SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

R20 Regulation

I, II & III B. TECH.
COURSE STRUCTURE AND SYLLABUS

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

INSTITUTE VISION

To emerge as one of the premier institutions through excellence in education and research, producing globally competent and ethically strong professionals and entrepreneurs.

INSTITUTE MISSION

M1: Imparting high-quality technical and management education through the state-of-the- art resources.

M2: Creating an eco-system to conduct independent and collaborative research for the betterment of the society

M3: Promoting entrepreneurial skills and inculcating ethics for the socio-economic development of the nation.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DEPARTMENT VISION

To impart quality education and research in Computer Science and Engineering for producing technically competent and ethically strong IT professionals with contemporary knowledge.

DEPARTMENT MISSION

M1: Achieving academic excellence in computer science through effective pedagogy, modern curriculum and state-of-art computing facilities.

M2: Encouraging innovative research in Computer Science and Engineering by collaborating with Industry and Premier Institutions to serve the nation.

M3: Empowering the students by inculcating professional behavior, strong ethical values and leadership abilities

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To provide software solutions for arising problems in diverse areas with strong knowledge in innovative technologies of computer science.

PEO2: To serve in IT industry as professionals and entrepreneurs or in pursuit of higher education and research.

PEO3: To attain professional etiquette, soft skills, leadership, ethical values meld with a commitment for lifelong learning.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: **Analysis & Design:**
Ability to design, develop and deploy customized applications in all applicable domains using various algorithms and programming languages.

PSO2: **Computational Logic:**
Ability to visualize and configure computational need in terms of hardware and software to provide solutions for various complex applications.

PSO3: **Software Development:**
Ability to apply standard procedures, tools and strategies for software development.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

INDUCTION PROGRAM (MANDATORY)	3 WEEKS DURATION
Induction program for students to be offered right at the start of the first year.	• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./Branch & Innovations

I B. Tech. – I Semester (CSE)

S.No.	Course Code	Subject	L	T	P	C
1	20HS0830	Algebra and Calculus	3	-	-	3
2	20HS0849	Applied Physics	3	-	-	3
3	20EE0250	Principles of Electrical Engineering	3	-	-	3
4	20CS0501	C Programming and Data Structures	3	-	-	3
5	20EC0445	Basic Electronics Engineering	3	-	-	3
6	20HS0851	Applied Physics Lab	-	-	3	1.5
7	20EE0252	Basic Electrical and Electronics Engineering Lab	-	-	3	1.5
8	20CS0502	C Programming and Data Structures Lab	-	-	3	1.5
Contact Periods / Week			**15**	**-**	**9**	**19.5**
			Total/Week 24			

I B. Tech. – II Semester (CSE)

S.No.	Course Code	Subject	L	T	P	C
1	20HS0835	Probability & Statistics	3	-	-	3
2	20HS0802	Applied Chemistry	3	-	-	3
3	20HS0810	Communicative English	3	-	-	3
4	20ME0301	Engineering Graphics	1	-	4	3
5	20CS0503	Digital Logic Design	3	-	-	3
6	20HS0803	Applied Chemistry Lab	-	-	3	1.5
7	20HS0811	Communicative English Lab	-	-	3	1.5
8	20ME0302	Workshop Practice Lab	-	-	3	1.5
Non-Credit Course						
9	20HS0816	Indian Constitution	2	-	-	-
Contact Periods / Week			**15**	**-**	**13**	**19.5**
			Total/Week 28			

II B. Tech. – I Semester (CSE)

S.No.	Course Code	Subject	L	T	P	C
1	20HS0845	Mathematical and Statistical Methods	3	-	-	3
2	20CS0504	Computer Organization & Architecture	3	-	-	3
3	20CS0505	Database Management Systems	3	-	-	3
4	20CS0507	Operating Systems	3	-	-	3
5	20CS0511	Python Programming	3	-	-	3
6	20CS0508	Database Management Systems Lab	-	-	3	1.5
7	20CS0510	Operating Systems Lab	-	-	3	1.5
8	20CS0514	Python Programming Lab	-	-	3	1.5
Mandatory Course						
9	20HS0864	Human Values and Professional Ethics	3	-	-	- / 3*
Skill Oriented Course						
10	20CS0546	Visual Effects-VFX	1	-	2	2
Contact Periods / Week			**19**	-	**11**	**21.5 / 24.5***
			Total/Week 30			

Note*: From 2021-22 batch onwards HVPE will have 3 Credits and total credits for this semester is 24.5

II B. Tech. – II Semester (CSE)

S.No.	Course Code	Subject	L	T	P	C
1	20HS0836	Discrete Mathematics	3	-	-	3
2	20CS0901	Fundamentals of Artificial Intelligence	3	-	-	3
3	20CS0506	Object Oriented Programming through Java	3	-	-	3
4	20CS0513	Computer Networks	3	-	-	3
5	20HS0812	Managerial Economics & Financial Analysis	3	-	-	3
6	20CS0902	Artificial Intelligence Lab	-	-	3	1.5
7	20CS0509	Object Oriented Programming through Java Lab	-	-	3	1.5
8	20CS0515	Linux Programming Lab	-	-	3	1.5
Skill Oriented Course						
9	20CS0547	Animation Design	1	-	2	2
Internship 2 Months (Mandatory) during summer vacation						
Contact Periods / Week			**16**	-	**11**	**21.5**
			Total/Week27			

III B. Tech. – I Semester (CSE)

S.No.	Course Code	Subject	L	T	P	C
1	20CS0903	Automata Theory and Compiler Design	3	-	-	3
2	20CS0904	Introduction to Machine Learning	3	-	-	3
3	20CS0518	Software Engineering	3	-	-	3
Open Elective (OE) – I						
4	20CE0170	Fundamentals Of Civil Engineering	3	-	-	3
	20EE0227	Generation of Energy from Waste				
	20ME0322	Non- Conventional Energy Resources				
	20EC0451	Introduction to Communication Systems				
	20HS0813	Management Science				
Professional Elective course (PEC) –I						
5	20CS0531	Soft Computing	3	-	-	3
	20CS0912	Natural Language Processing				
	20CS0913	Computer Vision				
6	20CS0905	Machine Learning Lab	-	-	3	1.5
7	20CS0519	Object Oriented Analysis and Design lab	-	-	3	1.5
Skill advanced course/ soft skill course						
8	20CS0548	App Design for Android	1	-	2	2
Non-Credit Course						
9	20HS0817	Essence of Indian Traditional Knowledge	2	-	-	-
10	20CS0521	Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester)	-	-	-	1.5
Contact Periods / Week			**18**	-	**8**	**21.5**
			Total/Week26			

III B. Tech. – II Semester (CSE)

S.No.	Course Code	Subject	L	T	P	C
1	20CS0906	Advanced Machine Learning	3	-	-	3
2	20CS0523	Design and Analysis of Algorithms	3	-	-	3
3	20CS0907	Web Programming for Artificial Intelligence	3	-	-	3
Professional Elective course (PEC) - II						
4	20CS0534	Human Computer Interaction	3	-	-	3
	20CS0914	Data Science and its Applications				
	20CS0915	Data Visualization				
Open Elective (OE) - II						
5	20CE0147	Fundamentals Of Urban Planning	3	-	-	3
	20EE0235	Industrial Instrumentation				
	20ME0354	General Mechanical Engineering				
	20EC0452	Elements of Embedded Systems				
	20HS0814	Intellectual Property Rights				
6	20CS0908	Advanced Machine Learning Lab	-	-	3	1.5
7	20CS0525	Design and Analysis of Algorithms Lab	-	-	3	1.5
8	20CS0909	Web Programming for Artificial Intelligence Lab	-	-	3	1.5
Skill advanced course/ soft skill course						
9	20HS0859	English for Corporate Communication Skills Lab	1	-	2	2
Non-Credit Course						
10	20HS0801	Environmental Science	2	-	-	-
Industrial/Research Internship (Mandatory) 2 Months during summer vacation						
Contact Periods / Week			**18**	**-**	**11**	**21.5**
			Total/Week 29			

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I B.Tech. – I Sem.

L	T	P	C
3	-	-	3

(20HS0830) ALGEBRA AND CALCULUS
(Common to All branches)

COURSE OBJECTIVES

The objectives of this course:

1. *To illuminate the students in the concepts of calculus and linear algebra.*
2. *To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.*
3. *To estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives, and select optimal results.*

COURSE OUTCOMES

On successful completion of this course, the student will be able to

1. *Develop the use of matrix algebra techniques that is needed by engineers for practical applications.*
2. *Utilize mean value theorems to real life problems.*
3. *Familiarize with functions of several variables which is useful in optimization.*
4. *Learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems.*
5. *Interpret the physical meaning of different operators such as gradient, curl and divergence.*
6. *Apply Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, or Divergence Theorem to evaluate integrals.*

UNIT - I

Matrices: Rank of a matrix by echelon form, solutions of system of homogeneous and non-homogeneous linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem.

UNIT - II

Mean value theorems: Rolle's theorem-Lagrange's Mean value theorem-Taylor's and Maclaurin's theorems (without proof);

Partial Differentiation: Chain rule, Total derivatives, Jacobians, functional dependence, Maxima and Minima of functions of two variables, method of Lagrange multipliers with three variables only.

UNIT - III

Integral Calculus: Evaluation of definite and improper integrals (single variable), Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Evaluation of Triple integrals (Cartesian).

UNIT - IV

Vector differentiation: Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT - V

Vector integration: Line integral-circulation-work done, surface and volume integrals.

Integral theorems: Green's theorem in the plane (without proof), Stoke's theorem (without proof), Divergence theorem (without proof) and applications of these theorems.

TEXT BOOKS

1. Grewal B S, *Higher Engineering Mathematics*, 44thEdition, Khanna Publishers, 2017.
2. Ramana B V, *Higher Engineering Mathematics*, Mc Graw Hill Education, 2010.

REFERENCES

1. Rukmangadachari. E & Keshava Reddy E, *Engineering Mathematics,* Volume-I,II&III, Pearson Publishers, 2010.
2. Satyanarayana Bh, Pradeep Kumar T.V & Srinivasulu D, *Linear Algebra and Vector Calculus*, Studera Press, New Delhi, 2017, ISBN: 978-81-930333-8-8.
3. Iyengar T.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *Engineering Mathematics*, Volume-I,II & III, 12thEdition, S.Chand publication, 2014.

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I B.Tech. – I Sem.

L	T	P	C
3	-	-	3

(20HS0849) APPLIED PHYSICS

COURSE OBJECTIVES

The objectives of this course:

1. *To identify the importance of optical phenomenon i.e. interference and diffraction related to its engineering applications.*
2. *To impart knowledge in basic concepts of free electron theory, energy bands in solids and propagation of Electromagnetic waves.*
3. *To recognize the basic concepts related to the properties of Lasers and Optical Fibers.*
4. *To understand key points, formation and importance of semiconductors in the functioning of electronic devices.*
5. *To understand the fundamental concepts of Superconductivity and Nano Science & Technology.*

COURSE OUTCOMES

On successful completion of this course, student will be able to

1. *Analyze the differences between interference and diffraction with applications.*
2. *Explain concepts of free electron theory and energy bands in solids and asses the EM wave propagation in non-conducting medium by using Maxwell Equations.*
3. *Explain the basic principles and properties of Lasers and Optical Fibers.*
4. *Identify the applications of semiconductors in electronic devices*
5. Explain the basic properties and applications of superconductors in various fields.
6. Illustrate methods for synthesis and characterization of nanomaterials and apply basic principles of nanomaterials in various engineering applications.

UNIT-I: WAVE OPTICS

Interference - Principle of Superposition-Interference of light- Conditions for sustained Interference - Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength of light- Engineering Applications of interference.

Diffraction – Introduction- Fraunhofer Diffraction-Single Slit – Double Slit -Diffraction Grating – Grating Spectrum -Determination of Wavelength of Light - Engineering Applications of diffraction.

UNIT-II: ELECTRON THEORY OF METALS &ELECTROMAGNETIC THEORY

Electron Theory of Metals : Classical free electron theory: postulates- drawbacks- Quantum free electron theory. – Fermi Dirac distribution–Effective mass of electron- sources of electrical resistance- Energy bands in solids - Types of electronic materials: metals, semiconductors and insulators.

Electromagnetic Theory :Divergence and Curl of Electric and Magnetic Fields- Gauss' theorem for divergence and Stokes' theorem for curl- Maxwell's Equations (Quantitative)- Electromagnetic wave propagation (Non-conducting medium).

UNIT-III : LASERS AND FIBER OPTICS

Lasers: Introduction - Characteristics of Laser - Spontaneous and Stimulated emission of radiation - Einstein's coefficients - Population inversion - Pumping Mechanisms - He-Ne laser, Nd-YAG laser - Applications of laser.

Fiber Optics: Introduction to Optical Fibers-Total Internal Reflection-Construction of optical fibers, Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile & modes –Propagation of electromagnetic wave through optical fiber- Block Diagram of Fiber optic Communication system –Applications.

UNIT-IV: SEMICONDUCTORS

Intrinsic semiconductors- Carrier concentration (qualitative) - Fermi level – Energy Band Structure - Electrical conductivity- Energy band gap - Extrinsic semiconductors- P-type & N-type – Carrier concentration (qualitative) - Fermi level – Energy Band Structure- Life time of charge carriers- Carrier generation and recombination – Drift and Diffusion processes –Einstein's Relation - Hall Effect and it's applications –Theory of p -n junction – Construction and working of LED and Photo Diode

UNIT-V: SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS

Superconductivity: Introduction – Meissner effect - Properties of superconductors Type I and type II superconductors- ac and dc Josephson effects -BCS theory (qualitative) –Applications of superconductors.

Physics of Nanomaterials: Introduction, Nanoscience and Nanotechnology – Surface area to volume ratio and Quantum confinement- Classifications of Nanomaterials – Properties of nanomaterials: Mechanical, Magnetic, Optical - Synthesis of nanomaterials- Top-Down Process-Ball Milling; Bottom-Up Process: Sol-Gel method–Applications of nanomaterials.

TEXT BOOKS

1. B.E.A. Saleh and M.C. Tech, "*Fundamentals of Photonics*", John Wiley & Sons, 2nd ed.2012.
2. K.Thyagarajan ,"*Engineering Physics*" , Mc Graw Hill Education Private Ltd, New Delhi.2nd ed,2019.

REFERENCES

1. M.N.Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy" *A Text book of Engineering Physics*",S.Chand Publications, 11th Edition,2019.
2. J. Singh, "*Semiconductor optoelectronics*: *Physics and Technology*", McGraw-Hill Inc. 2nd 1995.
3. S.M. Sze, "*Semiconductor Devices: Physics and Technology*", Wiley, 2rd ed. 2015.
4. P. Bhattacharya, "*Semiconductor Optoelectronic devices*", Prentice Hall of India , 2nd ed.1997.
5. R. Fitzpdricle , "*Maxwell's equations and the principles of Electromagnetism*", Infinity Science Press, 1st ed.2010.
6. John David Jackson , "*Classical Electrodynamics*".Wiley,3rd ed. 2007.

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I B.Tech. – I Sem.

L	T	P	C
3	-	-	3

(20EE0250) PRINCIPLES OF ELECTRICAL ENGINEERING

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the nature of different circuit elements, fundamental laws and network theorems.*
2. *Understand the operation of dc machines and single-phase transformers.*
3. *To learn the different types measuring instruments*

COURSE OUTCOMES

On successful completion of this course, the student will be able to

1. *Apply concepts of KVL/KCL in solving DC circuits*
2. *Apply the network theorems to simple circuits*
3. *Analyze single phase AC circuits consisting of series and RL-RC-RLC combination*
4. *Illustrate the principles and operation of DC Generators & Motors*
5. *Understand the principles and operation of Transformers &Induction Motor*
6. *Understand the different types of instruments*

UNIT- I

DC Circuits: Electrical circuit elements (R,L and C),voltage and current sources, Ohm's law, Kirchoff's laws, analysis of circuits with dc excitation (series, parallel and series-parallel). Superposition, Thevenin's, Norton's and Maximum Power transfer Theorems.

