. Introductory Computer vision Imaging Techniques and Solutions – Adrianlow, 2008, 2nd Edition.
5. Introduction to Image Processing & Analysis – John C. Russ, J. ChristianRuss, CRC press, 2010.

Course Outcomes
At the end of the course the student will be able to:
1. Describe the fundamental concepts of digital image processing andtrasformation techniques.
2. Explain the image enhancement techniques in spatial and frequencydomain
3. Explain degradation technique and restoration techniques for imagereconstruction.
4. Describe various image segmentation methods and morphologicalmethods.
5. Analyze various Lossy and Lossless image compression techniques.

END

(A30474) DIGITAL ELECTRONICS
(OPEN ELECTIVE)

B.Tech.   **L   T   P   C**
                                                                          3   0   0   3

UNIT I:

NUMBER SYSTEM AND BOOLEAN ALGEBRA AND SWITCHINGFUNCTIONS

Number Systems, Base Conversion Methods, Complements of numbers, Codes – binary codes, Binary Coded Decimal code and its properties, unit Distance Codes, Alpha Numeric Codes, Error Detecting and Correcting Codes.
Boolean Algebra: Basic theorems and properties - Switching Functions, Canonicaland Standard Forms-Algebraic simplification Digital Logic Gates, Properties of XOR gates & Universal Gates-Multilevel NAND/NOR realizations.

UNIT-II:
MINIMIZATION AND DESIGN OF COMBINATIONAL CIRCUITS:

Introduction, The Minimization methods with Theorem, The Karnaugh Map Method, Five and Six Variable Maps, Prime and Essential Implicants, Don't Care Map Entries, Minimization using tabular method, Partially Specified Expressions Multi Output minimization and combinational design, Arithmetic Circuits, Comparator, Multiplexer, Code-converters.

UNIT-III:
FUNDAMENTALS OF SEQUENTIAL MACHINES:

Introduction, Basic Architectural Distinctions between combinational and sequential circuits. The Binary Cell, Fundamentals of Sequential Machine Operations, The Flip-flop, D-Latch & Flip-flop, the clocked T-flip-flop, the clockedJ-K flip-flop, Design of a clocked flip-flop. Conversion from one type of Flip-Flopto another, Timing and Triggering Consideration.

UNIT-IV:
SEQUENTIAL CIRCUIT DESIGN AND ANALYSIS

Introduction, State Diagram, Analysis of synchronous Sequential Circuits,Approaches to the Design of Synchronous Sequential Finite State Machines, DesignAspects, State Reduction, Design Steps, Realization using Flip-Flops.
Counters –Design of single mode counter, Ripple counter, Ring counter, Shift register, Shift register sequences, Ring counter using Shift register.

UNIT-V:

FSM Charts: Finitestate machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequentialmachines, Partition techniques and Merger chart methods-concept of minimal cover table.

TEXT BOOKS:

    1. Switching& Finite Automata theory – ZviKohavi, &Niraj K. Jha, 3rd Edition,Cambridge.
    2. Digital Design -Morris Mano, PHI, 3rd Edition, 2006.

REFERENCE BOOKS:

    1 Introduction to switching design and logic design _ Fredriac J. Hill, Gerald R.Peterson, 3rd ED, John Wiley & Sons Inc
    2. Digital fundamentals – A Systems approach-Thomas L. Floyd, Pearson, 2013.
    3. Digital logic design- Ye Brian and Holds Worth, Elsevier.
    4. Fundamentals of Logic Design - Charles H. Roth, Thomson Publications, 5thEdition, 2004.
    5. Digital Logic Applications and Design - John M. Yarbrough, ThomsonPublications, 2006.
    6. Digital Logic and state machine design – Comer, 3rd, oxford, 2013.

Course Outcomes

At the end of the course the student will be able to:
1. Identify the various numeric and binary Numbers.
2. Apply the basic theorems to simply the Boolean Functions.
3. Design simple Combinational Circuits.
4. Design simple Sequential Circuits.
5. Distinguish the Finite State Machines

END

(A30357) FUNDAMENTALS OF MANUFACTURING PROCESSES
(OPEN ELECTIVE)

B.Tech.   **L T P C**
         3 0 0 3

UNIT – I

Casting: Steps involved in making a casting – Advantage of casting and its applications; Patterns - Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands. Methods of Melting - Crucible melting and cupola operation – Defects in castings; Casting processes – Types – Sand moulding, Centrifugal casting, die- casting, Investment casting, shell moulding; Principles of Gating – Requirements – Types of gates, Design of gating systems – Riser – Function, types of Riser and Riser design.

UNIT – II

Welding: Classification – Types of welds and welded joints; Gas welding - Types, oxy-fuel gas cutting. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding. Inert Gas Welding - TIG Welding, MIG welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non-destructive testing of welds.

UNIT – III

Hot working, cold working, strain hardening, recovery, recrystallisation, and grain growth. Stamping, forming, and other cold working processes. Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning. Types of presses and press tools. Forces and power requirement in the above operations.

UNIT – IV

Extrusion of Metals: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Extruding equipment – Tube extrusion and pipe making, Hydrostatic extrusion. Forces in extrusion

UNIT – V

    Forging Processes: Forging operations and principles – Tools – Forging methods
    – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging
    – forging defects –cold forging, swaging, Forces in forging operations.

TEXT BOOKS:

1. Manufacturing Technology / P.N. Rao / Mc Graw Hill
2. Manufacturing Engineering and Technology/Kalpakjin S/ Pearson.

REFERENCE BOOKS:

1. Metal Casting / T.V Ramana Rao / New Age
2. Métal Fabrication Technology/ Mukherjee/PHI

Course Outcomes:

For given product, one should be able identify the manufacturing process.
1. Understand the idea for selecting materials for patterns.
2. Learn different types and allowances of patterns used in casting andanalyze the components of moulds.
3. Design core, core print and gating system in metal casting processes Understand arc, gas, solid state and resistance welding processes.
4. Develop process-maps for metal forming processes using plasticityprinciples.
5. Identify the effect of process variables to manufacture defect freeproducts.

END

(A30379) FUNDAMENTALS OF AUTOMOBILE ENGINEERING
(OPEN ELECTIVE)

B.Tech.   **L T P C**
                                                                                                                      3 0 0 3

Unit – I

Introduction: Components of four-wheeler automobile – chassis and body – power unit – power transmission rear wheel drive, front wheel drive, 4-wheel drive types of automobile engines, engine construction – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engineservice, re boring, decarburization

Unit – II

Fuel System: S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pumps – Carburetor – types – air filters – petrol injection.
C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, Alternative fuels for Automobiles-injection, Classification, Properties, Hybrid vehicles injection timing, testing of fuel, pumps.
Cooling System: Cooling Requirements, Air Cooling, Liquid Cooling and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.

Unit – III

Electrical System: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn,wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.
Ignition System: Function of an ignition system, battery ignition system, constructional features of storage battery, auto transformer, contact breaker points,condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

Unit – IV

Transmission System: Clutches, principle, types- cone clutch, single plate clutch,multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – Gear boxes,types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box,over drive torque converter.Propeller shaft – Hoatch – Kiss drive, Torque tube drive universal joint, differential rear axles – types – wheels and tyres.
Steering System: Types of steering mechanism – Ackerman steering mechanism,Davis steering mechanism

Unit – V Suspension System: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system. **Braking System:** Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid,Pneumatic and vacuum brakes.

TEXT BOOKS

1. Automobile Engineering, Vol. 1 & Vol. 2/ Kripal Singh
2. Automobile Engineering, Vol. 1 & Vol. 2 ,by K.M Gupta,Umesh publication

REFERENCE BOOKS

1. A System approach to Automotive Technology by Jack Erjavec YesDeepublishing Pvt Ltd.
2. Automobile Engineering / William Crouse
3. Automotive Mechanics / Heitner
4. Alternative fuels of Automobiles by P. Rami Reddy, Frontline publications.

Course outcomes:

By undergoing this course, a student shall be able to
1. Identify power generation, transmission and control mechanisms in anautomobile
2. Manipulate the chemical, thermal, mechanical and electrical energies in anautomobile
3. Infer the interaction between subsystems
4. Analyze how transmission system works
5. Learn different components of suspension systems.

END

(A30259) ELECTRICAL & HYBRID VEHICLES
(OPEN ELECTIVE)

B.Tech.   **L T P C**
                                                                                             3 0 0 3

UNIT I: INTRODUCTION TO HEV

Configuration of Electric Vehicles, Performance of Electric Vehicles, Traction motor characteristics, Tractive effort and Transmission requirement, Vehicle performance, Tractive effort in normal driving, Energy consumption Concept of Hybrid Electric Drive Trains, Architecture of Hybrid Electric Drive Trains, Series Hybrid Electric Drive Trains, Parallel hybrid electric drive trains

UNIT II: ENERGY STORAGE FOR EV AND HEV

Energy storage requirements, Battery parameters, Types of Batteries, Modelling of Battery, Fuel Cell basic principle and operation, Types of Fuel Cells, PEMFC and its operation, Modelling of PEMFC, Super Capacitors

UNIT III: ELECTRIC PROPULSION

EV consideration, DC motor drives and speed control, Induction motor drives, Permanent Magnet Motor Drives, Switch Reluctance Motor Drive for ElectricVehicles, Configuration and control of Drives.

UNIT IV: DESIGN OF ELECTRIC AND HYBRID ELECTRIC VEHICLES

Series Hybrid Electric Drive Train Design: Operating patterns, control strategies, Sizing of major components, power rating of traction motor, power rating of engine/generator, design of PPS Parallel Hybrid Electric Drive Train Design: Control strategies of parallel hybrid drive train, design of engine power capacity, design of electric motor drive capacity, transmission design, energy storage design

UNIT V: POWER ELECTRONIC CONVERTER FOR BATTERYCHARGING

Charging methods for battery, Termination methods, charging from grid, The Z-converter, Isolated bidirectional DC-DC converter, Design of Z converter for battery charging, High-frequency transformer based isolated charger topology, Transformer less topology

TEXT BOOKS:

1. M. Ehsani, Y. Gao, S. Gay and Ali Emadi, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, CRCPress, 2005
2. Iqbal Husain, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003

REFERENCE BOOKS:

1. Sheldon S. Williamson, Energy Management Strategies for Electric and Plug-in Hybrid Electric Vehicles, Springer, 2013.
2. C.C. Chan and K.T. Chau, Modern Electric Vehicle Technology, OXFORD University Press, 2001.
3. Chris Mi, M. Abul Masrur, David Wenzhong Gao, Hybrid Electric Vehicles Principles and Applications with Practical Perspectives, Wiley Publication, 2011.