UNIT- II

AC Circuits: Representation of sinusoidal waveforms, peak ,average and rms values, form factor phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL ,RC, RLC combinations (series and parallel)

UNIT- III

DC Machines: Construction details of DC Machine, principle and operation of DC generator, EMF equation, Types of generators, OCC of DC generator, Operation of DC motor, back emf, torque equation. Speed control methods.

UNIT- IV

AC Machines: Construction and working principle of Single-Phase transformer, OC and SC tests, losses in transformers, Regulation and efficiency, Construction & working principle of 3 – phase alternators and three phase induction motor. Regulation of alternator by Synchronous Impedance method.

UNIT- V

Measuring Instruments: Operating principles, essential features of measuring instruments, Moving coil permanent magnet (PMMC) and moving Iron instruments (Voltmeters and Ammeters)- Extension of range of the meters.

TEXT BOOKS

1. D. P. Kothari and I. J. Nagrath, *Basic Electrical Engineering*, Tata McGraw Hill,2010.
2. D. C. Kulshreshtha, *Basic Electrical Engineering*", McGraw Hill, 2009.
3. Soni, Gupta, Bhatnagar, "*A Course in Electrical Power*", DhanpatRai & Sons.

REFERENCES

1. L. S. Bobrow, *Fundamentals of Electrical Engineering*, Oxford University Press,2011.
2. E. Hughes, *Electrical and Electronics Technology*, Pearson, 2010.
3. B.L. Thareja, *Basic* electrical *Engineering (Vol.1)*.

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L	T	P	C
3	-	-	3

(20CS0501) C PROGRAMMING AND DATA STRUCTURES
(Common to CSE & CIVIL)

COURSE OBJECTIVES

The objectives of this course:

1. *Teach the syntax and semantics of a C Programming language*
2. *Demonstrate the use of Control structures of C Programming language*
3. *Illustrate the methodology for solving Computational problems*
4. *Explain the approach to algorithm analysis*
5. *Introduce different data structures for solving the problems*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Recognize the programming elements of C language*
2. *Select the control structure for solving the problem*
3. *Apply modular approach for solving the problem*
4. *Solve mathematical problems using C Programming language*
5. *Develop the applications using stacks and queues*
6. *Construct the linked lists for various applications and perform sorting techniques*

UNIT- I

Introduction to C Language - C Language Elements, Variable Declarations and Data Types, General Form of a C Program, Input and Output Statements, Operators, Expressions, Precedence and Associativity, Type Conversions.

Statements: Decision Statements, Loop Control Statements, break, continue, goto statement.

UNIT- II

Arrays - Declaring and Referencing Arrays, Array Subscripts, Multidimensional Arrays.

Functions - Library Functions, Communications among Functions, Using Array Elements as Function Arguments, Scope, Storage Classes,Type Qualifiers, Recursion , Preprocessor Commands.

Strings - String Basics, String Library Functions

UNIT- III

Pointers - Pointer Declaration, Pointers and Arrays, Array of Pointers, Pointers to Pointers, Void Pointers, Memory Allocation Functions, Pointer to Functions, Pointers and Strings.

Structure and Union – Declaration and Initialization of Structures, Structure within Structure, Array of Structures, Pointer to Structure, Structure and Functions, typedef, Bit Fields, Enumerated Data Type, Union, Union of Structures.

UNIT- IV

Data Structures - Overview of Data Structure, Types of data structures, Stacks: Introduction-Definition-Representation of Stack-Operations on Stacks- Applications of Stacks. Queues: Introduction, Definition- Representations of Queues- Various Queue Structures- Applications of Queues.

Linked List -Single linked list, Circular linked list, Double linked list, Circular Double linked list, Applications of linked lists.

UNIT- V

Searching & Sorting - Linear Search, Binary Search, Exchange Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort.

TEXT BOOKS

1. J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, *Programming in C and Data Structures*,Pearson Education.
2. B.A.Forouzan and R.F. Gilberg, *C Programming & Data Structures*,Third Edition, Cengage Learning.

REFERENCES

1. Stephen G. Kochan,*Programming in C* , III Edition, Pearson Education.
2. J.A. Jones & K. Harrow ,*C Programming with problem solving*, Dreamtech Press.
3. Dr.N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand, *C and Data Structures*, a snapshot oriented treatise with live engineering examples.
4. E.Balaguruswamy, *C and Data Structures*, Tata McGraw Hill.
5. A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein ,*Data Structures using C* , Pearson
6. Education / PHI, Eighth Edition.

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I B.Tech. – I Sem.

L	T	P	C
3	-	-	3

(20EC0445) BASIC ELECTRONICS ENGINEERING

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the basics of Semiconductor materials, characteristics and applications of P-N junction diode.*
2. *To familiarize with the working principle of BJT, JFET and MOSFET and also biasing of the transistors for design of Amplifier circuits.*
3. *To analyze and design various electronic circuits using PN Junction diode, BJT, JFET and MOSFET.*

COURSE OUTCOMES

On successful completion of this course, the student will be able to

1. *Demonstrate the characteristics of PN Junction Diode, Rectifiers, Filters, BJT, JFET and MOSFET.*
2. *Analyze numerical and analytical problems in Rectifiers, Filters, and Transistor biasing circuits.*
3. *Design and develop electronic circuits such as Rectifiers with and without filters and Transistor biasing circuits.*
4. *Solve engineering problems and arrive at solutions relating to electronic devices and circuits.*
5. *Identify a suitable semiconductor device and transistor for any given specification.*
6. *Select suitable technique for Device modeling.*

UNIT-I

Basics of Semiconductor: Conductors, Insulators, and Semiconductors- crystal structure, Energy band diagrams, valence band, conduction band, and band gap; intrinsic, and extrinsic (p-type and n-type) semiconductors, drift and diffusion currents – expression only, mass action law , charge neutrality in semiconductor.

UNIT-II

P-N Junction diode: Open circuited PN Junction, Forward and Reverse Bias of PN Junction, V-I Characteristics, Quantitative Theory of PN Diode Currents, Temperature dependence of the V-I characteristic, Diode Resistances, Diode Capacitances, Applications, Breakdown Mechanisms-avalanche and Zener breakdown, Zener diode – V-I characteristics and Applications, Zener Diode as Voltage Regulator.

UNIT- III

Rectifiers: Definition and Types, Half-wave Rectifier, Full-wave Rectifier – Derivations for Vdc, Vac, ripple factor, efficiency and PIV, Comparison of Rectifiers, Filter - Definition and Types, Inductor Filter, Capacitor Filter, L-section Filter, CLC or π - section Filter- Derivation for Ripple factor, Comparison of various types of filters.

UNIT-IV

Bipolar Junction Transistor(BJT): Construction, Operation, Transistor configurations, Transistor characteristics- CB, CE and CC, Transistor as an Amplifier, Need for Transistor biasing, operating point, Load line analysis, Stability Factor, Biasing methods- Types, Self-bias, Bias compensation.

UNIT- V

Field Effect Transistor (FET): Classification, JFET-Construction, Working, Characteristics and parameters, MOSFET-Types, Construction, Working, Characteristics, Comparison of BJT and FET, Biasing methods- Types, operating point, Voltage Divider Bias.

TEXT BOOKS

1. J. Millman, C. Halkias, *Electronic Devices and Circuits*, Tata Mc-Graw Hill, 4thEdition, 2010.
2. S.Salivahanan, N.Suresh Kumar, *Electronic Devices and Circuits*, Third Edition, McGraw Hill Education (India) Private Limited, 2012.

REFERENCES

1. C. Halkies, C.D.Parikh, *Integrated Electronics–Jacob Millman,* Tata Mc-Graw Hill, 2009.
2. Sedra and Smith, *Micro Electronic Circuits*, Fourth Edition, Oxford University Press, 2002
3. Boylestead and Nashelsky, *Electronic Devices and Circuits Theory*, 9/e, PHI, 2006.

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I B.Tech – I Sem.

L	T	P	C
-	-	3	1.5

(20HS0851) APPLIED PHYSICS LAB

COURSE OBJECTIVES

The objectives of this course:

1. *To explore the application of Interference and Diffraction by doing concerned experiments.*
2. *Elucidate the concepts of Physics through involvement in the experiment by applying theoretical knowledge.*
3. *To understand the concept of Rigidity modulus, energy gap and B-H curve.*
4. *Develop an ability to apply the knowledge of physics experiments in the later studies.*
5. *Recognize the significance of Laser by studying its characteristics and its application in finding the particle size.*

COURSE OUTCOMES

On successful completion of this course, student will be able to

1. *Operate various optical instruments.*
2. *Estimate wavelength of laser and particles size using laser.*
3. *Plot the intensity of the magnetic field of induction along the axis of circular coil carrying current with distance.*
4. *Evaluate the acceptance angle of an optical fiber and numerical aperture.*
5. *Determine energy loss by B-H curve.*
6. *Evaluate rigidity modulus of a given wire.*

Suggested list of experiments from the following: (Perform any TEN experiments from the following)

1. Determination of wavelengths of various colors of Mercury vapor lamp using Diffraction Grating – Normal Incidence method.
2. Determination of Dispersive power of prism.
3. Rigidity Modulus – Torsional Pendulum
4. Determination of thickness of thin object by wedge method.
5. Determination of radius of curvature of Plano convex lens – Newton’s Rings.
6. Determination of wavelength of a given laser source by using diffraction grating.
7. Determination of particle size (Lycopodium particles deposited on glass plates) using Laser source.
8. Determination of energy gap of a semiconductor using p – n junction diode.
9. B- H curve.
10. Magnetic field along the axis of current carrying coil – Stewart & Gee’s Method.
11. Determination of frequency of tuning fork - Melde’s Apparatus.
12. Determination of Spring constant – Coupled Oscillator.
13. Determination of di electric constant of dielectric material using charging and discharging of capacitor.

14. Determination of Numerical Aperture of an Optical fiber.
15. Measurement of resistance with varying temperature –Thermistor.

REFERENCES

1. S. Balasubramanian, M.N. Srinivasan "*A Text book of Practical Physics*", S Chand Publishers,2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University.

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(20EE0252) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

COURSE OBJECTIVES

The objectives of this course:

1. *To enhance the student with knowledge on electrical and electronic equipment's.*
2. *Students can gain practical knowledge about network theorems.*
3. *To enhance the student with practical knowledge about characteristics of BJT.*

COURSE OUTCOMES

On successful completion of this course, the student will be able to

1. *Students will understand all the fundamental components about electrical engineering and electronics engineering.*
2. *Make electrical connections by wires of appropriate ratings.*
3. *Understand the usage of common electrical and electronic measuring instruments.*
4. *Understand the basic characteristics of transformers and electrical machines.*

PART – A
ELECTRICAL LAB

1. Verification of Superposition Theorem.
2. Verification of Thevenin's Theorem.
3. Open circuit characteristics of dc shunt generator.
4. Swinburne's Test on DC Shunt Machine
5. Brake Test on DC Shunt Motor.
6. OC & SC Tests on Single-Phase Transformer

PART –B
ELECTRONICS LAB

1. P-N Junction Diode and Zener Diode Volt-Ampere Characteristics.
2. Bipolar Junction Transistor in CB Configuration-Input and Output Characteristics, Computation of α.
3. Half-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
4. Full-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
5. Bipolar Junction Transistor in CE Configuration-Input and Output Characteristics, Computation of β.
6. Verification of Logic Gates- AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.

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(20CS0502) C **PROGRAMMING and DATA STRUCTURES LAB**
(Common to CSE & CIVIL)

COURSE OBJECTIVES

The objectives of this course:

1. *Explain basic constructs of C language*
2. *Explain problem solving techniques*
3. *Develop applications in C using strings, pointers, functions, structures*
4. *Explain the different operations that can be performed on data structures*
5. *Introduce the different search and sorting algorithms*

COURSE OUTCOMES

On Successful completion of this course, the student will be able to

1. *Read, understand and trace the execution of programs written in C language*
2. *Develop C programs for simple applications making use of basic constructs, arrays and strings*
3. *Develop C programs involving functions, recursion, pointers, and structures*
4. *Select the data structure appropriate for solving the problem*
5. *Illustrate the working of stack and queue*
6. *Implement searching and sorting algorithms*

LIST OF EXPERIMENTS

1. Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*,/,% and use Switch Statement)
2. a) Write a C program to find the sum of individual digits of a positive integer.
   b) 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 generate the first n terms of the sequence.
3. a) Write a C program to calculate the following Sum:
   Sum=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!
   b) Write a C program to find the roots of a quadratic equation.
4. a) Write a C program to determine if the given string is a palindrome or not
   b) Write a C program to determine whether the given number is Armstrong number or not.
5. a) Write a C program to generate Pascal's triangle.
   b) Write a C program to construct a pyramid of numbers.
6. a) Write a C program to find both the larges and smallest number in a list of integers.
   b) Write a C program that uses functions to perform the following:
      i) Addition of Two Matrices
      ii) Multiplication of Two Matrices

7. Write C programs that use both recursive and non-recursive functions
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To solve Towers of Hanoi problem.
8. Write a C program to swap(exchange) values of two integer variables using pointers
9. Write a C program that uses functions to perform the following operations:
   a) To insert a sub-string in to given main string from a given position.
   b) To delete n Characters from a given position in a given string.
10. a) Write a C program to check whether the entered string is palindrome or not.
    b) Write a C program to read student roll no, name and marks in six subjects for n number of students and give class of each student.
11. Write a C programs that implement stack (its operations) using Arrays
12. Write a C programs that implement queue (its operations) using Arrays
13. Write a C program that uses functions to perform the following operations on singly linked list.
    i) Creation ii) Insertion iii) Deletion iv) Traversal
14. Write a C program that uses functions to perform the following operations on doubly linked list:
    i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways
15. a) Write a C program to perform Linear Search on the elements of a given array.
    b) Write a C program to perform Binary Search on the elements of a given array.
16. a) Write a C program to sort the elements using Bubble sort.
    b) Write a C program to sort the elements using Insertion sort.

TEXT BOOKS

1. J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, *Programming in C and Data Structures*,Pearson Education.
2. B.A.Forouzan and R.F. Gilberg, *C Programming & Data Structures*,Third Edition, Cengage Learning.

REFERENCES

1. P. Padmanabham ,*C programming and Data Structures*, Third Edition, BS Publications
2. E Balaguruswamy ,*C and Data Structures*,TMH publications.

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(20HS0835) PROBABILITY & STATISTICS

COURSE OBJECTIVES

The objectives of this course:

1. *To train the students thoroughly in Mathematical concepts fundamentals of probability, test of hypothesis, Test of significance.*
2. *To prepare students for lifelong learning and successful careers using mathematical concepts of probability, test of hypothesis, Test of significance.*
3. *To develop the skill pertinent to the practice of the mathematical concepts including the Student abilities to formulate and modeling the problems, to think creatively and to synthesize information.*

COURSE OUTCOMES

On successful completion of this course, the student will be able to

1. *A good understanding of the laws of probability axioms and rules.*
2. *Understanding of moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.*
3. *Calculate and interpret the correlation between two variables.*
4. *Calculate the simple linear regression equation for a set of data.*
5. *Have acquired ability to participate effectively in group discussions.*
6. *Have developed ability in writing in various contexts.*
7. *Have acquired a proper level of competence for employability.*

UNIT - I

Probability: Sample spaces and Events, Definition of probability, Addition theorem, Conditional probability, Independence, Multiplication theorem, Baye's theorem.

Random variables: Discrete and Continuous random variables- Probability distribution functions and their properties- Expectation of Discrete and Continuous Random Variables.

UNIT- II

Probability distributions: Binomial, Poisson and Normal Distributions -Mean and Variance of Binomial, Poisson and Normal distributions, related problems.

UNIT - III

Basic statistics: Measures of Central tendency (Mean, Median & Mode), Moments, Skewness and Kurtosis. Correlation and regression – Rank correlation.

UNIT – IV

Applied statistics:

Curve fitting: Curve fitting by the method of least squares- fitting a straight line, second degree polynomial and more general curves (Exponential & Power curves).

Test of Hypothesis: Large sample tests for single proportion, difference of proportions, single mean, difference of means.

UNIT –V

Tests of significance: Small sample tests: t-test for single mean, difference of means, F-test, Chi-square test for goodness of fit and independence of attributes.

TEXT BOOKS

1. Grewal B S, *Higher Engineering Mathematics*, 44thedition, Khanna Publishers, 2017.
2. Iyengar T.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *Probability & Statistics*, S.Chand publications, 2018.

REFERENCES

1. Gupta S.P, *Statistical methods*, S.Chand publications, 2011.
2. Rukmangadachari E & Keshava Reddy E, *Probability & Statistics*, Pearson Publisher, 2015.
3. Shankar Rao G, *Probability & Statistics for Science and Engineering*, Universities Press, 2011

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(20HS0802) APPLIED CHEMISTRY

COURSE OBJECTIVES

The objectives of this course:

1. *To familiarize engineering chemistry and its applications.*
2. *To train the concepts of molecular structures and bonding.*
3. *To understand the physical and mechanical properties of polymers helps in selecting suitable materials for different purpose.*
4. *Learn the principles of spectroscopies to analyse them.*
5. *Be exposed to the importance of nano and engineering materials used in their daily life and Industry.*

COURSE OUTCOMES

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

1. *Apply Nernst equation for calculating electrode and cell potentials*
2. *Illustrate the molecular orbital energy level diagram of different molecular species*
3. *Explain the different types of polymers and their synthesis.*
4. *Synthesize of plastics, elastomers, conducting polymers and their applications in our daily life*
5. *Comprehend the principles and applications of spectroscopies.*
6. *Acquire spotlight to the nanomaterials and basic engineering materials used in academics, industry and daily life.*

UNIT - I Electrochemistry and Applications

Introduction to electrochemistry, Electrochemical cell - Nernst equation, Cell potential calculations and Numerical problems -Potentiometry - Potentiometric Titrations (Redox Titrations), Conductometric Titrations (Acid-Base titrations), Photovoltaic cell working and its applications, Photogalvanic cells Electrochemical sensors.

Primary cells – Zinc-air battery, Secondary cells – Lead acid, NICAD batteries, and Lithium ion cells (Rechargeable). Fuel cells - Hydrogen-Oxygen, Methanol-Oxygen fuel cell- Hydrogen-Oxygen, Methanol-Oxygen fuel cell - working of the cells and application.

UNIT - II Structure and Bonding Models

Planck's Quantum Theory, Dual Nature of matter - Schrodinger Equation, Significance of Ψ and Ψ^2, Molecular Orbital Theory – Bonding in Homo and Hetero nuclear Diatomic molecules - Calculation of Bond Order. Energy level diagrams of O_2, F_2, N_2 and CO, etc. π-molecular orbital's Energy Level Diagram of Butadiene and Benzene. Crystal Field Theory – Salient features – Splitting in Octahedral and Tetrahedral geometry, Magnetic properties and Color.

UNIT - III Polymer Chemistry

Introduction to Polymers, Functionality of Monomers, Nomenclature of Polymers. Chain growth and Step growth Polymerization, Co-ordination Polymerization, Co-Polymerization with specific examples and mechanisms of polymer formation

Plastics - Thermoplastics and Thermosetting, Preparation, Properties and Applications of – Bakelite, Nylon-6,6 , Carbon fibers.

Elastomers: Preparation, Properties and applications of Buna-S, Buna-N. Preparation, Properties and applications of Conducting Polymers – Classification, Synthesis and applications of polyacetylene, polyaniline.

UNIT - IV Instrumental Methods and Applications

Regions of Electromagnetic Spectrum, Absorption of radiation: Beer-Lambert's Law., UV-spectroscopy, Infra red Spectroscopy (IR) and Atomic absorption Spectroscopy (AAS).

Chromatography Techniques: Gas Chromatography (GC) and High Performance Liquid Chromatography (HPLC),Thin layer chromatography(TLC), Separation of Gaseous mixtures and Liquid mixtures.

UNIT - V Modern Engineering Materials

Semiconducting and Super Conducting materials- basic concept, band diagrams for conductors, semiconductors and insulators, effect of doping on band structures.

Electrical Insulators or Dielectric materials: Definition and classification, Characteristics of electrical insulators and applications of electrical Insulating materials.Concepts and terms of Supra molecular chemistry, Complementarity, Basic Lock and Key principle, examples of Supramolecules, Applications of Supra molecules (Sensors, Catalysts, Gas storage, Medical and Molecular switches).

Nano Chemistry: Introduction, Classification, Properties of Nanomaterials. Fullerenes, CarbonNanotubes.

TEXT BOOKS

1. Jain and Jain, *Engineering Chemistry*, 16 Ed., Dhanpat Rai Publishers, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' *Physical Chemistry*, 10 Ed., Oxford University Press, 2010.

REFERENCES

1. GVSubba Reddy, KNJayaveera and C. Ramachandraiah,*Engineering Chemistry*,
2. McGraw Hill Higher Education,, New Delhi 2019.
3. K Sesha Maheswaramma and Mridula Chugh, Engineering Chemistry, 1 Ed., Pearson India Education Services Pvt. Ltd, 2016.
4. Dr. S.S. Dara and Dr S.S Umare, A Text book of Engineering Chemistry, 1 Ed., Chand & Company Ltd., 2000
5. D. J. Shaw, Introduction to Colloids and Surface Chemistry, 4 Ed., Butterworth Heineman, 2013.

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(20HS0810) COMMUNICATIVE ENGLISH
(Common to CSE & CIVIL)

COURSE OBJECTIVES

The objectives of this course:

1. *Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers.*
2. *Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials*
3. *Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.*
4. *Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information.*
5. *Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *To understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information.*
2. *To ask and answer general questions on familiar topics and introduce oneself/others.*
3. *To employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information.*
4. *To recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs.*
5. *To form sentences using proper grammatical structures and correct word forms.*
6. *To use effective sentence structure for their professional activities.*

UNIT – I

Part 1

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Writing:** Beginnings and endings of paragraphs - introducing the topic; Letter writing. **Grammar and Vocabulary:** Parts of speech, Function words, Content words; Tenses**. Soft Skills:** Attitude is Everything; Positive attitude Positive thinking- thought provoking ideas – creative thinking.

Part 2

Half a Rupee Worth by R K Narayan from Engage with English.

UNIT – II

Part 1

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/ small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Mechanics of writing –punctuations. **Grammar and Vocabulary:** Voice; Cohesive devices; Articles. Types of sentences – Simple, Complex, and Compound.

Soft skills: The factors of human mindset; self-confidence- self-belief, self-learning – self motivation.

Part 2

The Thakur's Well byPremchand from Paths to Skills in English

UNIT – III

Part 1

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing Report Writing. **Grammar and Vocabulary: S**ubject-verb agreement; If- clauses; Direct and Indirect speech.wh-questions.

Soft skills: Emotional intelligence; Work efficiency- peace of mind- Broad nature in ideas- having patience in multiple ways.

Part 2

I am not that Woman by KishwarNaheed.

UNIT – IV

Part 1

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** conversational English in academic contexts (formal and informal).**Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Information transfer **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of synonyms and antonyms.

Soft skills: Time management; the priority of the task – the task you take- Urgent and importance- not urgent, important- not important, urgent- Not important, not urgent.

Part 2

What is my name? By Sathyavathi from Paths to Skills in English.

UNIT – V

Part 1

Listening: Identifying key terms.**Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides.**Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidences. **Grammar and**

Vocabulary: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).

Soft skills: Goal setting; Immediate goal – Short goal- midterm goal – Life goal.

Part 2

The Power of Prayer by A P J Abdul Kalam from Paths to Skills in English.

TEXT BOOKS

1. Pushpa Relia .P & Sanjay Mihhra .K, *English All Round: Communication Skills for Undergraduation Learners,* Vol. I, Orient Black Swan Publishers, First Edition, 2019.
2. Prof.Sundaravalli.G et al. ,*Paths to Skills in English*, Orient Blackswan, Publishers, First Edition 2015

REFERENCES

1. Bailey, Stephen., *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver., *Pathways: Listening, Speaking and Critical Thinking.*, Heinley ELT;2nd Edition, 2018.
3. Hewings, Martin., *Cambridge Academic English (B2)*. CUP, 2012.
4. Eric H. Glendinning et al, *Study Reading: A Course in Reading Skills for Academic* Purposes, Cambridge University Press; 2 edition, 14 October 2004.
5. Pattabiram, B.V, *Soft Skills*, Sonmez Publication, 2011(2nd Edition).
6. Virendranath Yandamuri, *Soft Skills for Engineer*, Yaswin Publication, 2nd Edition, 2009.

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(20ME0301) ENGINEERING GRAPHICS

(Common to all branches)

COURSE OBJECTIVES

The objectives of this course:

1. *Draw simple curves like ellipse, cycloid and Involutes.*
2. *Describe the Orthographic projections of points, lines and planes.*
3. *Construct the projection of solids like cylinders, cones, prisms and pyramids.*
4. *Sketch the development of the surfaces for practical cut sections of cylinders, cones, prisms and pyramids.*
5. *Depict the isometric and Orthographic Projections of simple objects.*

COURSE OUTCOMES

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

1. *Interpret the engineering drawing fundamentals to draw the curves like ellipse, cycloid and Involutes.*
2. *Know the projection of points and implement the same in the construction of projection of lines and planes.*
3. *Recognize the basic solids like cylinders, cones, prisms and pyramids and sketch the projections of them.*
4. *Explain the sectional views of Right regular Solids and Apply visualization skills in developing new products.*
5. *Understand the basic principles of isometric and Orthographic Projections.*
6. *Construct the isometric and orthographic projections of simple objects.*

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections – Eccentricity method, Rectangle Method, Parallelogram Method, Cycloids- Epi & Hypo-Cycloids and Involutes.

UNIT – II

Projections of Points: Principles of Orthographic Projections-Conventions - Projections of Points.

Projections of straight lines: Inclined to both the planes (Trapezoidal Method & Rotating line method) - simple problems only, Traces

UNIT – III

Introduction to plane surfaces: Surface Inclined to one plane - Surface inclined to both reference planes

Projections of Solids: Introduction– Projections of right regular solids-Prisms, Pyramids in different positions (Inclined to one plane only).

UNIT – IV

Section of solids - Sectional Views of Right regular Solids - Prisms, Pyramids

Development of surfaces - Development of surfaces of Right Regular Solids - Prisms, Pyramids.

UNIT – V

Orthographic Projections - Principles of Orthographic projection, Conversion of objects from 3D to 2D

Isometric Projections - Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids, Conversion of 2D to 3D.

TEXT BOOKS

1. K. L. Narayana, P.Kannaiah , *A text Book of Engineering Drawing*, Scitech Publishers, 23rd Reprint Edition, 2010.
2. N. D. Bhatt, *Engineering Drawing*, Charotar Publishers, 49th Edition, 2008.

REFERENCES

1. K. Venugopal, *A text Book of Engineering Drawing and Graphic*, New Age Publishing, 5th Edition, 2008.
2. Warren J. Luzadder & Jon M, *Fundamentals of Engineering Drawing*, Peach Pit Press, 11th Edition, 1992.
3. Dhananjay A Jolhe, *Engineering Drawing with An introduction to AutoCAD*, McGraw Hill Education; 1st Edition, 2017.

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(20CS0503) DIGITAL LOGIC DESIGN

COURSE OBJECTIVES

The objectives of this course:

1. *Impart basic knowledge of digital logic levels*
2. *Describe various digital electronic circuits.*
3. *Introduce the concepts of Random Access Memory and Programmable Logic Arrays*

COURSE OUTCOMES

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

1. *Compare various Number systems and implement Boolean Algebra operations*
2. *Design and implement Combinational and Sequential logic circuits*
3. *Implement Analog to Digital conversion and Digital to Analog conversion*
4. *Design and develop sequential logic circuits*
5. *Understand the working of logic families and logic gates*
6. *Implement the given logical problem using PLDs*

UNIT- I

Binary systems and Boolean algebra: Digital Systems - Binary Numbers - Number Base Conversions - Octal and Hexa decimal Numbers – Complements - Signed Binary Numbers - Binary Codes - Binary Storage and Registers - Axiomatic Definition of Boolean Algebra - Basic Properties of Boolean Algebra - Boolean Functions - Canonical and Standard Forms - Other Logic Operations - Digital Logic Gates.

UNIT- II

Gate–Level Minimization: The Map Method - Four Variable Map - Five-Variable Map - Product of Sums Simplification - Don‘t-Care Conditions - NAND and NOR Implementation - Other Two Level Implementations - EX-OR Function.

UNIT- III

Combinational Logic: Combinational Circuits - Analysis Procedure - Design Procedure - Binary Adder - Subtractor - Decimal Adder-Binary Multiplier - Magnitude Comparator - Decoders-Encoders – Multiplexers - De-Multiplexers.

UNIT- IV

Synchronous Sequential Logic: Sequential Circuits – Latches - Flip-Flops - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure – Registers - Shift Registers - Ripple counters - Synchronous counters - Ring Counter and Johnson Counter.

UNIT- V

Memory And Programmable Logic: Random access memory - Memory decoding - Error Detection and Correction - Read-only Memory - Programmable Logic Array Programmable Array Logic - Sequential Programmable Devices - Integrated circuits.

TEXT BOOKS

1. M.Morris Mano & Micheal D.,Digital Design, Ciletti, Pearson, 5th Edition, 2013.
2. David J. Comer, Digital Logic & State Machine Design, Oxford University Press, 3rd Reprinted Indian Edition, 2012.

REFERENCES

1. R.D. Sudhakar Samuel, Digital Logic Design, Elsevier
2. Roth, Cengage,Fundamentals of Logic Design, 5/e
3. Malvino, Saha,Digital Logic Design, Leach, TMH
4. R.P. Jain, Modern Digital Electronics,TMH
5. A.P.Godse, D.A.Godse, Digital Logic Design,Technical Publications Pune, 2009.

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(20HS0803) APPLIED CHEMISTRY LAB

COURSE OBJECTIVES

The objectives of this course:

1. *Learn to estimate the chemical impurities present in water such as hardness, alkalinity, chlorine*, etc.
2. *Understand and experience the formation of inorganic complex and analytical technique for trace metal determination*.
3. *Be trained to use the instruments to practically understand the concepts of electrochemistry.*
4. *Bridge theoretical concepts and their practical engineering applications, thus highlighting the role of chemistry in engineering.*
5. *Learn and understand the practical implementation of fundamental concepts*

COURSE OUTCOMES

On successful completion of this course, student will be able to

1. *Develop and perform analytical chemistry techniques to address the water related problems (for e.g., hardness, alkalinity present in water) technically*.
2. *Prepare advanced polymer materials*
3. *Estimate the Iron in cement*
4. *Handle electro-analytical instruments like digital conductivity meter and potentiometer to perform neutralization, precipitation and redox titrations respectively.*
5. *Think innovatively and improve the creative skills that are essential for solving engineering problems*

LIST OF EXPERIMENTS

1. Conductometric Titration of Strong acid vs Strong base
2. Conductometric Titration of Weak acid vs. Strong base
3. Determination of Hardness of a Groundwater sample.
4. pH metric titration of Strong acid vs. Strong base,
5. Potentiometry - Determination of Redox potentials and emfs
6. Determination of Strength of an Acid in Pb-Acid battery
7. Preparation of a Polymer
8. Determination of viscosity of an oil by Redwood viscometer .
9. Determination of percentage of Iron in Cement sample by Colorimetry
10. Determination of acidity of water sample.
11. Determination of Alkalinity of water sample.
12. Determination of Percentage Moisture content in a Coal sample

TEXT BOOKS

1. J. Mendham et al, *Vogel's Text book of Quantitative Chemical Analysis,* Pearson Education, Sixth Edition, 2002.
2. Chandra Sekhar, G.V. Subba Reddy and Jayaveera, *Chemistry Practical – Lab Manual*, McGraw Hill Higher Education, 2015.