List of Open Source Software/learning website:

- E-materials available at the website of NPTEL- http://nptel.ac.in/ MATLAB (Trial version): Software is useful for simulation and analysis of

electrical systems

Course Outcome:

After learning the course, the students should be able to:
1. Demonstrate the working of Electric Vehicles and recent trends
2. Analyze the energy storage requirements of EV and HEV
3. Develop the electric propulsion unit and its control for application ofelectric vehicles
4. Make use of various parameters for the design of EV and HEV
5. Analyze different power converter topology used for electric vehicleapplication

END

(A30260) ELECTRICAL SAFETY

(OPEN ELECTIVE)

B.Tech.   **L   T   P   C**

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UNIT I: CONCEPTS AND STATUTORY REQUIREMENTS

Introduction – electrostatics, electro magnetism, stored energy, energy radiation and electromagnetic interference – Working principles of electrical equipment-Indian electricity act and rules-statutory requirements from electrical inspectorate-international standards on electrical safety – first aid-cardio pulmonary resuscitation(CPR).

UNIT II: ELECTRICAL HAZARDS

Primary and secondary hazards-shocks, burns, scalds, falls-human safety in the use of electricity. Energy leakage-clearances and insulation-classes of insulation- voltage classifications-excess energy current surges-Safety in handling of war equipments-over current and short circuit current-heating effects of current- electromagnetic forces-corona effect-static electricity –definition, sources, hazardous conditions, control, electrical causes of fire and explosion-ionization, spark and arc ignition energy-national electrical safety code ANSI. Lightning, hazards, lightning arrestor, installation – earthing, specifications, earth resistance, earth pit maintenance.

UNIT III: PROTECTION SYSTEMS

Fuse, circuit breakers and overload relays – protection against over voltage and under voltage – safe limits of amperage – voltage –safe distance from lines-capacity and protection of conductor-joints-and connections, overload and short circuit protection-no load protection-earth fault protection. FRLS insulation-insulation and continuity test-system grounding-equipment grounding-earth leakage circuit breaker (ELCB)-cable wires-maintenance of ground-ground fault circuit interrupter-use of low voltage-electrical guards-Personal protective equipment – safety in handling hand held electrical appliances tools and medical equipments.

UNIT IV: SELECTION, INSTALLATION, OPERATION AND MAINTENANCE

Role of environment in selection-safety aspects in application - protection and interlock-self diagnostic features and fail-safe concepts-lock out and work permit system-discharge rod and earthing devices safety in the use of portable tools-cabling and cable joints-preventive maintenance.

UNIT V: HAZARDOUS ZONES

Classification of hazardous zones-intrinsically safe and explosion proof electrical apparatus-increase safe equipment-their selection for different zones-temperature classification-grouping of gases-use of barriers and isolators-equipment certifying agencies.

REFERENCE BOOKS

1." Accident prevention manual for industrial operations", N.S.C., Chicago, 1982.
2. Indian Electricity Act and Rules, Government of India.
3. Power Engineers – Handbook of TNEB, Chennai, 1989.
4. Martin Glov Electrostatic Hazards in powder handling, Research Studies Pvt.Ltd., England1988.
5. Fordham Cooper, W., "Electrical Safety Engineering" Butterworth and Company, London, 1986.

Course Outcomes:

After successful completion of this course, the students can be able to:
1. Illustrate the concept and necessity of electrical safety
2. Explain the possibilities of electrical hazards and its preventive measures
3. Identify the appropriate protective system to be adopted against various electrical hazards
4. Demonstrate the selection, installation, operation of various protective equipments.
5. Compare various hazardous zone and to identify the appropriate protective equipment for those zones.

END

(A30162) GREEN BUILDINGS

(OPEN ELECTIVE)

B.Tech.   **L T P C**

                                                                                          3 0 0 3

UNIT I - INTRODUCTION

A historical perspective. General premises and strategies for sustainable and green design, objectives and basis. Bio-mimicry as a design tool based on ecosystem analogy.

UNIT II - GREEN CONSTRUCTION AND ENVIRONMENTAL QUALITY

Sustainable architecture and Green Building: Definition, Green building evaluation systems; LEED Certification; Green Globe Certification; Case studies which look at the environmental approach; Renewable Energy; Controlling the water cycle, Impact of materials on environment; Optimizing construction; Site management; Environmental management of buildings.

UNIT III - PASSIVE DESIGN IN MATERIALS

Passive Design and Material Choice – Traditional Building Materials – Importance of envelope material in internal temperature control – Specification for walls and roofs in different climate –Material and Humidity Control.

UNIT IV - ECO HOUSE

The form of the house, the building as an analogy. Building concepts: energy loss, insulation, passive solar gain, active solar gain, health benefits, and sustainable materials. Small scale wind and hydro power systems. Case study of eco house.

UNIT V - SUSTAINABLE AND GREEN BUILDING DESIGN STUDIO

This studio will explore collaborative learning to explore, investigate and apply various parameters of sustainability for design development of projected building/ urban scenarios.

REFERENCE BOOKS

1. Ken Yeang: Eco Design- A manual for Ecological design; Wiley Academy, 2006.
2. Sue Roaf et all: Ecohouse, A design guide; Elsevier Architectural Press, 2007.
3. Thomas E Glavinich: Green Building Construction; Wiley, 2008.
4. Brenda and Robert Vale: Green Architecture, Design for a Sustainable Future;Thamesand Hudson, 1996.

Course Outcomes Students shall be able to
1. Explain the principles of building planning, its bylaws and providefacilities for rainwater harvesting
2. Understand the concepts of green buildings
3. Students should be able to describe the importance and necessity of greenbuilding.
4. Students should be able to assess a building on the norms available forgreen building.
5. Students should be able to suggest materials and technologies to improveenergy efficiency of building.

END

(A30163) AIR POLLUTION AND CONTROL
(OPEN ELECTIVE)

B.Tech.   **L   T   P   C**

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UNIT – I

Introduction: Definition, Sources, classification and characterization of air pollutants. Effects of air pollution on health, vegetation & materials. Types of inversion, photochemical smog.

UNIT – II

Meteorology: Temperature lapse rate & stability, wind velocity & turbulence, plume behavior, measurement of meteorological variables, wind rose diagrams, Plume Rise, estimation of effective stack height and mixing depths.

UNIT – III

Sampling: Sampling of particulate and gaseous pollutants (Stack, Ambient & indoor air pollution), Monitoring and analysis of air pollutants (PM2.5, PM10, SOX,NOX, CO, NH3). Development of air quality models-Gaussian dispersion model- Including Numerical problems.

UNIT – IV

Control Techniques: Particulate matter and gaseous pollutants- settling chambers,cyclone separators, scrubbers, filters & ESP - Including Numerical problems. Site selection for industrial plant location.

UNIT – V

Air pollution due to automobiles, standards and control methods. Noise pollution- causes, effects and control, noise standards. Environmental issues, global episodes.Environmental laws and acts.

TEXTBOOKS:

1. M. N. Rao and H V N Rao, "Air pollution", Tata Mc-G raw Hill Publication.
2. H. C. Perkins, "Air pollution". Tata McGraw Hill Publication.
3. Mackenzie Davis and David Cornwell, "Introduction t o EnvironmentalEngineering" McGraw-Hill Co.

REFERENCE BOOKS:

1. Noel De Nevers, "Air Pollution Control Engineering", Waveland Pr Inc.
2. Anjaneyulu Y, "Text book of Air Pollution and Control Technologies", AlliedPublishers.

Course outcomes:

After studying this course, students will be able to:
1. Upon completion of this course, the students would have the knowledge ofambient air pollution, its sources, its effects, and mechanisms for air pollution prevention.
2. Identify the sources of air pollutants and their effect on human, plants andmaterials.
3. Apply knowledge of meteorology for controlling air pollution
4. Design air pollution controlling equipment.
5. Apply knowledge of legislation for prevention and control of air pollution.

END

<center>

(C30163) MANAGEMENT OF INDUSTRIAL RELATIONS

(OPEN ELECTIVE)

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B.Tech.   **L   T   P   C**
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Unit I:

Industrial Relations: Introduction, concepts, importance of Industrial relations, scope and aspects of industrial relations, the management, the government factors affecting industrial relations, evolution of industrial relations policy, the industrial policy resolution 1991.

Unit II:

Anatomy of Industrial disputes and resolutions-I: industrial disputes, classification, causes, tripotisim, bipotism Tripartite and Bipartite Bodies, Standingorders and Grievance Procedure.

Unit III:

Anatomy of Industrial disputes and resolutions-II: Collective Bargaining, Conciliation, Arbitration, Adjudication, The Industrial Dispute Act 1947, Labour Welfare work, Labour Welfare officer, Worker's Participation.

Unit IV:

Industrial relations legislation-I: Wage Policy and Wage Regulation Machinery, Wage Legislation, Payment of Wages Act 1936, The Payment of Bonus Act,1965, Minimum wages Act-1948.

Unit V:

Industrial relations legislation-II: The Factories Act 1948, Mines Act 1952, Industrial Relations and Technological Change.

Journals: Indian Journal of Industrial Relation; NHRD Journal of Career Management; Management and Labour Studies; Personnel today; Leadership excellence; Indian Journal of Training & Development.

References:

- Mamoria, Mamoria, Gankar "Dynamics of Industrial Relations" HimalayaPublishing House.2012.
- Dr K S Anandram "Cases in Personnel Management Industrial Relationsand Trade Relations" Everest, 2012.
- Arun Monappa, Ranjeet Nambudiri, Selvaraj "Industrial Relations andLabour Laws", TMH,2012.
- A.M. Sharma "Industrial Relations and Labour Laws", HimalayaPublishing House,2013.
- Ratna Sen "Industrial Relations-Text and cases "MacmillanPublishers,2011.
- Kubendran.V, Kodeeswari.K "Industrial Relations and Labour Laws"Himalaya Publishing House,2011.
- Punekar S.D, Deodhar S.B, SaraswathiSankaren" LabourWelfare, Trade Unionism and Industrial Relations, "Himalaya Publishing House,2012.
- B.D. Singh "Industrial Relations" Excel Books 2008.
- S C Srivastava "Industrial Relations and Labor Laws" Vikas, 2012.
- Padhi"Labour and Industrial Relations" PHI, 2012.
- Venkata Ratnam "Industrial Relations" Oxford, 2012.

COURSE OUTCOMES

On completion of the course students will be able to:

1. Access the concept and Scope of Industrial Relations and its resolution.
2. Outline the knowledge towards Trade unions, Industrial disputes andGrievance Procedure.
3. Identify various Laws on Wages, Welfare and Social Security.
4. Illustrate rules and regulations of working conditions.
5. Enlighten on quality standards in industry.

<center>

END

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(C30164) ENTREPRENEURSHIP
(OPEN ELECTIVE)

L	T	P	C
3	0	0	3

B. Tech (CSE)

Unit I:

Understanding Entrepreneurial Mindset- The revolution impact of entrepreneurship- The evolution of entrepreneurship- Approaches to entrepreneurship- Process approach- Twenty first centaury trends in entrepreneurship.

Unit II:

The individual entrepreneurial mind-set and Personality- The entrepreneurial journey- Stress and the entrepreneur- the entrepreneurial ego- Entrepreneurial motivations. Corporate Entrepreneurial Mindset- the nature of corporate entrepreneur- conceptualization of corporate entrepreneurship Strategy-sustaining corporate entrepreneurship.

Unit III:

Launching Entrepreneurial Ventures- opportunities identification- entrepreneurial Imagination and Creativity- the nature of the creativity process- Innovation and entrepreneurship. Methods to initiate Ventures- Creating new ventures-Acquiring an Established entrepreneurial venture- Franchising-hybrid- disadvantage of Franchising.

Unit IV:

Legal challenges of Entrepreneurship-Intellectual property protection-Patents, Copyrights-Trade marks and Trade Secrets- Avoiding trademark pitfalls. Formulation of the entrepreneurial Plan- The challenges of new venture start-ups, Poor financial Understanding-Critical factors for new venture development-The Evaluation Process-Feasibility criteria approach.

Unit V:

Strategic perspectives in entrepreneurship- Strategic Planning-Strategic actions-strategic positioning-Business stabilization- Building the adaptive firms- Understanding the growth stage-Unique managerial concern of growing ventures.

Journal:

- **The Journal of Entrepreneurship,** Entrepreneurship DevelopmentInstitute of India, Ahmedabad
- **Journal of Human Values**: IIM Calcutta.

References:

1. D F Kuratko and T V Rao "Entrepreneurship- A South-Asian Perspective"Cengage Learning, 2012. **(For PPT, Case Solutions Faculty may visit:login.cengage.com)**
2. Vasant Desai "Small Scale industries and entrepreneurship" Himalaya publishing 2012.
3. Rajeev Roy "Entrepreneurship" 2e, Oxford, 2012.
4. B. Janakiram and M. Rizwana" Entrepreneurship Development: Text &Cases, Excel Books,2011.
5. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.
6. Robert Hisrich et al "Entrepreneurship" 6th e, TMH, 2012.
7. Nandan H, Fundamentals of Entrepreneurship, PHI, 2013
8. Shejwalkar, Entrepreneurship Development, Everest, 2011
9. Khanka, Entrepreneurship Development, S. Chand, 2012

COURSE OUTCOMES:

On completion of the course students will be able to:

1. Identify the Qualities, requirements, Risk & Ethical issues to become anEntrepreneur.
2. Analyze and develop the conceptualization of corporateEntrepreneurship.
3. Explore different possibilities to start an Enterprise for youngEntrepreneurs.
4. Outline challenging benchmarks for formulation of Entrepreneurship.
5. Evaluate the application of Strategic action for growing ventures.

END

(A30475) DATA COMMUNICATIONS
(OPEN ELECTIVE)

B.TECH (CSE)   **L T P C**
                                                                             3 0 0 3

Unit I:

Introduction to data communications, networking, signals, noise, modulation and demodulation. Data communication network architecture, layered network architecture, open systems interconnection, data communications circuits, serial and parallel data transmission, data communications circuit arrangements, data communication networks, alternate protocol suites. Information capacity, bits, bit rate, baud, and M-ARY encoding.

Unit II:

Metallic cable transmission media & optical fiber transmission media: metallic transmission lines, transverse electromagnetic waves, characteristics of electromagnetic waves, transmission line classifications, metallic transmission line types, metallic transmission line equivalent circuit, wave propagation on metallic transmission lines, metallic transmission line losses, block diagram of an optical fiber communications system, optical fiber versus metallic cable facilities.

Unit III:

 Digital transmission & multiplexing and t-carriers digital transmission: pulse modulation, pulse code modulation, dynamic range, signal–to-quantization noise voltage Ratio, linear versus nonlinear PCM codes
Multiplexing: Time- division multiplexing, t1 digital carrier system, north American digital multiplexing hierarchy, digital line encoding, t carrier systems, European digital carrier system, statistical time – division multiplexing, frame synchronization, frequency- division multiplexing, wavelength- division multiplexing, synchronous optical network

Unit IV:

 Telephone instruments and signals: The subscriber loop, standard telephone set, basic telephone call procedures, call progress tones and signals, cordless telephones,caller id, electronic telephones, paging systems.
The telephone circuit: The local subscriber loop, telephone message- channel noise and noise weighting, units of powers measurement, transmission parameters and private-line circuits, voice-frequency circuit arrangements, crosstalk.

Unit V:

Data communication codes, bar codes, error control, error detection, error correction, data formats, data communications hardware, character synchronization.

TEXT BOOKS:

1. Introduction to Data Communications and Networking, Wayne Tomasi, PearsonEducation.

REFERENCE BOOKS:

1. Data Communications and Networking, Behrouz A Forouzan, FourthEdition.Tmh.
2.   Computer Communications and Networking Technologies, Gallow,Secondedition Thomson
3. Computer Networking and Internet, Fred Halsll, Lingana Gouda Kulkarni,Fifth Edition, Pearson Education

Course Outcomes:

At the end of the course, the student will be able to:
Explain the basic concepts of data communication systems.
1. Distinguish various types of transmission medias for data communications.
2. Compare different multiplexing techniques for digital transmission
3. Aanalyze different telephone instruments, signal and circuits
4. Identify different error detecting and correcting codes

**

END**

(A30476) MICROCONTROLLERS & APPLICATIONS
(OPEN ELECTIVE)

B. Tech (CSE)   **L   T   P   C**

                                                                             3   0   0   5

UNIT-I

Introduction to Microprocessors and Microcontrollers: Introduction to Microprocessor and Micro Controller, Number system and Binary arithmetic. Microprocessor Architecture (8085 and 8086) and Microcomputer System, memory map and addressing, memory classification, review of logic device for Interfacing, Memory Interfacing, Overview of 8086 Instruction Set, stacks and Interrupts.

UNIT-II

The 8051 Architecture: 8051 Microcontroller hardware, Program Counter and Data Pointer, A and B CPU registers, Flags and Program Status Word (PSW),Internal Memory : Internal RAM – Stack and Stack Pointer, Special Function Registers, Internal ROM, Input / Output Pins, ports and Circuits, ExternalMemory, Timers and Counters, Serial data Input/ Output, interrupts.

UNIT-III

8051 Instruction set: Assembly Language Programming Process, AddressingModes, Assembler Directives, Data Transfer, Arithmetic, Logical and BranchInstructions, Decimal Arithmetic, Interrupt Programming, Serial Data Communication.

8051 Programming: Basic Assembly Language Programming, Input/ Output Port Programming, 8051 Timer / Counter Programming, 8051 Serial Communication Programming, 8051 Interrupt Programming.

UNIT-IV

8051 Applications: Introduction, Interfacing Keyboards, Key pads, Interfacing Displays (Seven Segment Displays and LCD's), Interfacing A/D Convertors,Interfacing D/A Convertors, Interfacing Hardware Circuits for Multiple Interrupts,8051 Interfacing with 8255, Interfacing Eternal Memory with 8051.

UNIT-V

Introduction to Advanced Architectures: ARM and SHARC, Processor andmemory organization and Instruction level parallelism; Networked embedded

System: Bus protocols, I2 bus and Can bus; Internet-Enabled Systems, DesignExample-elevator Controller.

TEXT BOOKS:
1. K.J. Ayala "The 8051 Micro controller, Architecture, Programming 8-Applications "Thomson Delmar Learning
2. RS Gaonkar, "Microprocessors Architecture, Programming andApplications "Penram International.
3. M. A. Mazidi& J.G Mazidi." The 8051 Micro controller 8- EmbeddedSystem "Pearson Education.

REFERENCE BOOKS:
1. B. Ram "Fundamentals of Microprocessors and Microcomputers"DhanpatRai and Sons.
2. 'Computers as Components- Principles of Embedded Computing SystemDesign', Wayne Wolf, Elsevier (2nd Edition)
3. Advanced μp & peripherals- A.K. Raj & KM Bhardhadi, TMF 2nd Edition

Course Outcomes:

Students shall be able to
1. Explain the architecture of 8085 and 8086 microprocessors and 8051microcontroller.
2. Distinguish various addressing modes, assembler directives and assemblylevel instructions of 8051 micro controller.
3. Develop assembly language programs for interfacing various I/O devicesand memories with 8051 micro controller.
4. Apply the knowledge of interfacing various I/O devices and memorieswith 8051 micro controller.
5. Compare architectures of various advanced processors

END

(A30382) FUNDAMENTALS OF MECHANICAL ENGINEERING
(OPEN ELECTIVE)

B. Tech (CSE)UNIT - I

L	T	P	C
3	0	0	3

Introduction: Prime movers and its types, Concept of Force, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Change of state, Path, Process, Cycle, Internal energy, Enthalpy, Statements of Zeroth Law and First law.

Energy: Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and bio-fuels, Environmental issues like Global warming and Ozone depletion.