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(20HS0811) COMMUNICATIVE ENGLISH LAB
(Common to CSE & CIVIL)

COURSE OBJECTIVES
The objectives of this course:

1. *Students will be exposed to a variety of self-instructional, learner friendly modes of language learning.*
2. *Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.*
3. *Students will learn better pronunciation through stress, intonation and rhythm.*
4. *Students will be trained to use language effectively to face interviews, group discussions, and public speaking*
5. *Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc.*

COURSE OUTCOMES
On successful completion of this course, the student will be able to

1. *Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.*
2. *Apply communication skills through various language learning activities.*
3. *Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.*
4. *Evaluate and exhibit acceptable etiquette essential in social and professional Settings.*
5. *Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.*
6. *Use effective communicative approaches by preparing job application, report and other kinds of writing correspondences.*

LIST OF EXPERIMENTS

1. PHONETICS

a. Definition - Articulation - Phonetic Chart - Pure Vowels and Diphthongs.

2. MINIMAL PAIRS

a. Definition - Minimal Pairs 1 -Minimal Pairs 2

3. CLUSTERS AND MARKERS

a. Consonant Clusters - Initial Consonant Cluster -Final Consonant Clusters

b. Past Tense Markers - Plural Markers.

4. **ICE BREAKING ACTIVITY**

5. Ice Breakers Overview - Ice Breakers Activity - Why Ice Breaker.

6. SYLLABLE

a. Syllable Overview -Syllable Types.

7. **STRESS**

a. Syllable Stress - Stress Pattern -Stress and Rhythm - Word Stress - Sentence Stress.

8. **Accent & Intonation**

a. Intonation overview- Intonation making lists – Intonation questions – Intonation – yes or no questions – notes.

9. **JAM**

a. Jam tips - Sample topics.

10. **Listening skills**

a. Listening skills - Effective listening - Listening importance - Barriers to listening.

11. **ROLE PLAY 1**

a. Greetings - Giving compliments - Making requests – Hobbies - Asking permission – Thanking.

12. **ROLE PLAY 2**

a. Comparing and contrasting - Agreeing and dis agreeing - Expressing opinions - Likes and dis likes - Formal and informal – Suggestions - Polite requests - Meeting people.

13. **ROLE PLAY 3**

a. Phone calls – Directions.

14. **Description**

a. Describing a person- Adjectives to describe – Giving direction – Asking giving direction – describing a product – Describing products – Personal narrative – narrative writing Notes.

15. **Book review**

a. Introduction – Book review over view- Book review tips – Book review notes.

16. **Information Transfer**

a. Information writings –Text to Diagram- Diagram to Text.

Minimum requirements for Communicative English Lab

1. Computer Assisted Language Learning (CALL) Lab: The Computer Assisted Language Lab for 60 Students with 60 systems one Master Console, LAN facility and English Language Software for self-study by learners.
2. Communicative English Lab with movable chairs and audio-visual aids with a P. A. system, Projector, a Digital stereo audio & video system and Camcorder etc.

System Requirement (Hardware component)

Computer network, LAN with minimum 60 multimedia systems with the following:

Specifications

1. a) Intel (R) core (TM) i3
2. Speed 3.10 GHZ
3. RAM – 4 GB
4. Hard Disk – 320 GB
5. Headphones with High quality

Software

Walden Info Tech Software

REFERENCES

1. T. Balasubramanian.,*A Textbook of English Phonetics for Indian Students,* second edition, (Mcmillian) 2012.
2. DhamijaSethi,*A Course in Phonetics and spoken English,* Prentice-hall of India Pvt. Ltd, 2000.
3. Krishna Mohan & NP Singh, Speaking *English Effectively*, Second Edition 2011 (Mcmillian).
4. E.Sureshkumar ,P.Sreehari, *A Hand Book of English Laboratories*, Foundation books, 2011.
5. M Ashraf Rizvi, Director, Jaipuria Institute of Management, Lucknow, *Effective Technical Communication*, McGraw Hill Education; Second edition (27 July 2017).

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(20ME0302) WORKSHOP PRACTICE LAB

COURSE OBJECTIVES

To make the student

1. *Familiarize with the different types of wood and carpentry joints.*
2. *Develop Tapered Tray and Conical funnel using sheet metal.*
3. *Acquire practical knowledge on Fitting and Electrical Wiring.*
4. *Learn about various peripherals of a computer.*
5. *Know about installation of MS Windows & Linux.*
6. *Gain knowledge on Productivity tools & Networking.*

COURSE OUTCOMES(COs)

Upon Completion of the course the students will be able to

1. *Describe the different types of wood and carpentry joints.*
2. *Produce Tapered Tray and Conical funnel using sheet metal.*
3. *Understands about Fitting and Electrical Wiring.*
4. *Identify various peripherals of a computer.*
5. *Explain the procedure to install MS Windows & Linux.*
6. *Understand about Productivity tools & Networking.*

PART A

LIST OF EXPERIMENTS:

CARPENTRY: Familiarity with different types of woods and tools used in wood working and make following joints

1.T-Bridle joint

2.Corner Dovetail joint

SHEET METAL WORKING: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal jobs using GI sheets.

1.Tapered tray

2.Conical funnel

FITTING: Familiarity with different types of tools used in fitting and do the following fitting exercises

1.Step Fitting

2.V-Fit

ELECTRICAL WIRING: Familiarity with different types of basic electrical circuits and makes the following connections

1. Parallel and series
2. Two way switch
3. Go down lighting
4. Tube light
5. Three phase motor
6. Soldering of wires

PART B

Task 1:
Identification of the peripherals of a computer: To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

Task 2:
A practice on disassembling the components of a PC and assembling them.

Task 3:
1.Basic DOS commands, Installation of MS windows.
2.Basic Linux Commands, Installation of Linux.

Task 4:
Hardware Troubleshooting (Demonstration): Identification of a problem and fixing the solution (improper assembly or defective peripherals). Software Troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues

Productivity tools
Task 5:
1. **MS Word Orientation:** Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving

2**. Presentations:** Creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper linking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

3**. Spread sheet:** Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 6:
Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

TEXT BOOKS

1. V Ramesh Babu, *Engineering Workshop for JNTU*, VRB Publishers Pvt. Ltd., 2009.
2. Peter Norton, *"Introduction to Computers*", McGraw Hill, 7th Edition, 2017.
3. Joan Lambert, Joyce Cox, *MOS study guide for word, Excel, Power point & amp; Outlook Exams*, PHI. 1st Edition, 2011.

REFERENCES

1. P. Kannaiah & K.L. Narayana, *Workshop Manual*, SciTech Publishers, 2010.
2. *Introduction to Information Technology*, ITL Education Solutions limited, Pearson Education.2009.
3. Rusen, *Networking your computers and devices*, PHI, 2009.
4. Bigelows, *Trouble shooting, Maintaining & amp; Repairing PCs*, TMH, 2010.

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(20HS0816) INDIAN CONSTITUTION
(Common to All Branches)

COURSE OBJECTIVES
The objectives of this course:

1. *To know the premises informing the twin themes of liberty and freedom from a civil rights perspective.*
2. *To address the growth of Indian opinion regarding modern Indian intellectuals 'constitutional role.*
3. *To address entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.*
4. *To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.*
5. *To acquire knowledge for various competitive examinations.*

COURSE OUTCOMES
On successful completion of this course, the student will be able to

1. *Explain the key concepts of political economy.*
2. *Analyse the significant developments in the political ideologies.*
3. *Describe the salient features of the constitution of India interpret, integrate and critically.*
4. *Analyse the political economy of Indian international relations and gain knowledge in Judiciary system.*
5. *Apply their knowledge and skills acquired to write various competitive examinations.*
6. *Analyse the constitutional rights in relating to Practical life.*

UNIT-I
Constitution: Definition, Introduction, Meaning of the term,- Indian Constitution: Sources and Features

UNIT-II
Historical Perspective of Indian Constitution: The Government Act of 1919and1935 - A Dual Form of Government – The Constitutional Reforms of Simon commission –Formation of Drafting Committee – The Role of Constitution Assembly. Salient features and characteristics of the Constitution of India: Structure of the Indian Union: Federalism, Centre- State relationship.

UNIT-III
Scheme of the Fundamental Rights: Concept of Fundamental Rights in India, Justifiability of Fundamental Rights - Reach of Fundamental Rights -The scheme of the Fundamental Duties and its Legal Status: Fundamental Duties in India – Article 51A - Introduction to Fundamental Duties in India – Importance of Fundamental Duties. The Directive Principles of State Policy - Its

importance and implementation - The Potential of Directive Principles of State Policy for the Judicial Enforcement of Socio-Economic Rights.

UNIT-IV

Parliamentary Form of Government in India: Origin, growth and development of the parliamentary system in India – Chief Characteristics of Indian Parliament – Constitutional Powers and Functions of Indian Parliamentary system. The President of India: Qualifications of President - Election of President, Tuner of President - Status, Powers and Functions of President. The Historical Perspectives of the Constitutional Amendments in India: Types of Amendments & Constitutional Amendment Process in India - Indian Polity-Judiciary System Introduction to Indian Judiciary System - Independent Indian Judiciary - Indian Judiciary Structure - Powers and Functions of Indian Judiciar**y**

UNIT-V

Local Self Government – Constitutional Scheme in India - District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zilla Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments),Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

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

TEXT BOOKS

1. Government of India Ministry of Law and Justice (Legislative Department), *The Constitution of India, 1950 (Bare Act)*Government Publication, 2015
2. Dr.Busi, S.N *Dr.B.R.*Ambedkar, *framing of Indian Constitution*, 1st Edition,GovernmentPublication 2015

REFERENCES

1. Jain M. P, *Indian Constitution Law* LexisNexis Publishers 7th Edition.2014.
2. Basu D.D, *Introduction to the Constitution of India* Lexis Nexis,8th Edition 2015
3. BakshiP.M, Constitution *of India* Universal Law Publishing.15th Edition,2018

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(20HS0845) MATHEMATICAL AND STATISTICAL METHODS
(Common to CSM & CIC)

COURSE OBJECTIVES
The objectives of this course:

1. *The Number Theory basic concepts useful for cryptography etc*
2. *To read and understand the current performance analysis and queueing theory.*
3. *Stochastic process and Markov chains.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Apply the number theory concepts to cryptography domain.*
2. *Design solution for problems using congruences.*
3. *Understand the stochastic processes, Markov chains, Transition probability matrix and various types of states.*
4. *Use statistical reasoning, formulate a problem in statistical terms, perform exploratory analysis of data and carry out a variety of formal inference procedures.*
5. *Resolve the potential misconceptions and hazards in each topic of study.*
6. *Analyze the problem and identify the structures required to generate the mathematical solution.*

UNIT - I
Greatest Common Divisors and Prime Factorization:
The Greatest integer function, Diophantine approximation, Mathematical induction, The Fibonacci numbers, Divisibility, Greatest common divisors, Computer operations with integers, Primes and greatest common divisors and their properties, The Euclidean algorithm, The fundamental theorem of arithmetic, Factorization of integers and the Fermat numbers, Linear Diophantine equations.

UNIT - II
Congruences: Introduction to congruences, Linear congruences, The Chinese remainder theorem, solving polynomial congruences, Systems of linear congruences.
Applications of congruences: Divisibility tests, Wilson's theorem and Fermat's little theorem, Euler's theorem, The Euler's Phi-function, The sum and number of divisors.

UNIT - III
Estimation: Introduction, Statistical Inference, Classical Methods of Estimation. Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Maximum Likelihood Estimation.

UNIT - IV
Stochastic Processes and Markov Chains: Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order

Markov process, nstep transition probabilities, Markov chain, Steady state condition, Markov analysis.

UNIT - V

Queueing theory: Introduction, Pure birth and death process, M/M/1: Finite and Infinite Queueing models, M/M/S: Multiple server with unlimited capacity and their related simple problems.

TEXT BOOKS

1. Kenneth H. Rosen, *Elementary number theory & its applications,* sixth edition, Addison-Wesley, ISBN 978 0-321-50031-1.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, *Probability & Statisticfor Engineers & Scientists*, 9th Ed. Pearson Publishers.

REFERENCES

1. Moorthy MBK, *Probability and Queuing Theory*, Scitech Publications (India) Pvt Ltd, 2010.
2. T.T. Soong, *Fundamentals of Probability And Statistics For Engineers*, John Wiley & SonsLtd, 2004.
3. Sheldon M Ross, *Probability and statistics for Engineers and scientists*, Academic Press.

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(20CS0504) COMPUTER ORGANIZATION & ARCHITECTURE

COURSE OBJECTIVES

The objectives of the course to

1. *Explain the fundamentals of computer organization and its relevance to classical and Modern problems of computer design*
2. *Make the students understand the structure and behavior of various functional modules of a computer.*
3. *Understand the techniques that computers use to communicate with I/O devices.*
4. *Illustrate the concepts of pipelining and the way it can speed up processing.*
5. *Understand the basic characteristics of multiprocessors*

COURSE OUTCOMES

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

1. *Describe the fundamental operations of computer*
2. *Explain the functional units of computer system*
3. *Understand the memory hierarchy and its impact of cost and performance.*
4. *Discuss hardware requirements for cache memory and virtual memory.*
5. *Design algorithms to exploit pipelining and multiprocessors*
6. *Compare memory and I/O devices*

UNIT- I

Basic Structure of Computers: Functional Units, Basic Operational Concepts, Basic I/O Operations, Bus Structures, Instruction Cycle, Data Transfer, Data Manipulation and Program Control**,** Addressing Modes.

UNIT- II

Data Representation: Signed number representation, Fixed and Floating point representations, Character representation.

Computer Arithmetic: Integer addition and subtraction, Multiplication – shift and add, Booth multiplication, Division, Signed operand multiplication, Floating point arithmetic.

UNIT- III

Register Transfer and Micro operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers: Arithmetic Micro operations, Logic Micro operations, Shift Micro operations.

CPU control unit design: Hardwired control, Micro-programmed control, Address Sequencing.

UNIT- IV

Memory Organization: Concept of hierarchical memory organization, Main memory, Semiconductor memory technologies, Cache memory, Virtual memory, Auxiliary memory, Direct Memory Access(DMA).

UNIT- V

Pipelining: Basic concepts of pipelining, Arithmetic pipeline, Instruction pipeline, Instruction Hazards.

Parallel Processors: Introduction to parallel processors, Multiprocessor, Interconnection structures and Cache coherency.

TEXT BOOKS

1. Carl Hamacher, Zvonko Vranesic, SafwatZaky and Naraig Manjikian, *Computer Organization and Embedded Systems*, Sixth Edition, McGraw Hill Education, 2012.
2. M.Morris Manno, *Computer System Architecture*, Third Edition, Pearson, 2017.

REFERENCES

1. Carl Hamacher, ZvonkoVranesic, and SafwatZaky, *Computer Organization*, Fifth Edition, McGraw Hill Education,2011.
2. John P. Hayes, *Computer Architecture and Organization*, Third Edition, McGraw Hill Education,2017.
3. David A. Patterson and John L. Hennessy, *Computer Organization and Design: The Hardware/Software Interface*, Fifth Edition, 2014.

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(20CS0505) DATABASE MANAGEMENT SYSTEMS

COURSE OBJECTIVES

The objectives of this course

1. *Understand the different issues involved in the design and implementation of a database system.*
2. *Study the physical and logical database designs, database modelling, relational, hierarchical, and network models*
3. *Understand and use data manipulation language to query, update, and manage a database*
4. *Understand the concept of a database transaction and related database facilities.*
5. *Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.*

COURSE OUTCOMES

On successful completion of this course, the student will be able to

1. *Develop relational algebra expressions for queries and optimize them.*
2. *Design the databases using E_R method for a given specification of requirements.*
3. *Apply Normalization techniques on given database.*
4. *Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system.*
5. *Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.*
6. *Understand Physical Storage Media and RAID concepts.*

UNIT- I

Introduction: Database System Applications, Purpose of Database Systems, View of Data, Data Abstraction, Data Independence, Data Models, Database Languages, Database Architecture, Database Users and Administrators.

Introduction to Data base design: ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets.