UNIT - II

Properties of gases: Gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant, Relation between Cp and Cv, Various non-flow processes like constant volume process, constant pressure process, Isothermal process, Adiabatic process, Poly-tropic process

Properties of Steam: Steam formation, Types of Steam, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of Steam tables, steam calorimeters.

Steam Boilers: Introduction, Classification, Cochran, Lancashire and Babcock and Wilcox boiler, functioning of different mountings and accessories.

UNIT - III

Heat Engines: Heat Engine cycle and Heat Engine, working substances, Classification of heat engines, Description and thermal efficiency of Carnot;Rankine; Otto cycle and Diesel cycles.

Internal Combustion Engines: Introduction, Classification, Engine details, four- stroke/ two-stroke cycle Petrol/Diesel engines, indicated power, Brake Power, Efficiencies.

UNIT - IV

Pumps: Types and operation of Reciprocating, Rotary and Centrifugal pumps, Priming Air Compressors: Types and operation of Reciprocating and Rotary air compressors, significance of Multistage.

Refrigeration & Air Conditioning: Refrigerant, Vapor compression refrigeration system, vapor absorption refrigeration system, Domestic Refrigerator, Window and split air conditioners.

UNIT - V

Couplings, Clutches and Brakes: Construction and applications of Couplings (Box; Flange; Pin type flexible; Universal and Oldham), Clutches (Disc and Centrifugal), and Brakes (Block; Shoe; Band and Disc).

Transmission of Motion and Power: Shaft and axle, Belt drive, Chain drive, Friction drive, Gear drive.

TEXT BOOKS:

1.Basic Mechanical Engineering / Pravin Kumar/ Pearson 2. Introduction to Engineering Materials / B.K. Agrawal/ Mc Graw Hill

REFERENCE BOOKS:

1. Fundamental of Mechanical Engineering/ G.S. Sawhney/PHI
2. Thermal Science and Engineering / Dr. D.S. Kumar/ Kataria

Course outcomes:

By undergoing this course, a student shall be able to
1. Understand different types of fuels.
2. Explain properties of steam
3. Understand the working Principle of IC Engines.
4. Explain the operations of types of pumps.
5. Know the application of mechanical drives in Transmission of Power.

END

B. Tech (CSE)Unit-I:

L	T	P	C
3	0	0	3

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Unit-II:

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods – Yields and application – Manufacture of pyrolytic oils and gases, yieldsand applications.

Unit-III:

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers –Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit-IV:

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the abovebiomass combustors.

Unit-V:

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion – Types of biogasPlants - Applications - Alcohol production from biomass - Bio diesel production -Urban waste to energy conversion - Biomass energy programme in India.

TEXT BOOKS:

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S.S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.

REFERENCE BOOKS:

1. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co.Pvt. Ltd., 1991.
2. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B.Hagan, John Wiley & Sons,1996.

Course Outcomes:

By undergoing this course, a student shall be able to
1. Understand different Conversion Devices.
2. Explain Biomass Pyrolysis.
3. Understand the working Principle of biomass gasification
4. Explain Biomass Combustion.
5. Know the application of Bio Gas.

END

(A30253) FUEL CELL TECHNOLOGY
(OPEN ELECTIVE)

B. Tech (CSE)

L	T	P	C
3	0	0	3

UNIT I: INTRODUCTION TO FUEL CELLS

Introduction – working and types of fuel cell – low, medium and high temperature fuel cell, liquid and methanol types, proton exchange membrane fuel cell solid oxide, hydrogen fuel cells – thermodynamics and electrochemical kinetics of fuel cells

UNIT II: FUEL CELLS FOR AUTOMOTIVE APPLICATIONS

Fuel cells for automotive applications – technology advances in fuel cell vehicle systems – onboard hydrogen storage – liquid hydrogen and compressed hydrogen –metal hydrides, fuel cell control system – alkaline fuel cell – road map to market.

UNIT III:
FUEL CELL COMPONENTS AND THEIR IMPACT ON PERFORMANCE

Fuel cell performance characteristics – current/voltage, voltage efficiency and power density, ohmic resistance, kinetic performance, mass transfer effects –membrane electrode assembly components, fuel cell stack, bi-polar plate, humidifiers and cooling plates.

UNIT IV: HYDROGEN STORAGE TECHNOLOGY

Hydrogen storage technology – pressure cylinders, liquid hydrogen, metal hydrides,carbon fibers – reformer technology – steam reforming, partial oxidation, auto thermal reforming – CO removal, fuel cell technology based on removal like bio- mass.

UNIT V: FUEL CYCLE ANALYSIS

Fuel Cycle Analysis – application to fuel cell and other competing technologies likebattery powered vehicles, SI engine fueled by natural gas and hydrogen and hybridelectric vehicle.

REFERENCEBOOKS:

1. Fuel Cells for automotive applications – professional engineering publishing UK.ISBN 1- 86058 4233, 2004.

2. Fuel Cell Technology Handbook SAE International GregorHoogers CRC PressISBN 0-8493-0877-1-2003.

Course Outcome:

After learning the course, the students should be able to:
1. Demonstrate the working of various types of fuel cells.
2. Make use of the fuel cell for automotive applications.
3. Compare the fuel cell performance characteristics.
4. Explain the concept of hydrogen storage systems
5. Analyze the fuel cycle

END

(A30255) ENERGY EFFICIENCY IN ELECTRICAL UTILITIES
(OPEN ELECTIVE)

L	T	P	C
3	0	0	3

B. Tech (CSE)

UNIT I: ELECTRICAL SYSTEMS & ELECTRIC MOTORS

Introduction of Electrical systems, Tariff and economic considerations; T & D losses, Electrical load management; Maximum demand management, Role of Power factor and its improvement- Electric Power systems analysis -Energy Efficient Technologies in Electrical Systems - Motor Types, Characteristics, Efficiency - Energy Efficient Motors - Factors affecting Energy efficiency of a motor - Soft starters, Variable speed drives

UNIT II: COMPRESSED AIR SYSTEMS &HVAC

Introduction, Compressor types and performance; Compressed air systems components; efficient operation of compressed air systems, Systems capacity assessmentEnergy conservation opportunities

UNIT III: REFRIGERATION SYSTEMS.

Introduction: Types of Refrigeration systems; Common Refrigerant and Properties compressor types and applications Performance assessment of Refrigeration plan ts -Energy conservation opportunities

UNIT IV: FANS, PUMPING SYSTEMS AND COOLING TOWERS

Types, Performance evaluation, efficient system operation, Capacity selections -Performance assessment of fans and blowers - Energy conservation opportunities Types, Performance evaluation, efficient system operation - Energy conservation opportunities in pumping systems - Introduction to cooling towers; cooling tower performance, efficient system operation-Energy conservation opportunities incooling towers.

UNIT V: LIGHTING SYSTEMS

Basic terms of lighting systems; Lamp and Luminaries types, recommended illumination level-Methodology of lighting systems energy efficiency study - Cast study, Energy conservation opportunities

TEXT BOOKS

1. Capehart, Turner, Kennedy. Guide to Energy Management. Fifth Ed. TheFairmount Press, 2006.
2. Thumann, Younger. Handbook of Energy Audit. Sixth Ed. The FairmountPress, 2003.
3. Thumann, Mehta. Handbook of Energy Engineering. Fifth Ed. The Fairmount Press, 2001

REFERENCES BOOKS

1. General Aspect of Energy Management and EnergyAudit, 2010, BEE Guide book
2. Energy Efficiency in Thermal Utilities, 2010, BEE guide book
3. Energy Efficiency in Electrical Utilities, 2010, BEE guide book
4. Turner WC. Energy Management
   Handbook, 5th Edition, The Fairmont Press, 2005

Course Outcome:

After learning the course, the students should be able to:
1. Explain the energy efficient technologies meant for electrical systems
2. Examine the energy conservation opportunities in compressed air andHVAC systems
3. Assess the performance of refrigeration plants
4. Choose the appropriate energy efficient method for fanning, pumping, cooling, compressed air and refrigeration systems.
5. Analyze various efficient lighting systems and their energy conservationmeasures

   END

	L	T	P	C
B. Tech (CSE)	3	0	0	3

UNIT – I

General introduction to Civil Engineering - Introduction to types of buildings, Components of a residential building, Introduction to industrial buildings; Introduction to planning of residential buildings - Simple building plans;

UNIT – II

Introduction to the various building area terms; Setting out of a building; Surveying
– Principles, Objectives, Horizontal measurements with tapes, Ranging;

UNIT – III

Levelling – Instruments, Reduction of levels; Modern surveying instruments; Building materials – Bricks, cement blocks, Cement, Cement mortar, Steel;

UNIT – IV

Building construction – Foundations, Brick masonry, Roofs, Floors, Decorative finishes, Plastering, Paints and Painting;

UNIT – V

Basic infrastructure and services – Elevators, Escalators, Ramps, Air conditioning, Sound proofing, Towers, Chimneys, Water Tanks; Intelligent buildings.

REFERENCES BOOKS:

1. Chudley, R., Construction Technology, Vol. I to IV, Longman Group, England 2.Chudley, R. and Greeno, R., Building Construction Handbook, Addison Wesley,Longman Group, England
3. Gopi, S., Basic Civil Engineering, Pearson Publishers
4. Kandya, A. A., Elements of Civil Engineering, Charotar Publishing house 5.Mamlouk, M. S., and Zaniewski, J. P., Materials for Civil and ConstructionEngineering, Pearson Publishers.

Course Outcomes

1. learn the brief introduction of all area covered under the head of civilengineering.
2. understand the need of monitoring land, air , water pollution and takeremedial measures to control them.
3. understand Basic Concepts of Ecology and Ecosystem.
4. Understand the need to plan, develop and maintain infrastructure at ahigh level.
5. Understand the importance of Risk Management for the successfulcompletion Infrastructure Projects

END

(A30165) SUSTAINABILITY CONCEPTS IN CIVIL ENGINEERING
(OPEN ELECTIVE)

B. Tech (CSE)

L	T	P	C
3	0	0	3

UNIT – I

Introduction: Sustainability - Introduction, Need and concept of sustainability, Social-environmental and economic sustainability concepts. Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols - Clean Development Mechanism (CDM), Environmental legislationsin India - Water Act, Air Act.