UNIT- II

Relational Algebra and Calculus: Relational Algebra - Selection and Projection, Set operations, Renaming, Joins.

Form of Basic SQL Query- Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set - Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values, Disallowing NULL values, Triggers and Active Data bases.

UNIT- III

Introduction to Schema Refinement- Problems Caused by redundancy, Functional Dependencies, Normal Forms - FIRST, SECOND, THIRD Normal forms – BCNF.

Properties of Decompositions: Lossless join Decomposition, Dependency preserving Decomposition - FOURTH Normal Form, FIFTH Normal form.

UNIT- IV

Transaction and Concurrency: Transaction Concepts – ACID Properties –Transactions and Schedules- Transaction States - Concurrent Execution, Serializability - Types of Failures.

UNIT- V

Recoverability: System Recovery – Media Recovery –Two Phase locking – Deadlock-Detection, Recovery and Prevention.

Physical Storage and Database Concepts: Overview of Physical Storage Media and RAID.

TEXT BOOK

1. Abraham Silberschatz, Henry F. Korth and S. Sudharshan, *Database System Concepts*, Sixth Edition, Tata McGraw Hill, 2011.

REFERENCES

1. RamezElmasri and Shamkant B. Navathe, *Fundamentals of Database Systems*, Fifth Edition, Pearson Education, 2008.
2. Raghurama Krishnan, Johannes Gehrke, *Database Management Systems*, 3rd Edition, McGrawHill Education, 2003.
3. J. D. Ullman, *Principles of Database and Knowledge – Base Systems*, Computer Science Press.
4. Peter Rob & Carlos Coronel, *Database Systems Concepts*, Cengage Learning2008.
5. C.J. Date, *Introduction to Database Systems*, Pearson Education.

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(20CS0507) OPERATING SYSTEMS

COURSE OBJECTIVES

The objectives of this course

1. *Explain main components of an OS & their functions.*
2. *Describe the process management and scheduling.*
3. *Discuss various issues in Inter Process Communication (IPC) and the role of OS in IPC.*
4. *Illustrate the concepts and implementation of Memory management policies and virtual memory*
5. *Explain working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS.*

COURSE OUTCOMES (COs)

On successful completion of this course, students will be able to

1. *Describe the important computer system resources and the role of operating system in their management policies and algorithms.*
2. *Understand the process management policies and scheduling of processes by CPU.*
3. *Analyze the requirement for process synchronization and coordination handled by operating system.*
4. *Analyze the memory management and its allocation policies.*
5. *Categorize the storage management policies with respect to different storage management technologies*
6. *Study the need for special purpose operating system with the advent of new emerging technologies.*

UNIT - I

Operating Systems Overview: What is an operating system-History of operating systems-Operating system functions- Operating systems Operations-Types of Operating Systems and Computing Environments.

System Structures: Operating System Services-User and Operating-System Interface- systems calls- Types of System Calls- system programs- Structure of an OS - Layered Monolithic-Microkernel Operating Systems and Concept of Virtual Machine.

UNIT - II

Processes: Process, Process state, Process Scheduling,-Schedulers- Inter process Communication synchronization--Scheduling Algorithms: FCFS-SJF-Priority-RR-Message Passing

Threads: Definition, Multithreading-Advantages-ULTs,-KLTs-Thread Libraries- Difference between ULTs and KLTs.

UNIT - III

Process Synchronization: Critical Section- Mutual Exclusion- Semaphores- Monitors. Classical Problems of Synchronization: The Producer- Consumer Problem -Dinning Philosopher Problem- Reader's & Writer Problem

Deadlocks: Definition- Deadlock Characteristics- Deadlock Prevention and Deadlock Avoidance: Banker's algorithm- Deadlock detection and Recovery.

UNIT - IV

Memory Management: Main Memory-Swapping-Contiguous Memory allocation Paging-Segmentation.

Virtual memory: Basics of Virtual Memory- Demand paging-Page-replacement- Page Replacement algorithms-Thrashing.

Disk scheduling: Overview of Mass Storage Structure- FCFS- SSTF- SCAN- C-SCAN- Disk Management.

UNIT - V

File Management: Concept of File- Access methods-File types-File operation-Directory structure-File System structure- Allocation methods (contiguous, linked, indexed)- Free- space management (bit vector, linked list, grouping)

Protection & Security: Goals of Protection- Principles of Protection- Domain of Protection- Access matrix- Authentication - Threats- Intruders- Basics of Cryptography- Secret key-public key- One-Way Function- Digital Signature.

TEXT BOOKS

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, *Operating System Concepts*, Wiley, Eight Edition.
2. Andrew S Tanenbaum, *Modern Operating Systems*, Pearson Education International, Third Edition.

REFERENCES

1. Charles Crowley, *Operating System: A Design-oriented Approach*, Irwin Publishing, 1st Edition.
2. Gary J. Nutt, *Operating Systems: A Modern Perspective*, Wesley, 2nd Edition.
3. Maurice Bach, *Design of the Unix Operating Systems*, Prentice-Hall of India, 8th Edition.

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(20CS0511) PYTHON PROGRAMMING

COURSE OBJECTIVES

The objectives of this course:

1. *Introduce Scripting Language*
2. *Exposure to various problem solving approaches of computer science*
3. *Introduce function-oriented programming paradigm*
4. *Exposure to solve the problems using object oriented concepts, exceptional handling*
5. *Exposure to solve the problems using Files, Regular Expressions and, Standard Libraries*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Solve the problems using control structures, input and output statements.*
2. *Summarize the features of lists, tuples, dictionaries, strings and files*
3. *Experience the usage of standard libraries, objects, and modules*
4. *Solve the problems using Object Oriented Programming Concepts*
5. *Build the software for real time applications using python*

Install various Python packages

UNIT – I

Introduction: History of Python- Python features- Applications-Programming Using the REPL-Running Python Scripts-Variables – Assignment- Keywords- Input-Output- Indentation.

Data Types: Single-Value data types - int, float, Complex and Boolean.

Multi-Valued Data types - Lists, Tuples, Sets, Dictionaries, Strings- indexing and slicing.

UNIT – II

Operators and Expressions: Operators-Arithmetic Operators, Comparison Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators- Expressions and order of evaluations

Control Flow: Branching- simple if, if-else, if-elif-else, nested if, looping-while and for-jumping – break- continue and pass

UNIT – III

Functions: Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions-Nested functions, Recursive functions- Scope of the Variables in a Function.

Object Oriented Programming in Python: Classes and Objects- self-variable- Methods – Constructor- Inheritance-polymorphism- Method Overloading- Method Overriding.

UNIT – IV

Modules: Creating modules, import statement, from...import statement and name spacing.

Python packages: Introduction to PIP- Installing Packages via PIP (Numpy, Pandas, MatPlotlib etc.,)- Using Python Packages.

Exception Handling: Introduction to Errors and Exceptions, Handing Exceptions, Raising Exceptions, User Defined Exceptions, Regular Expressions-Searching and Matching.

UNIT – V

Functional Programming: Iterators and Generators - Maps and Filters.

Files: Text files- Reading and Writing files- Command line arguments.

Brief Tour of the Standard Library: Dates and Times- Data Compression- Python Runtime Services- Data Management and Object Persistence.

GUI Programming - Turtle Graphics

TEXT BOOKS

1. Reema Thareja, *Python Programming: Using Problem Solving Approach,* First Edition, Oxford University Press.
2. Vamsi Kurama, *Python Programming: A Modern Approach,* Pearson.

REFERENCES

1. Mark Lutz , *Learning Python*, O Reily, 4th Edition, 2009.
2. Tim Hall and J-P Stacey , *Python 3 for Absolute Beginners*, 2009.
3. Magnus Lie Hetland , *Beginning Python: From Novice to Professional*, 2nd Edition, 2009.

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(20CS0508) DATABASE MANAGEMENT SYSTEMS LAB

COURSE OBJECTIVES

The objectives of this course

1. *Illustrate the different issues involved in the design and implementation of a database system.*
2. *Use data manipulation language to query, update, and manage a database.*
3. *Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.*

COURSE OUTCOMES (COs)

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

1. *Develop relational algebra expressions for queries and optimize them.*
2. *Design the databases using E_R method for a given specification of requirements.*
3. *Apply Normalization techniques on given database.*
4. *Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system.*
5. *Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.*
6. *Execute DDL, DML, DCL commands.*

LIST OF EXPERIMENTS:

1. Practice session: Students should be allowed to choose appropriate DBMS software, install it, configure it and start working on it. Create sample tables, execute some queries, use SQLPLUS features, and use PL/SQL features like cursors on sample database. Students should be permitted to practice appropriate User interface creation tool and Report generation tool.
2. DDL Commands – Table Creation, Altering the table structures, truncating a table and dropping a table.
3. DML Commands – Insert, Select Commands, update & delete Commands.
4. Create relationship between the databases – Nested Queries & Join Queries
5. Create a database and to set various possible constraints.
6. Views – Create a Virtual table based on the result set of an SQL statement.
7. Create PL/SQL functions to implement the stored procedures in SQL (Function and Procedures).
8. Write a PL/SQL program using For loop to insert ten rows into a database table.
9. Write Relational algebra queries for a given set relations.
10. Write a PL/SQL program to execute a number of queries in one block using single command.

TEXT BOOK

1. Raghu Ramakrishnan, Johannes Gehrke, Jeff Derstadt, Scott Selikoff and Lin Zhu, *Database Management Systems solutions manual*, third Edition, 2013.

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(20CS0510) OPERATING SYSTEMS LAB

COURSE OBJECTIVES

The objectives of this course:

1. B*uild 'C' program for process and file system management using system calls*
2. *Analyze the best CPU scheduling algorithm for a given problem instance*
3. *Analyze the performance of various page replacement algorithms*
4. D*evelop algorithm for deadlock avoidance, detection and file allocation strategies*
5. S*imulate frame allocation to process*

COURSE OUTCOMES (COs)

On successful completion of this course, students will be able to:

1. *Understand and implement basic services and functionalities of the operating system using system calls*
2. *Use modern operating system calls and synchronization libraries in software/ hardware interfaces*
3. *Understand the benefits of thread over process and implement synchronized programs using multithreading concepts*
4. *Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority*
5. *Implement memory management schemes and page replacement schemes*
6. *Understand the concepts of deadlock in operating systems and implement them in multiprogramming system.*

LIST OF EXPERIMENTS:

1. Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time.
   a) FCFS b) SJF c) Round Robin (pre-emptive) d) Priority
2. Write a C program to simulate producer-consumer problem
3. Write a C program to simulate the concept of Dining-Philosophers problem.
4. Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.
5. Write a C program to simulate Bankers algorithm for the purpose of deadlock prevention.
6. Write a C program to simulate the MVT and MFT memory management techniques
7. Write a C program to simulate paging technique of memory management.
8. Write a C program to simulate the following file allocation strategies.
   a) Sequential b) Indexed c) Linked
9. Write a C program to simulate the following file organization techniques
   a) Single level directory b) Two level directory c) Hierarchical
10. Write a C program to simulate page replacement algorithms
    a) FIFO b) LRU c) LFU

11. Simulate how operating system allocates frame to process.

TEXT BOOKS

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, *Operating System Concepts*, Wiley, Eighth Edition.
2. Andrew S Tanenbaum, *Modern Operating Systems*, Pearson Education International, 3rd Edition.

REFERENCES

1. Charles Crowley, *Operating System: A Design-oriented Approach*, Irwin Publishing, 1st Edition.
2. Gary J. Nutt, *Operating Systems: A Modern Perspective*, Wesley, 2nd Edition.
3. Maurice Bach, *Design of the Unix Operating Systems*, Prentice-Hall of India, 8th Edition.

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(20CS0514) PYTHON PROGRAMMING LAB

COURSE OBJECTIVES

The Objectives of this course:

1. *Exposure to various problem solving approaches of computer science*
2. *Learn how to carry out a range of commonly used statistical methods including analysis of variance and linear regression.*
3. *Explore data-sets to create testable hypotheses and identify appropriate statistical tests.*

COURSE OUTCOMES (COs)

On successful completion of the course students will be able to

1. *Write, Test and Debug Python Programs*
2. *Implement Conditionals and Loops for Python Programs*
3. *Create functions and represent Compound data using Lists, Tuples and Dictionaries*
4. *Develop python program to Read and write data from & to files using Pygame*
5. *Build software for real needs.*
6. *Implement real life Project, implementing R Analytics to create Business insights.*

LIST OF EXPERIMENTS:

1. Implement the following tasks
   a) Write a python program to check whether the number is positive or negative.
   b) Write a python program to find whether a given number is even or odd.
   c) Write a python program to find biggest number among three numbers.
2. Implement the following tasks
   a) Write a python program to displaying reversal of a number.
   b) Write a python program to print factorial of a number
   c) Write a python program to generate prime numbers series up to N
3. Implement following problems using python script
   a)Swapping of two number with and without using temporary variable.
   b) If the age of Ram, Sam, and Khan are input through the keyboard, write a python program to determine the eldest and youngest of the three.
   c) Arithmetic operations (Addition, Subtraction, Multiplication, and Division) on integers. Input the two integer values and operator for performing arithmetic Operation through keyboard.
4. Implement the following tasks
   a) Implement the python program to generate the multiplication table.
   b) Implement Python program to find sum of natural numbers
   c) If the first name of a student is input through the keyboard, write a program to display the vowels and consonants present in his/her name.

5. Implement the following tasks
   a) The marks obtained by a student in 5 different subjects are input through the keyboard. Find the average and print the student grade as per the SIETK examination policy
   b) Given a number x, determine whether it is Armstrong number or not. Hint: For example,371 is an Armstrong number since 3**3 + 7**3 + 1**3 = 371. Write a program to find all Armstrong number in the range of 0 and 999.
6. Implement the following tasks
   a) Write a Python script to
      - create a list
      - access elements from a list
      - slice lists
      - change or add elements to a list
      - delete or remove elements from a list

   b) Write a Python script to read the values from a list and to display largest and smallest numbers from list.
   c) Write a Python script to compute the similarity between two lists.
7. Implement the following tasks:
   a) Write a Python script to read set of values from a Tuple to perform various operations.
   b) Write a Python script to perform basic dictionary operations like insert, delete and Display.
   c) Write a Python program to count the occurrence of each word in a given sentence.
8. Implement the following tasks
   a) Write a Python script to create Telephone Directory using dictionary and list to perform basic functions such as Add entry, Search, Delete entry, Update entry, View and Exit.
   b) Implement Python script to display power of given numbers using function.
   c) Implement a Python program that takes a list of words and returns the length of the longest one using function.
9. Implement the following tasks
   a) Implement Python program to perform various operations on string using string libraries.
   b) Implement Python program to remove punctuations from a given string.
   c) Write a Python program to change the case of the given string (convert the string from lower case to upper case). If the entered string is “computer”, your program should output “COMPUTER” without using library functions.
10. Implement the following tasks
    a) Implement Python program to capitalize each word in a string. For example, the entered sentence “god helps only people who work hard” to be converted as “God Helps Only People Who Work Hard”
    b) Write a Python script to display file contents.
    c) Write a Python script to copy file contents from one file to another.

11. Implement the following tasks
    a) Write a Python script to combine two text files contents and print the number of lines, sentences, words, characters and file size.
    b) Write a Python commands to perform the following directory operations.
        - List Directories and Files
        - Making a New Directory
        - Renaming a Directory or a File
        - Removing Directory or File
12. Implement the following tasks
    a) Create a package named Cars and build three modules in it namely, BMW, Audi and Nissan. Illustrate the modules using class. Finally we create the __init__.py file. This file will be placed inside Cars directory and can be left blank or we can put the initialization code into it.
    b) Write a python script to display following shapes using turtle.

TEXT BOOKS

1. Reema Thareja, *Python Programming: Using Problem Solving Approach*, First Edition, Oxford University Press.
2. Vamsi Kurama, *Python Programming: A Modern Approach*, Pearson.

REFERENCES

1. Mark Lutz , *Learning Python*, O Reily, 4th Edition, 2009.
2. Mark Lutz , *Programming Python* , O Reily, 4th Edition, 2010.
3. Tim Hall and J-P Stacey , *Python 3 for Absolute Beginners*, 2009.
4. Magnus Lie Hetland , *Beginning Python: From Novice to Professional*, 2nd Edition, 2009.
5. Michael T. Goodrich , Roberto Tamassia, Michael H. Goldwasser, *Data Structures and Algorithms in Python*,1st Edition , Kindle.

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(20HS0864) HUMAN VALUES AND PROFESSIONAL ETHICS (MANDATORY COURSE)

COURSE OBJECTIVES

The Objective of the course:

1. *Create awareness on Human Values.*
2. *Impart knowledge on an Engineering Ethics*
3. *Install morality, accountability in an engineering experimentation*
4. *Create awareness on an assessment of safety, risk and rights*
5. *Develop knowledge on global issues*
6. *Create an awareness on Human Values and Engineering Ethics, Engineers social responsibility in an experimentation, appreciate the rights of others and ethics in global issues.*

COURSE OUTCOMES

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

1. *Identify and analyse human values in their relevant field*
2. *Assess their own engineering ethics and have the social consciousness*
3. *Get knowledge on codes of ethics and on a utilitarian thinking*
4. *Identify safety, risks and an ethical concern in research and intellectual contexts*
5. *know necessity of computer and an environmental ethics, give a picture on weapons development*
6. *Upon completion of the course, the student should be able to apply the ethics in society, discuss an ethical issue related to engineering and realize the responsibilities and rights in the society*

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UNIT I

Human Values - Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Necessity of Yoga and meditation for professional excellence and stress management.

UNIT II

Engineering Ethics - Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

UNIT III

Engineering As Social Experimentation- Engineering as Experimentation--Engineering Projects VS. Standard Experiments, Engineers as responsible Experimenters–Conscientiousness-Comprehensive Perspective - Moral Autonomy - Accountability, Industrial Standards, Codes of Ethics – A Balanced Outlook on Law.

UNIT IV

Safety, Responsibilities and Rights- Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk, Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT V

Global Issues-Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility

TEXTBOOKS

1. R S Nagarajan, *Professional Ethics and Human Values*, New Age International (P) Limited Publishers,3rd Edition,2006
2. M.Govindarajan, S.Natarajananad, V.S.SenthilKumar,*Engineering Ethics includes Human Values* -PHI Learning Pvt. Ltd- 2nd Edition,2009

REFERENCES

1. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, *Engineering Ethics – Concepts and Cases*, Cengage Learning, 2nd Edition, 2009
2. John R Boatright, *Ethics and the Conduct of Business*, Pearson Education, New Delhi, 1st Edition,2003
3. Edmund G Seebauer and Robert L Barry, *Fundamentals of Ethics for Scientists and Engineers*, Oxford University Press, Oxford, 4th Edition,2001
4. PSR Murthy, *Indian Culture, Values and Professional Ethics*, BS Publication, 2nd Edition, 2013

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(20CS0546) VISUAL EFFECTS-VFX
(SKILL ORIENTED COURSE)

COURSE OBJECTIVES

The objectives of this course

1. *Visual Effects Course (VFX Course) is a career Program catering to the increasing demand of skilled and quality manpower for the thriving domestic and International VFX industry.*
2. *This course is aimed at equipping students with the basic and fundamental knowledge needed for creating high end industry standard Visual effects that cannot necessarily be captured in a Camera Shot.*
3. *The VFX Course is a course that would help Multimedia Students understand the basic concepts of Visual Effects and how to use Video Editing software to obtain seamless shots and create internationally standard projects*

COURSE OUTCOME

Students will be able to

1. *Understand the major video editing software such as Final Cut pro, Adobe premiere pro and Nuke*
2. *Create internationally standard Motion Graphics project for Television stations and Web Media*
3. *Develop the footages into several standard formats of Television, film, Documentary, Commercials or Music Videos*
4. *Design a 3D object with real life footages*
5. *Compose stunning, crisp and realistic Visual effects*
6. *Implement the models in visual effects*

CONTENTS

1. Introduction to Photoshop, Installation of Adobe Photoshop 7.0 freeware
2. Photoshop Basic Operations
3. Using Layers, Masks and Paths
4. Fine Tuning your image, Prepping images for the web
5. Visual Effects: Set Up Your VFX Content Development Workstation
6. The Foundation of Raster for VFX: Pixels, Color, and Alpha
7. The Foundation of Motion for VFX: Frames and Codecs
8. The Foundation of Audio for VFX: MIDI, Wave, and Sample
9. The Foundation of 2D Vector for VFX: Point, Path, and SVG
10. The Foundation of 3D Vector for VFX: Models and OpenGL
11. Professional VFX Software: Blackmagic Design Fusion

TEXT BOOKS

1. Steve Bark, *"An Introduction to Adobe Photoshop"*, published by Ventus Publishing ApS, 2012.
2. Wallace Jaackson, "*VFX Fundamentals – Visula Special Effects using Fusion 8.0*", published by Apress, 2012.
3. Martin Watt And Erwin Coumans "*Visual Effects and Compositing*", Jon Gress.

REFERENCES

1. Karen E. Goulekas, "*Visual Effects in A Digital World*".
2. David B. Mattingly "*The Digital Matte Painting Handbook*".
3. Kelly, Murdock & Eric Allen "*Body Language Advanced 3d Character Rigging*".

WEB REFERENCES

1. http://www.luv2code.com/#_blank
2. http://www.wallacejackson.com/
3. http://chrisoatley.com/upcoming2015/
4. https://thewaltdisneycompany.com/employee-profile-spotlight-on-avisualdevelopment-artist-2/
5. http://www.artofvfx.com/escape-plan-chris-wells-vfx-supervisor-hydraulx/
6. http://conceptartworld.com/artists/interview-with-visual-development-artistlandis-fields/
7. https://vfxforfilm.wordpress.com/2013/01/03/mattepainting/
8. http://bct.me/tutorials/vfx-supervision-1/
9. https://www.pluralsight.com/blog/film-games/understanding-rotoscoping-process-every-vfx-artist-know
10. https://cmivfx.com/products/410-cinema-4d-advanced-lighting-and-rendering

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(20HS0836) DISCRETE MATHEMATICS

COURSE OBJECTIVES

The objectives of this course

1. *To train the students thoroughly in Mathematical concepts of Mathematical logic, Relations, Algebraic structures, Recurrence Relation, Graph Theory.*
2. *To prepare students for lifelong learning and successful careers using Mathematical concepts of Mathematical logic, Relations, Algebraic structures, Recurrence Relation, Graph Theory.*
3. *To develop the skill pertinent to the practice of the Mathematical concepts including the students' abilities to formulate and modeling the problems, to think creatively and to synthesize information.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Write an argument using logical notation and determine if the argument is or is not valid.*
2. *Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.*
3. *Understand the basic principles of sets and operations in sets.*
4. *Demonstrate an understanding of relations and functions and be able to determine their properties.*
5. *Determine when a function is 1-1 and "onto".*
6. *Demonstrate different traversal methods for trees and graphs.*
7. *Model problems in Computer Science using graphs and trees.*

UNIT-I

Graph Theory:

Representation of Graphs, Sub graphs, Multi graphs, Graph Theory Applications: Basic Concepts Isomorphism. Euler circuits, planar Graphs, Hamiltonian graphs, Chromatic Numbers, Spanning Trees, DFS, BFS.

UNIT-II

Mathematical Logic:

Statements and notations, Connectives, Truth Tables, Well-formed formulae, tautology, equivalence implication, Rules of inference, Consistency, proof of Contradiction, Normal forms.
Predicates: Predicative logic, Free & Bound variables, Quantifiers, Rules of inference, Automatic Theorem Proving.

UNIT-III

Relations:

Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations.

Functions: Inverse Function, Composition of functions, recursive Functions.

Algebraic structures: Algebraic systems examples and general properties, Semi groups and monoids, groups, sub groups, homomorphism, Isomorphism.

UNIT-IV

Elementary Combinatorics:

Basis of counting, Enumerating Combination & Permutation with repetition, Constrained repetitions, Binomial & Multinomial theorems (without proof), Binomial Coefficients, The principle of Inclusion & Exclusion - Pigeon hole principle and its application.

UNIT-V

Recurrence Relation:

Generating Functions & Sequences, Calculating Coefficient of generating function, Recurrence relations, Solving Recurrence relation by substitution and Characteristic roots, solution of Inhomogeneous Recurrence Relation. Solving Recurrence relation by Generating function.

TEXT BOOKS

1. Thomas Koshy, *Discrete Mathematics with Applications*, Elsevier, 2004.
2. Chandra Sekharaiah D.S, *Mathematical Foundations of computer Science (Discrete Structures)*, Prism, 2012.

REFERENCES

1. Liu C.L & Mohapatra D.P, *Elements of Discrete Mathematics*- A Computer Oriented Approach, 3rd edition, McGraw Hill Education, 2012.
2. Mott J.L, Kandel A & Baker T.P, *Discrete Mathematics for Computer Scientists & Mathematicians*, 2nd edition, Prentice Hall of India , 2008.
3. Tremblay J.P and Manohar R, *Discrete Mathematical Structures with Application to Computer Science*, McGraw Hill Publication, 2017.
4. Satyanarayana Bh & Syam Prasad K, *Discrete Mathematics and Graph Theory*, Printice Hall of India, New Delhi, April 2014, ISBN: 978-81-203-4948-3.
5. Satyanarayana Bh, Venkata Pradeep Kumar T & Mohiddin Shaw S, *Mathematical Foundation of Computer Science*, BS Publications (A unit of BSP Books Pvt. Ltd.), Hyderabad, India, 2016, ISBN: 978-93-83635-81-8.

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(20CS0901) FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

The objective of the course is to

1. *To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language*
2. *To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs*
3. *To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning*

COURSE OUTCOMES

On successful completion of the course, the students will be able to

1. *Outline problems that are amenable to solution by AI methods*
2. *AI methods may be suited to solving a given problem*
3. *Apply the language/framework of different AI methods for a given problem*
4. *Implement basic AI algorithms- standard search algorithms or dynamic programming*
5. *Design and carry out an empirical evaluation of different algorithms on problem formalization*
6. *State the conclusions that the evaluation supports related to Expert Systems*

UNIT I

Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

UNIT II

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction. Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

UNIT-III

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

UNIT IV

Knowledge Representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames. Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web

UNIT V

Expert System and Applications: Introduction phases in building expert systems, expert system versus traditional systems Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory

TEXT BOOKS

1. *Artificial Intelligence*- Saroj Kaushik, CENGAGE Learning

2. *Artificial intelligence, A modern Approach*, 2nded, Stuart Russel, Peter Norvig, PEA References

REFERENCES

1. *Artificial Intelligence*- Deepak Khemani, TMH, 2013

2. *Introduction to Artificial Intelligence*, Patterson, PHI

3. *Artificial intelligence, structures and Strategies for Complex problem solving*, -George F Lugar, 5thed, PEA

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(20EC0416) MICROPROCESSORS AND MICROCONTROLLERS

COURSE OBJECTIVES

The objective of the course is to

4. *To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language*
5. *To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs*
6. *To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning*

COURSE OUTCOMES

On successful completion of the course, the students will be able to

7. *Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem*
8. *Apply the language/framework of different AI methods for a given problem*
9. *Implement basic AI algorithms- standard search algorithms or dynamic programming*
10. *Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports*

UNIT I

Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

UNIT II

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction. Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

UNIT-III

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

UNIT IV

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames. Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web

UNIT V

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory

TEXT BOOKS

1. *Artificial Intelligence*- Saroj Kaushik, CENGAGE Learning

2. *Artificial intelligence, A modern Approach* , 2nded, Stuart Russel, Peter Norvig, PEA References

REFERENCES

1. *Artificial Intelligence*- Deepak Khemani, TMH, 2013

2. *Introduction to Artificial Intelligence*, Patterson, PHI

3. *Atificial intelligence, structures and Strategies for Complex problem solving*, -George F Lugar, 5thed, PEA

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(20CS0506) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

COURSE OBJECTIVES

The objectives of this course to

1. *Explain formal definitions of machine models.*
2. *Classify machines by their power to recognize languages and understanding of formal grammars, analysis.*
3. *Illustrate hierarchical organization of problems depending on their complexity.*
4. *Explain logical limits to computational capacity.*
5. *Describe decidable and un-decidable problems.*

COURSE OUTCOMES (COs)

On successful completion of the course, students will be able to

1. *Compare, understand and analyze different languages, grammars, Automata and Machines and appreciate their power and convert Automata to Programs and Functions.*
2. *Construct finite Automats for various problems.*
3. *Design automata, regular expressions and context-free grammar accepting and generating a certain language, design of new grammar and languages.*
4. *Define Pushdown Automata performing simple tasks and equivalence of PDA and CFGs.*
5. *Find solutions to the problems using Turing machines.*
6. *Distinguish between computability, decidability and un-decidability problems.*

UNIT – I

Introduction: Basics of set theory, Relations on sets, Alphabet, Strings, languages and grammars, Chomsky hierarchy of languages.

Finite Automata: History of Automata theory, Characteristics of Automata, Graphical notation of FA, DFA and NFA, Conversion of an NFA to DFA, NFA with ϵ(null)Move, Equivalence of DFA and NFA, Finite Automata with Output, Conversion from Moore to Mealy and Mealy to Moore Machine, Minimization of Finite Automata, Myhill-Nerode Theorem, Applications and Limitations of FA.

UNIT-II

Regular Languages: Basics of Regular Expressions, Identities of Regular Expressions, The Arden's Theorem, Construct RE from FA, Construct FA from RE, Equivalence of Two FAs, Equivalence of Two REs, Regular grammars, Pumping Lemma for RLs, Applications of Pumping Lemma, Closure properties of Regular Sets, Applications of Regular Expressions.

UNIT-III

Context Free Grammar: Definition, Derivation trees, Ambiguity in CFG, Left recursion and Left factoring, Simplification of CFGs, Chomsky Normal Form and Greibach Normal Form, Pumping lemma for Context-free languages, Closure properties of CFLs.

UNIT-IV

Push Down Automata (PDA): The Formal Definition, Graphical Notation, Instantaneous Description, The Languages of a PDA, Equivalence of PDAs and CFGs, Deterministic Push Down Automata, Non-Deterministic Push Down Automata.

UNIT-V

Turing Machines and Undecidability: The basic model of Turing Machine(TM), Instantaneous Description, Variants of Turing Machines, Conversion from RE to TM, LBA, Universal Turing Machine, Recursive and Recursively Enumerable Languages, PCP.

TEXT BOOKS

1. Shyamalendu Kandar, *Introduction to Automata Theory, Formal Languages and Computation*, Pearson, 1st Edition, 2013.
2. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, *Introduction to Automata Theory, Languages, and Computation*, Pearson Education Asia, 3rd Edition, 2014.

REFERENCES

1. Harry R. Lewis and Christos H. Papadimitriou, *Elements of the Theory of Computation*, Pearson Education Asia.
2. Dexter C. Kozen, *Automata and Computability, Undergraduate Texts in Computer Science*, Springer.
3. Michael Sipser, *Introduction to the Theory of Computation*, PWS Publishing.
4. John Martin, *Introduction to Languages and The Theory of Computation*, Tata McGraw Hill.

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(20CS0513) COMPUTER NETWORKS

COURSE OBJECTIVES

The objectives of this course:

1. *Build an understanding of the fundamental concepts of computer networking.*
2. *Understand how errors detected and corrected that occur in transmission*
3. *How collisions to be handled when many stations share a single channel*
4. *Know about routing mechanisms and different routing protocols*
5. *Understand transport layer functions*
6. *Know about different application layer protocols*

COURSE OUTCOMES

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

1. *Understand the terminology and concepts of OSI and TCP/IP Reference models and identify different physical media used for data transmission*
2. *Explain and implement the services of Data link layer*
3. *Describe the principles of network layer and implement routing algorithms used for data transmission*
4. *Demonstrate the essential services of transport layer*
5. *Contrast the functioning of various protocols of Application layer*
6. *Illustrate the principles of networking*

UNIT - I

Introduction: Networks, Network criteria, Physical structures - Reference Models: The OSI Reference Model, The TCP/IP Reference Model- Introduction to physical layer: Data and Signals, Data rate limits, Performance.