UNIT – II

Global Environmental Issue: Resource degradation, Climate change, Regional and Local Environmental Issues. Carbon credits and carbon trading, carbon foot print Carbon sequestration – Carbon capture and storage (CCS). Environmental management standards, ISO 14000 series, Life Cycle Analysis (LCA) - Scope and Goal, Bio-mimicking.

UNIT – III

Sustainable Design: Basic concepts of sustainable habitat, Green buildings, greenmaterials for building construction, material selection for sustainable design, green building certification- GRIHA & IGBC Certification for buildings, Energy efficient building design- Passive solar design technique, Thermal storage, Cooling strategies, high performance insulation. Sustainable cities, Sustainable transport.

UNIT – IV

Clean Technology and Energy: Energy sources: Basic Concepts-Conventional and non-conventional, solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans, Geothermal energy. Rainwater harvesting.

UNIT – V

Green Engineering: Green Engineering concepts, Sustainable Urbanization, industrialization and poverty reduction; Social and technological change, Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis.

TEXTBOOKS:

1. Allen, D.T. and S honnard, D. R., Sustainability Engineering: Concepts, Designand Case Studies, Prentice Hall.
2. Bradley. A.S; Adebayo, A. O., Maria, P. Engineering applications in sustainabledesign and development, Cengage learning.

REFERENCE BOOKS:

1. Mackenthun, K. M. Basic Concepts in Environmental Management, LewisPublication.
2. ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of EnergyEfficiency PublicationsRating System, TERI Publications - GRIHA Rating System.
3. Ni bin Chang, Systems Analysis for Sustainable Engineering: Theory andApplications, McGraw-Hill Professional.
4. Twidell, J. W. and Weir, A. D., Renewable Energy Resources, EnglishLanguage Book Society (ELBS).
5. Malcolm Dowden, Climate Change and Sustainable Development: Law, Policyand Practice.
6. Daniel A. Vallero and Chris Brasier, "Sustainable Design: The Science of Sustainability and Green Engineering", Wiley-Blackwell.
7. Sustainable Engineering Practice: An Introduction, Committee on Sustainability,American Society of Civil Engineers.

Course Outcomes:

After studying this course, students will be able to:
1. Learn about the principles, indicators and general concept of sustainability.
2. Apprehend the local, regional and global impacts of unsustainable designs,products and processes.
3. Student shall be able to apply the sustainability concepts in engineering
4. Know built environment frame work sand their use
5. Understand how building and design is judged and valued by clients and stakeholders and how to implement sustainability.

END

(C30165) BASICS OF INSURANCE & TAXATION(OPEN ELECTIVE)

L	T	P	C
3	0	0	3

B. Tech (CSE)

Unit I: Introduction to Life Insurance and General Insurance:

Introduction to Life Insurance - Principles of Life Insurance - Life insurance products, pensions and annuities, Introduction to General Insurance. Principles of General Insurance. Types of General Insurance - Personal general insurance products (Fire, Personal Liability, Motors, Miscellaneous Insurance). Terminology,clauses and covers.

Unit II:Claim Management & Re-Insurance:

Claim Management - Claim Settlement - Legal Framework - Third party Administration, Insurance ombudsman - Consumer Protection Act - Re-Insurance in Life Insurance - Retention Limits - Methods of Re-insurance.

Unit III: General Perspectives and Income Tax rate Structure:

Historical background of Taxation Laws in India, Fundamental Principles of Income Tax and concepts, Government Financial Policies regarding Taxation. Tax structure and its Role in Indian Economy, Residential Status, Non-Resident persons & Non-Ordinary Resident, Previous year and Assessment year Tax: Fees and cess,Capital Expenditure and Capital Income. Revenue Expenditure and Revenue Income, Tax Evasion and Tax Avoidance, Direct and Indirect Taxes.

Unit IV:

Heads and Sources of Income and Exemptions & Deductions under the IncomeTax: Salary and Fringe Benefit Tax, Income from House Property, Income from Business; Profession or Vocation, Capital Gains, Income from other sources.(Theory only), Exemptions & Deductions under the Income Tax Act, Income exempt u/s 10 of the I.T. Act, Permissible deductions under Chapter VI of I.T. Act,Relief, Double Taxation Relief.

Unit V:

Assessment Procedures: PAN AND TAN, Filing of return and e-filling, Advance payment of Tax, Tax deduction at source, Tax Collection at Source, Refund of Tax,and Types of Assessment. Computation of Income in Individuals.

REFERENCE BOOKS:

1. Mishra M.N: Insurance Principles and Practice; S.Chand and Co. NewDelhi.
2. Principles of Life Insurance: Dr.Shrikrishan Laxman Karve, Himalaya
3. Insurance: Theory & Practice: Tripathy& Pal, PHI
4. Taxation: H.Prem raja - Sri Hamsrala publications
5. Direct Taxes &Practice :Dr. V K Singhania, Taxman Publications.
6. Gour and Narang - Income Tax Law and Practice, Kalyani Publication
7. Practicals in Taxation: H.Prem raja - Sri Hamsrala publications.
8. Income Tax: B.B. Lal, Pearson Education
9. Taxation: R.G. Saha, Himalaya Publishing House Pvt. Ltd
10. Income Tax: Johar, McGraw Hill Education
11. Taxation Law and Practice: Balachandran &Thothadri, PHI Learning.

COURSE OTCOMES:

On completion of the course students will be able to:
1. Explain the basic legal concepts and general principles of Insurance sector.
2. Implement claim management and settlement.
3. Explain the importance of income tax and its structure
4. Analyze tax exemptions and deductions of income tax.
5. Prepare tax assesments, computation of individual Incomes

END

(C30166) BUSINESS ETHICS & CORPORATE GOVERNANCE
(OPEN ELECTIVE)

B. Tech (CSE)Unit I

L	T	P	C
3	0	0	3

Business Ethics The Changing Environment: Business Ethics-why does it matter?; Levels of Business Ethics-Five Myths about Business Ethics- Can Business Ethics be Taught and Trained?; stages of Moral development, Kohlberg's study- Carol Gilligan's Theory-Principles of Ethics.

Unit II

Professional Ethics. Introduction to Professional Ethics- Ethics in Production and Product Management-Ethics of Marketing Professionals-Ethics in HRM-Ethics of Finance and Accounting Professionals-Ethics of Advertisement-Ethics of Media Reporting-Ethics of Healthcare Services. Ethical Dilemma. Introduction, Dilemma and Ethical Dilemma-Mounting Scandals-Ethical Issues-Preparatory Ethics: Proactive steps-The software challenge.

nit III

Cyber crimes and cyber Terrorism-social,Political, ethical and psycological , dimensitional , Intellectual properrty in the cyberspace,Ethical dimenstions of cybercrimes-the psycology, mindset & Skills of Hackers & Other cyber criminals,Sociology of cyber criminals, inforamtion Warfare.

Unit IV

Corporate Governance I: Does Good Governance Really matters to Corporations?-Importance of corporate Governance – Corporate Governance in India-Board Structures Processes and Evaluation-Director Independence –Board committees, Indian odel of Corporate Governance.

Unit V

Corporate Governance-II: Information communication and Disclosure-Irani Committee Report-OECD Principles of Corporate Governance –Risk, InternalControl and Assurance-Banks and Corporate Governance.

REFERENCE BOOKS:

1. SK Mandal: Ethics in Business and Corporate Governance, TMH, 2/e, 2012. Journal of Human Values: IIM Calcutta. SAGE.
2. Archie. B Carroll, Business Ethics-Brief Readings on Vital Topics,Routledge, 2013.
3. A.C.Fernando: Corporate Governance, Principles, Policies and Practices,Pearson, 2012.
4. C.S.V.Murthy: Business Ethics, Himalaya Publishing House, 2012.
5. N.Balasubramanian : Corporate Governance and Stewardship, TMH,2012.
6. Nina Godbole & Sunit Belapure " Cyber Security" wiley india 2012.
7. Joseph W.Weiss : Business Ethics, Thomson, 2006.
8. Geethika,RK   Mishra,   Corporate   Governance   Theory   andPractice,Excel,2011.
9. Dr.S.S.Khanka, Business Ethics and Corporate Governance, S.Chand,2013.
10. K.PraveenParboteeach, Business Ethics, Routledge, 2013.
11. Praveen B Malla, Corporate Governance, Routledge 2010.
12. H.C.Mruthyunjaya, Business Ethics and Value Systems, PHI, 2013
13. V Balachandram, V Chandrasekaran, Corporate Governance, Ethics andSocial Responsibility, PHI, 2011
14. Khanka, Business Ethics and Corporate Governance, S. Chand, 2013

COURSE OUTCOMES:

On completion of the course students will be able to:
1. Identify the concept and principles of Business ethics
2. Analyze the importance of Professional Ethics and relate Ethical Dilemmato Business Practices
3. Outline the factors of Cybercrime and Cyber Terrorism.
4. Predict stakeholder's roles in corporate Governance.
5. Review committee Reports on development of Corporate Governance.

END

(A30477) FUNDAMENTALS OF EMBEDDED SYSTEMS(OPEN ELECTIVE)

L	T	P	C
3	0	0	3

B. Tech (CSE)

Unit-I: Introduction to Embedded Systems
Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems

Unit-II: Typical Embedded System
Core of the Embedded System: General Purpose and Domain Specific Processors, Memory, ROM, RAM, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: On-board and External Communication Interfaces.

Unit-III: Embedded Firmware
Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

Unit - IV: RTOS Based Embedded System Design
Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

Unit - V: Task Communication
Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/ Synchronization issues, Task Synchronization Techniques, Device Drivers

TEXT BOOK:
1. Introduction to Embedded Systems – Shibu K.V. McGraw Hill
2. Embedded Systems – Raj Kamal, TMH

REFERENCE BOOKS:
1. Embedded System Design – Frank Vahid, Tony Givargis, John Wiley.
2. Embedded Systems – Lyla, Pearson, 2013
3. An Embedded Software Primer- David E Simon, Pearson Education

rse outcomes:

At the end of the course the student will be able to:
1. Explain the basics of embedded systems and classify its applications
2. Compare various types of memories, sensors and Input / Output devices.
3. Discuss the embedded firmware for various applications.
4. Interpret the characteristics of Real time operating Systems
5. Illustrate the concepts of shared memory and task communications

END

A30478) SENSORS& TRANSDUCERS

(OPEN ELECTIVE)

B.Tech (CSE)

Unit – I:

Introduction: Definition, principle of sensing & transduction, classification. **Mechanical and Electromechanical sensor:** Resistive (potentiometric type): Forms, material, resolution, accuracy, sensitivity. Strain gauge: Theory, type, materials, design consideration, sensitivity, gauge factor, variation with temperature, adhesive, rosettes. Inductive sensor: common types- Reluctance change type, Mutual inductance change type, Magnetostrictive type, material, construction and input output variable, Ferromagnetic plunger type, short analysis.