Transmission Media: Introduction,-Guided Media, -Unguided Media.

UNIT - II

Introduction to Data Link Layer: Introduction, Link layer addressing- Error detection and Correction: Cyclic codes, Checksum

Data link control: DLC Services- Data link layer protocols, HDLC, Point to Point Protocol- Media Access control:-Random Access -Controlled Access- Channelization

UNIT - III

The Network Layer: Network layer design issues- Routing algorithms - Congestion control algorithms - Quality of service- Internetworking- The network layer in the Internet: IPV4 -IPV6, Internet Control protocols- OSPF- BGP.

UNIT - IV

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

UNIT - V

Introduction to Application Layer: Introduction, WWW and HTTP – FTP - E-mail- TELNET - Secure Shell - Domain Name System - SNMP.

TEXT BOOKS

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

REFERENCES

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

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(20HS0812) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

COURSE OBJECTIVES

The objectives of this course:

1. *To familiarize the students with the concepts of microeconomics and make them understand the concept of demand and supply analysis in business applications*
2. *To understand the pricing and output decisions under different market structures*
3. *To understand the basic financial statements and techniques of financial statement analysis*

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

1. *Understand the nature of managerial economics and the role of it in business firms*
2. *Identify the determinants of demand and apply cost analysis under different market conditions*
3. *Integrate the concepts of price and output decisions of business firms*
4. *Appreciate the importance of market structures and implement appropriate price and output decisions*
5. *Assess the financial statements of a firm and the financial performance of the firm through the financial statements*
6. *Measure operating, investing and financial performance of a firm*

UNIT-I

Introduction To Managerial Economics - Managerial Economics - Definition, nature and scope – contemporary importance of Managerial Economics - Demand Analysis: Determinants- Law of Demand - Elasticity of Demand. Significance –Types – measurement of elasticity of demand - Demand forecasting- factors governing demand Forecasting- methods of demand forecasting –Relationship of Managerial Economics with Financial Accounting and Management.

UNIT-II

Theory Of Production and Cost Analysis -Production Function – Short-run and long-run production - Isoquants and Isocosts, MRTS, least cost Combination of inputs - Cobb-Douglas production function - laws of returns - Internal and External Economies of scale .

Cost Analysis: Cost concepts - Break-Even Analysis (BEA) – Managerial Significance and limitations of BEA - Determination of Break Even Point (Simple Problems).

UNIT-III

Introduction to Markets and New Economic Environment - Market structures: Types of Markets - Perfect and Imperfect Competition - Features, Oligopoly -Monopolistic competition. Price-Output determination - Pricing Methods and Strategies - New Economic Environment- Economic systems – Economic Liberalization – Privatization and Globalization

UNIT-IV

Capital and Capital Budgeting - Concept of Capital - Over and under capitalization – Remedial measures - Sources of Short term and Long term capital - Estimating Working Capital requirement – Capital budgeting – Features of Capital Budgeting proposals – Methods and Evaluation of Capital budgeting – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

UNIT-V

Introduction to Financial Accounting and Analysis - Financial Accounting – Concept - emerging need and importance - Double-Entry Book Keeping-Journal - Ledger – Trial Balance - Financial Statements - - Trading Account – Profit & Loss Account –Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Techniques – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

TEXT BOOKS

1. *Managerial Economics and Financial Analysis* Aryasri:, 4/e, TMH,2009.
2. *Managerial Economics* Varshney&Maheswari:, Sultan Chand,2009.

REFERENCES

1. *Financial Accounting and Analysis* PremchandBabu, Madan Mohan:,Himalaya, 2009
2. *Managerial Economics and Financial Analysis* S.A. Siddiqui and A.S. Siddiqui:,New Age International,.2009.
3. *Principles of Business Economics, Pearson* Joseph G. Nellis and David Parker:,2/e, New Delhi.
4. *Managerial Economics in a Global Economy* Domnick Salvatore:,Cengage,2009.
5. *Managerial Economics* H.L.Ahuja:, S.Chand, 3/e,2009

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(20CS0902) ARTIFICIAL INTELLIGENCE LAB

COURSE OBJECTIVES

The objective of the course is to

1. *To provide a basic foundation on python Tool.*
2. *To Build various applications of AI such as Back propagation algorithm, Hangman game.*
3. *Explore the scope, advantages as well as limitations of intelligent systems.*
4. *Experiment with different machine learning concepts such as Deep Learning and Reinforcement Learning*
5. *To expose students to the AI-intensive computing and information system frameworks.*

COURSE OUTCOMES

On successful completion of the course, the students will be able to

1. *Identify various domains in which AI can be applied*
2. *Analyze the standard logics and algorithm of AI*
3. *Implementing the Sentiment Analysis*
4. *Classify the properties of images*
5. *Understand the python programming in various domains*

LIST OF EXPERIMENTS

1. A) Write a python program to implement List operations (Nested List, Length, Concatenation, Membership, Iteration, Indexing and Slicing)?
   b) Write a python program to implement List methods (Add, Append, Extend & Delete).
2. Write a program to implement Hangman game using python.
3. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
4. Write a python program to remove stop words for a given passage from a text file using NLTK?
5. Write a python program to implement stemming for a given sentence using NLTK?
6. Write a python program to POS (Parts of Speech) tagging for the give sentence using NLTK?
7. Write a python program to implement Lemmatization using NLTK?
8. Write a python program to for Text Classification for the give sentence using NLTK?
9. Read any image that you want and save it in gray scale. Now rotate the image that you have read. Write the image to the disk.
10. For the image given below (provided with the lab handout), apply the connected component labelling and count the total number of white objects. First threshold the images and then do connected component analysis.

REFERENCES

1. AurélienGéron, Hands on Machine Learning with Scikit-Learn and Tensor Flow [Concepts, Tools,and Techniques to Build Intelligent Systems], Published by O'Reilly Media, 2017.
2. Build an AI Assistant with Wolfram Alpha and Wikipedia in Python. **https://medium.com/@salisuwy/build-an-ai-assistant-with-wolfram-alpha-and-wikipedia-in- python-d9bc8ac838fe**
3. Joseph Howse, Prateek Joshi, Michael Beyeler - Opencv_ Computer Vision Projects with Python- Packt Publishing (2016). Curated Datasets on Kagglehttps://www.kaggle.com/datasets

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(20CS0509) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

COURSE OBJECTIVES

The objectives of this course:

1. *Illustrate software design, implementation, and testing using Java.*
2. *Introduce object-oriented design techniques and problem solving.*
3. *Emphasize development of secure, well-designed software projects that solve practical real-world problems.*
4. *Indentify the threads through multi thread programming*

COURSE OUTCOMES (COs)

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

1. *Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs*
2. *Read and make elementary modifications to Java programs that solve real-world problems*
3. *Validate input in a Java program*
4. *Identify and fix defects and common security issues in code.*
5. *Execute a Java program using Javadoc*
6. *Execute a Java program using Java Swings*

LIST OF PROGRAMS

1. Write a java program to read and write different types of data through keyboard and display them on console.
2. a) Write a java program to find Factorial of given number.
   b) Write a java program to find Fibonacci series of given number.
3. a) Write a java program to display prime number series up to N.
   b) Write a java program to find the maximum and minimum of N array elements.
4. a) Create a user defined package and import it into a java program.
   b) Write a java program to implement an interface using your own example.
5. Write a Java program that prints all real and imaginary solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula.
6. Write a java program to illustrate Constructor Overloading.
7. Write a Java program that creates three threads. First thread displays ―Good Morning, every one second, the second thread displays Hello, every two seconds and the third thread displays Welcome every three seconds.
8. Write a java program to accept a string from user and display number of vowels, consonants, digits and special characters present in each of the words of the given text.
9. Write a java program to create your own exception subclass and how to handle it.
10. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
11. Write a java program to show multiple type parameters in Java Generics.

12. Write a java program to use swings to create frame and buttons.

TEXT BOOKS

1. H.M.Dietel and P.J.Dietel, *Java How to Program*, Sixth Edition, Pearson Education/PHI.
2. Herbert Schildt, *Java-The Complete Reference*, TMH, 8th Edition.

REFERENCES

1. Y.Daniel Liang, *Introduction to Java programming*, Pearson Education, Sixth Edition.
2. Cay Horstmann,*Big Java*, Wiley Student Edition, Wiley India Private Limited, 2nd Edition.
3. J.Dean&R.Dean, *Introduction to Programming with Java*, McGraw Hill.

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(20CS0515) LINUX PROGRAMMMING LAB

COURSE OBJECTIVES

The objective of the course is to

1. *To demonstrate the basic knowledge of Linux commands and file handling utilities by using Linux shell environment.*
2. *To evaluate the concept of shell scripting programs.*
3. *To create the directory, how to change and remove the directory.*
4. *Use the following Bourne Shell constructs: test, if then, if then else, if then elif, for, while, until, and case.*
5. *Demonstrate how to use the following Bourne Shell commands: cat, grep, ls, more, ps, chmod etc.,*
6. *Make a Shell script executable.*

COURSE OUTCOMES (COs)

On successful completion of the course, the students will be able to

1. *Understand and make use of various LINUX commands*
2. *Create file systems and directories and operate them*
3. *Explain LINUX commands and shell programs*
4. *Demonstrate the inner workings of LINUX-like operating systems.*
5. *Write Regular expressions for pattern matching and apply them to various filters for a specific task*
6. *Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem*

LIST OF EXPERIMENTS

1. Demonstrate the following commands
   i. Date Command
   ii. Calendar Command
   iii. Basic Calculator Commands
   iv. Print Command
   v. Script Command
   vi. Manual Command
2. i. Use the appropriate command to determine your login shell
   ii. Use the /etc/passwd file to verify the result of step i.
   iii. Use the who command and redirect the result to a file called myfile1. Use the more command to see the contents of myfile1.
   iv. Use the date and who commands in sequence (in one line) such that the output of date will display on the screen and the output of who will be redirected to a file called myfile2. Use the more command to check the contents of myfile2.

3. Demonstrate the following Commands
   i. To create directory
   ii. To change directory permission
   iii. To create sub directory
   iv. To delete directory
   v. To list the files and directories
4. Demonstrate the following
   i. Use vi editor to create a file called myfile.txt
   ii. open the file created
   iii. Add some text
   iv. Change some text
   v. Delete some text
   vi. Apply Cursor move commands
   vii. Save the Changes
5. Demonstrate the following
   i. Use the cat command to create a file containing the following data. Call it student_data use tabs to separate the fields.

   101 Ravi 15.65
   102 Ramu 26.27
   103 Sita 36.15
   104 Raju 21.86

   ii. Use the cat command to display the file, student_data.
   iii. Use the vi command to correct any errors in the file, student_data
   iv. Use the sort command to sort the file student_data according to the first field. Call the sorted file my table
   v. Print the file student_data
   vi. Use the cut and paste commands to swap fields 2 and 3 of student_data. Call it my table (same name)
   vii. Print the new file, student_data.
6. i. Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else.
   ii. Write a shell script that accepts one or more file name as arguments and converts all of them to uppercase, provided they exist in the current directory.
7. i. Write a shell script that accepts a file name starting and ending line numbers as arguments and displays all the lines between the given line numbers.
   ii. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
8. i. Write a shell script that computes the gross salary of a employee according to the following rules:
   a) If basic salary is < 1500 then HRA =10% of the basic and DA =90% of the basic.
   b) If basic salary is >=1500 then HRA =Rs500 and DA=98% of the basic
   The basic salary is entered interactively through the key board.
   ii. Write a shell script that accepts two integers as its arguments and computers the value of first number raised to the power of the second number.

TEXT BOOKS

1. N.Matthew,R.Stones, Wrox, *Beginning Linux Programming*, 4 th Edition, Wily India Edition.
2. N.B.Venkateswarlu, *Advanced Unix Programming*, BS Publications.

REFERENCES

1. M.G.Venkatesh Murthy, *Unix & Shell Programming*, Pearson Education
2. Ellie Quigley, *Unix shells by example*,4th Edition, Pearson Education.

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(20CS0547) ANIMATION DESIGN
(SKILL ORIENTED COURSE)

COURSE OBJECTIVES

The objective of the course is

1. *To enable the students to be multimedia literates, which will prepare them to actively participate in various media related activities for strengthening their skills?*
2. *The Course will have scope for skill development in the field of Electronics and Print Media Production, which in turn make them employable in the media industry.*

COURSE OUTCOMES

Students will be able to

1. *Understand fundamentals of animations and present a visual concept to a target audience.*
2. *Design and implementation of animation projects.*
3. *Develop and execute believable animation sequences.*
4. *Create animation sequences that employ basic cinematography principles.*
5. *Apply performance theory to the creation of animation. Produce layouts and backgrounds with attention to composition, perspective and color.*
6. *Describe computer skills and appropriate digital asset management techniques to function effectively within a production pipeline.*

CONTENTS

1. Introduction to Animation, Traditional Animation, Stop Motion Animation, 3D and 2D Animation
2. Installation of Blender Software
3. Blender Interface, Working with Viewports (windows), Creating and Editing Objects
4. Blender Render Engines, Materials and Textures, Setting Up a World, Lighting and Cameras, Render Settings
5. Ray-Tracing (mirror, transparency, shadows), Animation Basics, Adding 3D Text
6. NURBS and Meta Shape Basics, Modifiers, Particle Systems and Interactions
7. Child-Parent Relationships, Working With Constraints, Armatures (bones and skeletons) Relative Vertex Keys (shape keys), Object Physics
8. Creating Springs, Screws, Gears and other Add-On Shapes
9. Video Motion Tracking, Game Engine Basics (real-time animation), Video Sequence Editor
10. Production Pipeline, Pre-Production and Storyboarding

TEXT BOOK

1. James Chronister,*"Blender Basics – Classroom Tutorial Book"*, published by Blender Nation, 5th Edition, 2017.

REFERENCES

1. SteveRoberts ,*Character Animation Fundamentals*: *Developing Skills for 2D and 3D Character.*
2. KitLaybourne *The Animation Book: A Complete Guide to Animated Filmmaking--from Flip-books to Sound Cartoons to 3-D Animation*

WEB REFERENCES

1. http://www.digitaltutors.com/subject/2d-animation-tutorials
2. http://webneel.com/2d-animation-best
3. http://www.lynda.com/Flash-Professional-tutorials/2D-Animation-Principles/158769-2.html
4. http://en.wikipedia.org/wiki/Traditional_animation
5. http://animate-it.com/get-animating/how-to-create-a-hand-drawn-animated-movie/
6. http://en.wikipedia.org/wiki/Cinemagraph
7. http://www.tripwiremagazine.com/2011/07/cinemagraphs.html
8. http://giphy.com/search/cinemagraph
9. https://www.open-of-course.org/courses/course/view.php?id=84
10.http://www.cdschools.org/blenderbasics

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(20CS0903) AUTOMATA THEORY AND COMPILER DESIGN

COURSE OBJECTIVES

The objectives of the Course**:**

1. *Describe formal definitions of machine models and regular expressions*
2. *Illustrate the types of grammars, decidable and undecidable problems.*
3. *Introduce the major concept areas of language translation and compiler design. and learn how a compiler works*
4. *Know about the powerful compiler generation tools and techniques, which are useful to the other non-compiler applications*
5. *Know the importance of optimization and code generation in compiler*.

COURSE OUTCOMES (COs)

At the end of the course, students will be able to

1. *Design automata, regular expressions and context-free grammar accepting and generating a certain language, design of new grammar and languages.*
2. *Find solutions to the problems using Turing machines and distinguish between computability, Decidability and undecidability problems.*
3. *Classify the compiler phases into meaningful and acquire skills in using LEX tool & YACC tool for developing a scanner and parser.*
4. *Design and implement LL and LR parsers.*
5. *Implement the techniques for intermediate code and code optimization.*
6. *Design algorithms to generate machine code.*

UNIT-I

Finite Automata: Introduction to Finite Automata, Conversion of NFA to DFA, Conversion of NFA with ε-moves to DFA, Equivalence of FA's, Moore and Mealy machines.