Unit – II:

Capacitive sensors: variable distance-parallel plate type, variable area- parallel plate, serrated plate/teeth type and cylindrical type, variable dielectric constant type, calculation of sensitivity, Proximity sensor. Stretched diaphragm type: microphone, response characteristics. Piezoelectric element: piezoelectric effect, charge and voltage co-efficient, crystal model, materials, natural & synthetic type, their comparison, force & stress sensing, ultrasonic sensors.

Unit – III:

Thermal sensors: Resistance change type: RTD materials, tip sensitive & stem sensitive type, Thermistor material, shape, ranges and accuracy specification. Thermoemf sensor: types, thermoelectric power, general consideration, Junction semiconductor type IC and PTAT type. Radiation sensors: types, characteristics andcomparison, Pyro electric type.

Unit – IV:

Magnetic sensors: Sensor based on Villari effect for assessment of force, torque, proximity, Wiedemann effect for yoke oil sensors, Thomson effect, Hall effect, and Hall drive, performance characteristics. Radiation sensors: LDR, Photovoltaic cells, photodiodes, photo emissive celltypes, materials, construction, response. Geiger counters, Scintillation detectors.

Unit – V:

Film Sensors: Thick film and thin film types, Electroanalytic sensors – Electrochemical cell, Polarization types, and membrane electrode types.
Biosensors, Smart/Intelligent sensors, Nano-sensors, Nano-tube sensors, molecularand quantum sensors.

TEXT BOOKS:

1. Sensor & transducers, D. Patranabis, 2nd edition, PHI
2. Instrument transducers, H.K.P. Neubert, Oxford University press.
3. Measurement systems: application & design, E.A. Doebelin, McGraw Hill.

REFERENCE BOOKS:

1. Sensor and Transducers, Third Edition, Ian Sinclair, Newnes.
2. Sensor Technology, Hand Book, JON S. Wilson, Newnes.ELSEVIER.
3. Sensor and Transducers, Characteristics, Applications, Instrumentation,Interfacing, Second Edition, M.J. Usher and D.A. Keating, MACMILLAN Press Ltd.

COURSE OUTCOMES:

At the end of the course the student will be able to:
1. Explain the basic concepts of mechanical and electromechanical sensors,their electrical characteristics.
2. Analyze various capacitor sensors, ultrasonic sensors their electricalcharacteristics.
3. Compare and elaborate various thermal sensors, principle of operation.
4. Distinguish various magnetic sensors based on their operations, radiationsensors and their operation.
5. Analyze various film sensors and operation of different nano sensors andtheir applications.

END

(A30358) INDUSTRIAL SAFETY ENGINEERING

(OPEN ELECTIVE)

L	T	P	C
3	0	0	3

B. Tech (CSE)

UNIT-I:

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes.Fire prevention and firefighting, equipment and methods.

UNIT-II:

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Servicelife of equipment.

UNIT-III:

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication
vi. Side feed lubrication, vii. Ring lubrication, Definition principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT-IV:

Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault-finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Typesof faults in machine tools and their general causes.

UNIT-V:

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventivemaintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repaircycle concept and importance

TEXT BOOKS

1. Mobley, R. Keith, Lindley R. Higgins, and Darrin J. Wikoff. *Maintenance Engineering Handbook*. New York, NY: Mcgraw-Hill, 2008.
2. Garg, H. P. *Industrial Maintenance*. S Chand, 1976.

REFERENCE BOOKS:

1. Graham, F. D. "Audels Pumps, Hydraulics and Air Compressors. Theo."(1998).
2. Winterkorn, Hans F., and Hsai-Yang Fang. *Foundation engineeringhandbook*. Springer, Boston, MA, 1991.

Course Outcomes:

At the end of the course, the student should be able to

1. Understand various hazards and their prevention.
2. Apply maintenance techniques to various equipments.
3. Understand types of wear and corrosions and their prevention.
4. Explain fault tracing and its applications.
5. Apply periodic and preventive maintenance techniques to variousequipments.

END

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B. Tech (CSE) | 3 | 0 | 0 | 3 |

Unit-I

Work System Design: Introduction and Concept of Productivity, Measurement of Productivity, Productivity Measures, Productivity Measurement Models, Factors Influencing Productivity, Causes of Low Productivity, Productivity Measurement Models, Productivity Improvement Techniques, Numerical Problems onproductivity, Case study on productivity.

Unit-II

Work Study: Basic Concept, Steps Involved in Work Study, Concept of WorkContent, Techniques of Work Study, Human Aspects of Work Study.
Method Study: Basic Concept, Steps Involved in Method Study, RecordingTechniques, Operation Process Charts, Operation Process Charts: Examples.
Flow Process Charts, Flow Process Charts: Examples, Two-Handed-ProcessCharts, Multiple Activity Charts, Flow Diagrams.

Unit-III

String Diagrams, Principles of Motion Economy, Micro-Motion Study, Therbligs,SIMO Charts, Memo-Motion Study, Cycle graph and Chrono-Cycle Graph, Critical Examination Techniques, Development and Selection of New Method, Installation and Maintenance of Improved Methods.

Unit-IV

Work Measurement: Basic Concept, Techniques of Work Measurement, Steps Involved in Time Study, Steps and Equipment of Time Study,
Performance Rating: Examples, Allowances, Computation of Standard Time-I, Computation of Standard Time-II, Case Study

Unit-V

Work Sampling: Basics, Procedure of Work Sampling Study, Numerical Problemson work sampling, Introduction to Synthetic Data and PMTS, Introduction to MTM and MOST

Ergonomics: Basic Concept, Industrial Ergonomics, Anthropometry, Man-Machine System-1, Man-Machine System-2

TEXT BOOKS:

1. Introduction to Work Study: International Labor Office (ILO), Geneva.
2. Motion and Time Study Design and Measurement of Work: Ralph M. Barnes,Wiley, The University of California.
3. Industrial Engineering and Production Management: M. Telsang, S. Chand andCompany Ltd.

Course Outcomes:

At the end of the course, the student should be able to

1. Calculate the basic work content of a specific job for employees of an organization. Thereby they will be able to calculate the production capacity of man power of an organization.
2. Analyze and calculate the level of risk in a job causing stress, fatigue and musculoskeletal disorders and design appropriate work systems.
3. Rate a worker engaged on a live job and calculate basic, allowed and standard time for the same.
4. Analyze the existing methods of working for a particular job and developan improved method through questioning technique.
5. devise appropriate wage and incentive plan for the employees

END

(A30256) ENERGY AUDIT & CONSERVATION

(OPEN ELECTIVE-IV)

B. Tech (CSE)

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3	0	0	3

UNIT I: Basic Principles of Energy Audit

Energy audit- definitions, concept, types of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT II: Energy Management

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting- Energy manger,Qualities and functions, language, Questionnaire – check list for top management.

UNIT III: Energy Efficient Motors

Energy efficient motors, factors affecting efficiency, loss distribution, constructional details, characteristics – variable speed, variable duty cycle systems,RMS hp- voltage variation-voltage unbalance- over motoring- motor energy audit

UNIT IV: Power Factor Improvement, Lighting and Energy Instruments Power factor – methods of improvement, location of capacitors, pf with non-linear loads, effect of harmonics on power factor, power factor motor controllers – Good lighting system design and practice, lighting control, lighting energy audit – Energy Instruments- wattmeter, data loggers, thermocouples, pyrometers, lux meters,tongue testers, application of PLC's.

UNIT V: Economic Aspects and Analysis

Economics Analysis-Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis- Energy efficient motors- calculation of simple payback method, net present worth method-Power factor correction, lighting – Applications of life cycle costing analysis, returnon investment.

TEXT BOOKS:
1. Energy management by W.R. Murphy AND G. Mckay Butter worth,Heinemann publications.
2. Energy management by Paul o' Callaghan, Mc-graw Hill Book company-1st edition, 1998

REFERENCES:
1. Energy efficient electric motors by John.C. Andreas, Marcel Dekker IncLtd-2nd edition, 1995-
2. Energy management hand book by W.C. Turner, John wiley and sons
3. Energy management and good lighting practice: fuel efficiency- booklet12-EEO

Course Outcomes

On completion of the course, students will be able to
1. Explain the various methods of energy audit.
2. Illustrate the energy management strategies.
3. Perform energy audit in energy efficient motors
4. Relate the energy conservation with the improvement in energy efficiencyand power factor.
5. Analyze the economic aspects to be considered in energy usage

END

(A30257) NANO TECHNOLOGY
(OPEN ELECTIVE)

L	T	P	C
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B. Tech (CSE)

UNIT I: NTRODUCTION

History and Scope, Can Small Things Make a Big Difference? Classification of Nanostructured Materials, Fascinating Nanostructures, Applications of Nanomaterials, Nature: The Best of Nanotechnologist, Challenges, and Future Prospects.

UNIT II: UNIQUE PROPERTIES OF NANOMATERIALS

Microstructure and Defects in Nanocrystalline Materials: Dislocations, Twins,stacking faults and voids, Grain Boundaries, triple and declinations, Effect of Nano-dimensions on Materials Behavior: Elastic properties, Melting Point, Diffusivity, Grain growth characteristics, enhanced solid solubility. Magnetic Properties: Soft magnetic nano crystalline alloy, Permanent magnetic nano-crystalline materials, Giant Magnetic Resonance, Electrical Properties, Optical Properties, Thermal Properties, and Mechanical Properties.

NIT III: SYNTHESIS ROUTES

Bottom up approaches: Physical Vapor Deposition, Inert Gas Condensation, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Solgel method, Self-assembly, Top down approaches: Mechanical alloying, Nano-lithography, Consolidation of Nanopowders: Shock wave consolidation, Hot isostatic pressing and Cold isostatic pressing, Spark plasma sintering.

UNIT IV: TOOLS TO CHARACTERIZE NANO MATERIALS

X-Ray Diffraction (XRD), Small Angle X-ray scattering (SAXS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field IonMicroscope (FEM), Three-dimensional Atom Probe (3DAP), Nanoindentation.

UNIT V: APPLICATIONS OF NANOMATERIALS

Nano-electronics, Micro- and Nano-electromechanical systems (MEMS/NEMS), Nanosensors, Nanocatalysts, Food and Agricultural Industry, Cosmetic and Consumer Goods, Structure and Engineering, Automotive Industry, WaterTreatment and the environment, Nano-medical applications, Textiles, Paints, Energy, Défense and Space Applications, Concerns and challenges of Nanotechnology.

TEXT BOOKS:

1. Text Book of Nano Science and Nano Technology – B.S. Murthy, P.Shankar, Baldev Raj, B.B. Rath and James Munday, University Press-IIM.
2. Introduction to Nanotechnology – Charles P. Poole, Jr., and Frank J.Owens, Wley India Edition, 2012.

REFERENCES BOOKS:

1. Nano: The Essentials by T. Pradeep, Mc Graw- Hill Education.
2. Nanomaterials, Nanotechnologies and Design by Michael F. Ashby, Paulo J. Ferreira and Daniel L. Schodek.
3. Transport in Nano structures- David Ferry, Cambridge University press2000
4. Nanofabrication towards biomedical application: Techniques, tools,Application and impact – Ed. Challa S., S. R. Kumar, J. H. Carola.
5. Carbon Nanotubes: Properties and Applications- Michael J. O'Connell.
6. Electron Transport in Mesoscopic systems - S. Dutta, CambridgeUniversity press

Course Outcomes

On completion of the course, students will be able to

1. Classify nanostructured materials
2. Illustrate the characteristics and properties of nano-materials.
3. Identify the synthesis routes of nano-materials
4. Make use of the tools to characterize the nano-materials.
5. Utilize the nano-materials for various applications

END

(A30166) ENVIRONMENTAL PROTECTION AND MANAGEMENT
(OPEN ELECTIVE)

B. Tech (CSE)

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UNIT – I

Environmental Management Standards:

Unique Characteristics of Environmental Problems – Systems approach to Corporate environmental management - Classification of Environmental Impact Reduction Efforts - Business Charter for Sustainable Production and Consumption – Tools, Business strategy drivers and Barriers - Evolution of Environmental Stewardship. Environmental Management Principles - National policies on environment, abatement of pollution and conservation of resources - Charter on Corporate responsibility for Environmental protection

UNIT – II

Environmental Management Objectives: Environmental quality objectives – Rationale of Environmental standards: Concentration and Mass standards, Effluent and stream standards, Emission and ambient standards, Minimum national standards, environmental performance evaluation: Indicators, benchmarking. Pollution control Vs Pollution Prevention - Opportunities and Barriers – Cleaner production and Clean technology, closing the loops, zero discharge technologies.

UNIT – III

Environmental Management System: EMAS, ISO 14000 - EMS as per ISO 14001– benefits and barriers of EMS – Concept of continual improvement and pollution prevention - environmental policy – initial environmental review – environmental aspect and impact analysis – legal and other requirements- objectives and targets – environmental management programs – structure and responsibility – training awareness and competence- communication – documentation and document control – operational control – monitoring and measurement – management review.

UNIT – IV

Environmental Audit: Environmental management system audits as per ISO 19011- – Roles and qualifications of auditors - Environmental performance indicators and their evaluation – Non conformance – Corrective and preventive actions - compliance audits – waste audits and waste minimization planning – Environmental statement (form V) - Due diligence audit.

UNIT – V

Applications: Applications of EMS, Waste Audits and Pollution Prevention Control: Textile, Sugar, Pulp & Paper, Electroplating, Tanning industry. Hazardous Wastes - Classification, characteristics Treatment and Disposal Methods, Transboundary movement, disposal.

REFERENCE BOOKS

1. Christopher Sheldon and Mark Yoxon, "Installing Environmental management Systems – a step by step guide" Earthscan Publications Ltd, London, 1999.
2. ISO 14001/14004: Environmental management systems – Requirements and Guidelines – International Organisation for Standardisation, 2004
3. ISO 19011: 2002, "Guidelines for quality and/or Environmental Management System auditing, Bureau of Indian Standards, New Delhi, 2002
4. Paul L Bishop „Pollution Prevention: Fundamentals and Practice, McGraw- HillInternational, Boston, 2000.
5. Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations, Second Edition, NSF International, Ann Arbor,Michigan, January 2001.

Course Outcomes:

1. Students are able to understand the meaning of environmental management.
2. Students are also able to understand the importance of environmental management
3. Development of society and country. It also explains how we can use natural resources in sustainable manner.
4. After completion of the course students will have knowledge of various acts and laws and will be able to identify the industries that are violating these rules
5. Students are able to understand importance of environmental rules for development of society

END

(A30167) ALTERNATE BUILDING MATERIALS
(OPEN ELECTIVE)

B. Tech (CSE)

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UNIT – I

Introduction: Energy in building materials, Environmental issues concerned to building materials, Embodied energy and life-cycle energy, Global warming and construction industry, Green concepts in buildings, Green building ratings – IGBC and LEED manuals – mandatory requirements, Rainwater harvesting & solar passive architecture. Environmental friendly and cost-effective building technologies, Requirements for buildings of different climatic regions.

UNIT – II

Elements of Structural Masonry: Elements of Structural Masonry, Masonry materials, requirements of masonry units' characteristics of bricks, stones, clay blocks, concrete blocks, stone boulders, laterite Blocks, Fal- G blocks and Stabilized mud block. Manufacture of stabilized blocks.

Structural Masonry Mortars: Mortars, cementations materials, sand, natural & manufactured, types of mortars, classification of mortars as per BIS, characteristics and requirements of mortar, selection of mortar. Uses of masonry, masonry bonding, Compressive strength of masonry elements, Factors affecting compressive strength, Strength of Prisms/wallets and walls, Effect of brick bond on strength, Bond strength of masonry: Flexure and shear, Elastic properties of masonry materials and masonry, Design of masonry compression elements subjected to axial load.

UNIT – III

Alternate Building Materials: Lime, Pozzolana cements, Raw materials, Manufacturing process, Properties and uses. Fibers-metal and synthetic, Properties and applications. Fiber reinforced plastics, Matrix materials, Fibers organic and synthetic, Properties and applications. Building materials from agro and industrial wastes, Types of agro wastes, Types of industrial and mine wastes, Properties and applications. Masonry blocks using industrial wastes. Construction and demolition wastes.

UNIT – IV

Alternate Building Technologies: Use of arches in foundation, alternatives for wall constructions, composite masonry, confined masonry, cavity walls, rammed earth, Ferro cement and ferroconcrete building components, Materials and specifications, Properties, Construction methods, Applications. Top down construction, Mivan Construction Technique. Alternate Roofing Systems: Concepts, Filler slabs, Composite beam panel roofs, Masonry vaults and domes

UNIT – V

Equipment for Production of Alternate Materials: Machines for manufacture of concrete, Equipments for production of stabilized blocks, Moulds and methods of production of precast elements, Cost concepts in buildings, Cost saving techniques in planning, design and construction, Cost analysis: Case studies using alternatives.

TEXKS Jagadish, B V Venkatarama Reddy and K S Nanjunda Rao, "Alternative Building Materials and Technologies", New Age International pub.

1. Arnold W Hendry, "Structural Masonry", Macmillan Publishers.

REFERENCE BOOKS:

1. RJS Spence and DJ Cook, "Building Materials in Developing Countries", Wiley pub.
2. LEED India, Green Building Rating System, IGBC pub.
3. IGBC Green Homes Rating System, CII pub.
4. Relevant IS Codes.

Course Outcomes:

1. Students are able to understand the meaning of environmental management.
2. Students are also able to understand the importance of environmental management
3. Development of society and country. It also explains how we can use natural resources in sustainable manner.
4. After completion of the course students will have knowledge of various acts and laws and will be able to identify the industries that are violating these rules dents are able to understand importance of environmental rules for development of society

(OPEN ELECTIVE)

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Unit I

Understanding Marketing Management: Concepts of Marketing, Marketing Strategies & Plans, Creating long term Loyalty relationships, Marketing mix, Product Life Cycle.

Unit II

Connecting with Customers & Building Strong Brands: Analyzing Competitors, Conducting Marketing Research, Consumer Behaviour, Identifying market segments and targets, crafting Brand Positioning.

Unit III

New Product and Promotions: Introducing New Market Offering, Developing Pricing Strategies & Programmes, Designing & Managing Integrated Marketing Communications, Advertising & Sales Promotions, Managing Digital-Communication – Online, Social Media & Mobile, Personal Selling.

Unit IV

Delivering Value: Managing Retailing, Wholesaling and logistics, Designing and Managing Integrated Marketing Channels.

Unit V

Sales Management: Nature and Importance of Sales Management, Skills of Sales Manager, Sales objectives, Concepts of Sales organization, Type of Sales organization.

TEXT BOOKS:

1. Marketing Management, Philip Kotler, Kevin Lane Keller, Pears REFERENCE BOOKS

1. Marketing, A south Asian prospective, Lamb, Hair, Sharma, Mcdaniel, Cenage
2. Marketing Asian Edition Paul Baines Chris Fill Kelly Page, Oxford
3. Marketing Management 22e, Arun Kumar, Menakshi, Vikas Publishing

COURSE OUTCOMES:

On completion of the course students will be able to:
1. Analyze the scope, concepts of Marketing and forecasting techniques in present Global Market Environment.
2. Develop conceptual knowledge on consumer behavior, Marketing Mix and Product Mix
3. Outline Segmentation, targeting and Positioning Goods and Services in Market.
4. Illustrate marketing channels of distribution and Promotional mix
5. Identify Pricing Decisions and importance of digital Marketing.

END

(C30168) INTELLECTUAL PROPERTY RIGHTS
(OPEN ELECTIVE)

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B. Tech (CSE)	3	0	0	3

UNIT-I:

INTRODUCTION TO INTELLECTUAL PROPERTY:

Introduction, types of intellectual property, international Organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II: 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: LAW OF COPY RIGHTS:

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right owner ship issues, copy right registration, notice of copy right , international copy right law.
Law of Patents: Foundation of patent law, patent searching process, owner rights and transfer.

UNIT-IV: TRADE SECRETS:

Trade secret law, determination of trade secretes status' liability for misappropriations of trade secrets, protection for submission, trade secret litigation.
UNFAIR COMPETITION: Misappropriation right of publicity, false advertising

UNIT-V:

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 & REFERENCES

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, Prabuddha Ganguli, Tata Mc Graw Hill Publishing Company Ltd.

COURSE OUTCOMES:

On completion of the course students will be able to:
1. Skill to understand the concept of intellectual property rights.
2. Develops procedural knowledge to Legal System and solving the problem relating Patents.
3. Gain knowledge on development and owning of Trade Marks, CopyRights, and Patents.
4. Develops conceptual exposure on legal aspects related to IPR
5. Knowledge on different types of competition and ethical and unethical practices of advertising.

END

(A30017) INDIAN CONSTITUTION

(MANDATORY COURSE)

B. Tech (CSE) VI Semester

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UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution- Sources and constitutional history, Features- Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM andCouncil of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, TheSupreme Court and High Court: Powers and Functions; State Government and its Administration Governor: Role and Position, CM and Council of ministers, State Secretariat: Organization, Structure and Functions

UNIT-III

A: Local Administration District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation,
B:Pachayati raj: Introduction, PRI: ZilaPachayat, Elected officials and their roles, CEO ZilaPachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT-IV

Concept and Development of Human Rights: Meaning Scope and Development of Human Rights, United Nations and Human Rights – UNHCR, UDHR 1948, ICCPR1996 and ICESCR 1966, Human Rights in India: Protection of Human Rights Act,1993 (NHRC and SHRC), First, Second and Third Generation Human Rights, Judicial Activism and Human Rights.

UNIT-V

Election Commission: Election Commission- Role and Functioning, Chief ElectionCommissioner and Election Commissioners, State Election Commission: Role andFunctioning, Institute and Bodies for the welfare of SC/ST/OBC and women

REFERENCE BOOKS:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice –Hall of India Pvt. Ltd. NewDelhi

2. ashKashyap, Indian Constitution, National BookTrust
3. J.A. Siwach, Dynamics of Indian Government &Politics
4. D.C. Gupta, Indian Government andPolitics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes(Universal Law Publication)
6. J.C. Johari, Indian Government and PoliticsHans

E-Resources:
1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

Course Outcomes:

At the end of the course, the student will be able to:

1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State government and itsadministration.
3. Get acquainted with Local administration and Pachayati Raj.
4. Be aware of basic concepts and developments of HumanRights.
5. Gain knowledge on roles and functioning of ElectionCommission.

END

(A30018) ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE
(MANDATORY COURSE)

B. Tech (CSE) VI Semester

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2	0	0	0

UNIT I

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

UNIT II

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Roleof Government to harness TK.

UNIT III

Legal frame work and TK:
A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act);
B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

UNIT IV

Traditional knowledge and intellectual property:
Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of IndianTraditional Knowledge.

UNIT V

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

REFERENCE BOOKS

1. Traditional Knowledge System in India, by Amit Jha,2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan2012.
3. Traditional Knowledge System in India by Amit Jha Atlanticpublishers,2002

E-RESOURCES

1. https://www.youtube.com/watch?v=LZP1StpYEPM
2. http://nptel.ac.in/courses/121106003/

Course Outcomes

After completion of the course, students will be able to:
1. Understand the concept of Traditional knowledge and its importance.
2. Know the need and importance of protecting traditionalknowledge.
3. Know the various enactments related to the protection of traditionalknowledge.
4. Understand the concepts of Intellectual property to protect the traditionalknowledge
5. Compare and contrast the basics of Indian Traditional knowledge withmodern scientific perspectives.

END

(A30559) INTRODUCTION TO DATA SCIENCE

(OPEN ELECTIVE)

B. Tech (CSE)

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3	0	0	3

Unit-I

Introduction to Data Science: Concept of Data Science, Traits of Big data, Web Scraping, Analysis vs Reporting.
Introduction to Programming Tools for Data Science: Toolkits using Python- Matplotlib, NumPy, Scikit-learn, NLTK.

Unit-II

Visualizing Data- Bar Charts, Line Charts, Scatterplots. **Working with data-** Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction

Unit-III

Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised, Unsupervised, Reinforced learning, Introduction to Bayes Theorem, Linear Regression- model assumptions, regularization (lasso, ridge, elastic net), **Classification and Regression algorithms-** Naïve Bayes, K- Nearest Neighbors, logistic regression, support vector machines (SVM).

Unit-IV

Decision trees, and random forest, Classification Errors, Analysis of Time Series- Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Neural Networks- Learning & Generalization, Overview of Deep Learning.

Unit-V

Case Studies of Data Science Application: Weather forecasting, Stock market prediction, Object recognition, Real Time Sentiment Analysis.

TEXT BOOK:

1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media
2. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media

3. in V.K., "Data Sciences", Khanna Publishing House, Delhi.
4. Jain V.K., "Big Data and Hadoop", Khanna Publishing House, Delhi.
5. Jeeva Jose, "Machine Learning", Khanna Publishing House, Delhi.

EFERENCE BOOKS:

1. Chopra Rajiv, "Machine Learning", Khanna Publishing House, Delhi.
2. Ian Goodfellow, Yoshua Bengio and Aaron Courville, "Deep Learning", MITPress http://www.deeplearningbook.org
3. Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Third Edition,Morgan Kaufmann Publisher**s**

ourse Outcomes

At end of this course, the students will be able to:
1. Demonstrate understanding of the mathematical foundations needed fordata science.
2. Collect, explore, clean, munge and manipulate data.
3. Implement models such as k-nearest Neighbors, Naive Bayes, linear and logisticregression, decision trees, neural networks and clustering.
4. Build data science applications using Python based toolkits.
5. Build data science applications using Python based toolkits.

END

(A30557) WEB PROGRAMMING

(OPEN ELECTIVE)

B. Tech

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Unit-I

Structuring Documents for the Web: Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups Links and Navigation: Basic Links, Creating Links with the **< a>** Element, Advanced E- mail Links. Images, Audio, and Video: Adding Images Using the **<img>** Element, Using Images as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your web pages. Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables Forms: Introducing Forms, Form Controls, Sending Form Data to the Server Frames: Introducing Frameset, <frame>Element, Creating Links Between Frames, Setting a Default Target Frame Using **<base>**Element, Nested Framesets, Inline or Floating Frames with **<iframe>**. Changing font size, color of text using <font> Element, scrolling text/image using <marquee> Element

Unit-II

Cascading Style Sheets: Introducing CSS, where you can Add CSS Rules. **CSS Properties**: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the Box Model. **More Cascading Style Sheets:** Links, Lists, Tables, Outlines, the: focus and: activate Pseudo classes Generated Content, Miscellaneous Properties, Additional Rules, Positioning and Layout with CSS, **Page Layout**: Understating the Site's Audience, Page Size, Designing Pages, Coding your Design, Developing for Mobile Devices. **Design Issues:** Typography,Navigation, Tables, Forms.

Unit-III

Learning JavaScript: How to Add Script to Your Pages, the Document Object Model, Variables, Operators, Functions, Control Statements, Looping, Events, Built- In Objects, Working with JavaScript: Practical Tips for Writing Scripts, Form Validation, Form Enhancements, JavaScript Libraries. Putting Your site on the web:Meta tags, testing your site, Taking the Leap to Live, Telling the World about yoursite, Understanding your visitors.

Unit-IV

XML - Introduction, XML Basics, Structuring Data, XML Namespaces, Document Type Definitions (DTDs), W3C XML Schema Documents, XML Vocabularies, Extensible Style sheet Language and XSL Transformations, Document Object Model (DOM).

Unit-V

Ajax-Enabled Rich Internet Applications: introduction, history of Ajax, traditionalweb applications Vs Ajax Applications, RIAs with Ajax, Ajax example using XMLHttpRequest object, XML and DOM, creating full scale Ajax-enabled application, Dojo Toolkit.

TEXT BOOK:

1. Jon Duckett, Beginning HTML, XTML, CSS and JavaScript
2. Dietel and Dietel : "Internet and World Wide Web - How to Program", 5thEdition, PHI/Pearson Education, 2011.

REFERENCE BOOKS:

1. Chris Bates, Web Programming
2. M. Srinivasan, Web Technology: Theory and Practice
3. Achyut S. Godbole, AtulKahate, Web Technologies
4. Kogent Learning Solutions Inc, Web Technologies Black Book
5. Ralph Moseley and M. T. Savaliya, Developing Web Applications

Course Outcomes

Students shall be able to
1. write well-structured, easily maintained, standards-compliant, accessibleHTML code.
2. write well-structured, easily maintained, standards-compliant CSS codeto present HTML pages in different way
3. use JavaScript to add dynamic content to pages.
4. effectively debug JavaScript code, making use of good practice anddebugging tools.
5. use JavaScript to access and use web services for dynamic content(AJAX, JSON, etc.)

END

(A30560) INTRODUCTION TO ARTIFICIAL INTELLIGENCE

(Common to ECE, EEE, CIVIL, MECH)

B. Tech

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Unit-I

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*)

Unit-II

Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning.

Basic Knowledge Representation and Reasoning: Propositional Logic, First- Order Logic, Forward Chaining and Backward Chaining.

Unit-III

Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Nonmonotonic Reasoning, Other Knowledge Representation Schemes.

Unit-IV

Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks.

Unit-V

Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's LearningProgram, Decision Trees.

TEXT BOOK:

1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, ThirdEdition, Prentice Hall, 2010.

REFERENCE BOOKS:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, TheMcGraw Hill publications, Third Edition, 2009.

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

Course Outcomes

After undergoing this course, the students will be able to:
1. Build intelligent agents for search and games
2. Solve AI problems through programming with Python
3. Learning optimization and inference algorithms for model learning
4. Design and develop programs for an agent to learn and act in a structuredenvironment.
5. Explain various learning approaches