Regular Languages: Regular Expression, Identities of RE, Arden's Theorem- Conversion FA to RE, Pumping Lemma for RL's, Closure properties of RL's.

UNIT-II

Context Free Grammar: Chomsky Hierarchy of Languages, Simplification of CFG, CNF, Pumping lemma for CFL's, closure properties of CFL's, Pushdown Automata.

Turing Machine: Introduction, Types of Turing Machine, Undecidability, Post Correspondence problem.

UNIT-III

Lexical Analysis: Phases of Compiler, The Role of the Lexical Analyzer, Input Buffering, LEX Tool.

Parsing: Top Down Parsing: Derivation,Parse Tree, Ambiguity, Eliminating ambiguity, Left Recursion, Left Factoring, Recursive Descent Parsing, LL(1)grammar.

UNIT-IV

Bottom-Up Parsing: Handle Pruning, Shift-Reduce Parsing, Construction of S L R , C L R and LALR Parsers, YACC Tool.

Semantic Analysis: Syntax Directed Definition (SDD), Evaluation order of SDD, Type Checking, Runtime Environment.

UNIT-V

Code Optimization: Intermediate code Representation, Three Address code implementation, Function Preserving Transformations and Loop Optimization, Peephole Optimization

Code Generation: Issues in code generator, The Target Machine, Flow Graphs, optimization of Basic Blocks, Simple Code Generator, Register Allocation and Assignment.

TEXT BOOKS

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, *Introduction to Automata Theory, Languages, and Computation*, Pearson Education Asia,1939.
2. Alfred V. Aho, Monica, S.Lam, RaviSethi, Jeffrey D. Ullman, *Compilers Principles, Techniques and Tools*, Second Edition, Pearson, 2007.

REFERENCES

1. Shyamalendukandar, *Introduction to Automata Theory, Formal Languages and Computation*, First Edition, Kindle Edition, 2013.
2. Harry R. Lewis and Christos H. Papadimitriou, *Elements of the Theory of Computation*, Pearson Education Asia.
3. K. Muneeswaran, *Compiler Design*, Oxford University Press, 2012.
4. Dexter C. Kozen, *Automata and Computability*, Undergraduate Texts in Computer Science, Springer.
5. Parag H. Dave, Himanshu B. Dave, *Compilers Principles and Practice*‖, Pearson. Keith D. Cooper & Linda Torczon.,
6. K Morgan - Kaufmann, *Engineering A Compiler*, Second Edition - ELSEVIER

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(20CS0904) INTRODUCTION TO MACHINE LEARNING

COURSE OBJECTIVES

The objectives of the Course:

1. *To understand the basic concepts of machine learning and Regression*
2. *To implement the predicative analysis using Linear Regression*
3. *To Apply Logistic regression for solving the classification problems*
4. *Discuss decision making under uncertainty and estimate probabilities*
5. *Analyze learning from multiple inputs and feature selection methods*

COURSE OUTCOMES:

At the end of the course, the students will be able to

1. *Design and program efficient algorithms related to recent machine learning techniques.*
2. *To train the models, conduct experiments, and develop real-world ML-based applications and products*
3. *Apply the Bayesian concepts to machine learning in the classification.*
4. *Analyze and suggest appropriate Perceptrons Algorithm for various ML problems*
5. *Open source tool for implement classification or regression problems in ML*
6. *The ability to capture design intent easily to define how the model should behave when something is changed*

UNIT-1

INTRODUCTION

Machine Learning – Basic Concepts in Machine Learning – Machine Learning Process – Types of Machine Learning – Supervised Learning – Unsupervised Learning –Weight Space – Testing Machine Learning Algorithms – A Brief Review of Probability Theory –Turning Data into Probabilities – The Bias-Variance Tradeoff.

UNIT-II

Classification:

Classification, Decision Trees – Univariate Tree –Multivariate Tree – Pruning

Regression

Introduction to linear regression- Simple and multiple- General linear - Estimation methods - Applications of linear regression

UNIT-III

Logistic regression

Logistic Discrimination-Discrimination by Regression, Multilayer Perceptrons - Back Propagation Algorithm- Bayesian logistic regression.

UNIT-IV

Bayesian Decision Theory

Bayesian Decision Theory – Classification – Losses and Risks – Discriminant Functions

Parametric Methods

Parametric methods – Maximum Likelihood estimation – Bernoulli Density – Multinomial Density – Gaussian Density – Evaluating an Estimator: Bias and Variance – Tuning Model complexity: Bias/Variance Dilemma – Model selection procedures.

UNIT-V

Multivariate Methods

Multivariate methods – Parameter estimation – Multivariate Normal Distribution – Tuning Complexity – Discrete Features – Multivariate regression.

Text Book:

1. Ethem Alpaydin, *Introduction to Machine Learning*, Third Edition, MIT Press, 2014.
2. Tom M. Mitchell, *Machine Learning*, McGraw Hill Education (India) Edition, 2013.

REFERENCES

1. Stephen Marsland, *Machine Learning: An Algorithmic Perspective*, Chapman Hall/CRC Second Edition, 2015, ISBN 978-1-4200-6718-7.
2. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar *Foundations of Machine Learning*, MIT Press 2012, ISBN 978-0-262-01825-8.

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(20CS0518) SOFTWARE ENGINEERING

COURSE OBJECTIVES

The objectives of this course:

1. *Illustrate the Software Development Models*
2. *Explain Software Requirements Engineering Process and SRS document*
3. *Illustrate the importance of modeling and modeling languages*
4. *Explain importance of Design Interface*
5. *Explain various testing methodologies*

COURSE OUTCOMES

On successful completion of this course, the student will be able to

1. *Define and develop a software project from requirement gathering to implementation*
2. *Ability to code and test the software*
3. *Illustrate the plan, estimate and maintain software systems*
4. *Understand the basic testing procedures*
5. *Classify the generation of test cases and test suites.*
6. *Test the applications manually by applying different testing methods and automation tools.*

UNIT – I

INTRODUCTION: Introduction to Software Engineering, Software Process, Software Myths, A generic view of process, A layered Technology, A Process Framework, Software Process Models., Unified process

INTRODUCTION TO AGILITY: Agility, Agile Process, Extreme Programming, Other Agile Process Models.

UNIT – II

REQUIREMENTS ANALYSIS AND SPECIFICATION: Requirements Engineering, Establishing the groundwork, Eliciting Requirements, Developing Use Cases, Building the requirements model, Negotiating Requirements, Validating Requirements. Requirements Modeling Scenarios, Information and Analysis Classes: Requirements Analysis, Scenario-BasedModeling, UML Models that Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling, Behavioral Models

UNIT – III

DESIGN CONCEPTS: The Design Process, Design Concepts, Design Model. **ARCHITECTURAL DESIGN:** Software Architecture, Architecture Genres, Architecture Styles, Architectural Design, Assessing Alternative Architectural Designs.

UNIT – IV

USER INTERFACE DESIGN: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps.

WEB APP DESIGN: Introduction, Web App Interface Design, Aesthetic Design, Content Design, Architecture Design, Navigation Design, Component-Level Design

UNIT – V

TESTING: A strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Validation Testing, System Testing, The Art of Debugging.

TESTING CONVENTIONAL APPLICATIONS: Software Testing Fundamentals, White-Box Testing, Black-Box Testing, Testing for Specialized Environments, Architectures and Applications, Object-Oriented Testing Strategies, Object-Oriented Testing Methods, Testing Methods Applicable at the Class level, Interclass Test-Case Design.

TEXT BOOKS

1. Roger S.Pressman, *Software engineering- A practitioner's Approach*, McGraw-Hill International Edition, seventh edition, 2001.

REFERENCES

1. Ian Sommerville, *Software Engineering*, 8th Edition, Pearson Education, 2008.
2. Richard Fairley, *Software Engineering Concepts* , McGraw Hill, 2004.

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(20CE0170) FUNDAMENTALS OF CIVIL ENGINEERING
(OPEN ELECTIVE-I)
(Common to all branches)

COURSE OBJECTIVES
The objectives of this course

1. *To impart basic knowledge on Civil-Engineering.*
2. *To familiarize the materials and measurements used in Civil Engineering.*
3. *To provide the exposure on the fundamental elements of civil engineering structures.*

COURSE OUTCOMES
On successful completion of this course, the student will be able to

1. *Explain the usage of construction material and proper selection of construction materials*
2. *Attain the knowledge of building planning and construction of buildings.*
3. *Understand various basic methods and techniques of surveying and its applications*
4. *An ability describe to the various functional units in water treatment and distribution system*
5. *Describe water quality criteria and standards, and their relation to public health*
6. *Understand the rigid pavements as per IRC & Describe different components of permanent way in Railway Track*

UNIT – I
Introduction to Civil engineering: Introduction - History of Civil Engineering- Sub-Disciplines of Civil Engineering

Building materials : Classification - Properties of Building Materials- Most Common Building Materials- Uses of Building Materials- Bricks- Classification- Size and weight of bricks- Qualities of good brick- Stones- Sources of stones- Common Building Stones in India- Timber- Qualities of good timber- Common timbers used for building work- Steel-Uses of steel in building work.

UNIT – II
Building Construction: Building Components-Basic Requirements of Building Components, Planning Regulations-Foundation-Purpose of Providing a Foundation, Types of Foundations-Mortar- Functions, Types of Mortars and their Preparation-Masonry Works-Stone Masonry, Classification of Stone Masonry, Brick Masonry, Types of Brick Masonry-Concrete-Ingredients of Concrete and their Functions, Mixing of Concrete, Curing of Concrete.

UNIT – III

Surveying : Objectives of Surveying- Principles of Surveying-Equipments used in surveying- Types of Surveying- Classification of Surveying- Basic methods used in surveying- Linear and angular measurements- chain Surveying, -Levelling - Purpose of Levelling, Major parts in levelling instrument, Technical terms used in levelling -Introduction to Theodolite.

UNIT – IV

Introduction to Water Supply: Importance and Necessity of protected water supply system - Objectives of protected water supply system- Flow chart of public water supply system,
Wastewater Characteristics: Characteristics of sewage – Physical, Chemical and Biological.
Wastewater Treatment: Layout and general outline of various units in a wastewater treatment plant–Primary treatment-Screens–Grit Chamber– Skimming tanks – Sedimentation tanks.

UNIT – V

Transportation Engineering: Introduction- Planning and design aspects of transportation Engineering-different modes of transport- Pavement Design- Types of pavement, Components and their functions - Railway Engineering - Permanent way way components , Cross section of permanent way , Functions and requirements of Rails, Sleepers and Ballast , Types of gauges, Rail fastenings.

TEXT BOOKS

1. Sateesh Gopi, *Basic Civil Engineering, Pearson Publications*, Published by Dorling Kindersley (India) Pvt. Ltd.
2. Madan Mohan Das, Bharga b Mohan Das, Mimi Das Saikia, Et Al. Saikia, *Elements Of Civil Engineering (1st Edition)*, Published by Ashoke K PHI Learning Pvt. Ltd.
3. Modi, P.N., *Water Supply & Waste Water Engineering, Vol. I & II*, Standard Book House, New Delhi, 2010.

REFERENCES

1. S.C.Saxena and S.P.Arora, *A Text Book of Railway Engineering*, Dhanpat Rai Publications, New Delhi, 2011
2. L.R.Kadiyali and Lal, *Principles and Practice of Highway Engineering Design*, Khanna Publications, 7th edition, 2013
3. Punmia, B.C., Jain, A.K., and Jain.A.K, *Water Supply & Waste Water Engineering, Vol. I & II*, Laxmi Publications, 2010
4. Dr. B.C. Punmia, *Ashok Kumar Jain, Arun Kumar Jain*, Surveying-Vol I, Lakshmi Publications(P) Ltd., New Delhi, Seventeen Edition,2016.

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(20EE0227) GENERATION OF ENERGY FROM WASTE
(OPEN ELECTIVE-I)
(Common to all branches)

COURSE OBJECTIVES

The objectives of this course:

1. *To understand different types of waste as fuel*
2. *To introduce Pyrolysis methods and conversion processes*
3. *To understand gasification methods for biomass*
4. *To learn concepts of biomass resources, combustion types and biogas plant technology*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Analyse agro based, forest residue and industrial waste conversion processes.*
2. *Manufacture of Pyrolytic oils and gases*
3. *Manufacture of charcoal, yields and applications*
4. *Understand various types of gasifiers operation*
5. *Understand inclined and fluidized bed combustors operation*
6. *Understand types of biogas plants and biomass energy programme in India*

UNIT- I

Introduction to Energy from waste: Classification of waste as fuel – Agro based- Forest residue- Industrial waste- MSW- conversion devices- Incinerators- Gasifiers-Digestors.

UNIT- II

Bio-mass Pyrolysis: Pyrolysis- Types- Slow-Fast- Manufacture of Charcoal- methods- yields and application. Manufacture of Pyrolytic oils and gases – yields and applications.

UNIT- III

Biomass Gasification: Gasifiers- Fixed bed system- Downdraft and Updraft gasifiers- Fluidized bed gasifiers- construction and operation- Gasifier burner arrangement for thermal heating.

UNIT- IV

Biomass Combustion: Biomass stoves- Types- Inclined combustors- Fluidized bed combustors- construction and operation of above biomass combustors.

UNIT- V

Properties of Biogas: Biogas plant Technology and status – Biomass resources and their classification- Biomass conversion processes- thermo chemical conversion – Direct Combustion-

Biomass gasification- Pyrolysis and liquefaction – bio-chemical conversion- anaerobic digestion- Types of biogas plants- applications-Biomass Energy Programme in India.

TEXT BOOKS

1. Desai Ashok V , *Non-Conventional Energy*, Wiley Eastern Ltd 2010.
2. Khandelwal K.C. and Mahdi SS, *Biogas Technology – A Practical Hand Book* , Vol I & II. Tata Mc Graw Hill Publishing Co Ltd.,2008.

REFERENCES

1. Challal D.S., *Food, Feed and Fuel from Biomass*, IBH Publishing Co Pvt Ltd.,1991.
2. GD Roy, Khanna *Non-conventional Energy Sourcrs*, Publishers, 6th Edition
3. Khahid Rehman Hekeem, Mohammad Jawald., Umar Rashid, *Biomass & Bioenergy* , Springer International Publishing Ltd.

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(20ME0322) NON- CONVENTIONAL ENERGY RESOURCES
(OPEN ELECTIVE-I)
(Common to all branches)

COURSE OBJECTIVES

The objective of the course is to

1. *Know the importance of energy, resources of renewable energy, their usage and impact on environment.*
2. *Recognize the significance of solar energy, its harnessing technologies & its applications.*
3. *Identify the method of exploiting energy from wind and parameters to be considered for the selection of site for wind turbine installation.*
4. *Explain the concept of bio energy and its conversion devices.*
5. *Differentiate various renewable energies such as tidal energy, fuel cells.*

COURSE OUTCOMES

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

1. *State various sources of energies, its availability and explain the importance of them by observing the global energy scenario.*
2. *Distinguish the types of solar energy tapping devices and describe the method of harnessing the solar energy.*
3. *Summarize the wind energy systems and elucidate the impact of it in environmental aspects.*
4. *Describe the biomass conversion process and list out various bioenergy applications.*
5. *Interpret the knowledge of renewable energies such as tidal energy, OTEC.*
6. *Identify numerous applications renewable energy resources and illustrate its harnessing technologies.*

UNIT-I

Fundamentals of Energy system: Energy source, various forms of renewable energy, Conservation of energy and Energy scenario, need for non-conventional energy sources, alternative energy sources, Environmental consequences of oil fuel use, Role of new and renewable sources.

Solar Radiation: Environmental Impact of solar power, Direct & Diffuse Radiation, Terrestrial and extraterrestrial solar radiation, Solar radiation on tilted surface- Measurement of Solar Radiation using Pyranometer, Pyrheliometer, and Sunshine recorder.

UNIT-II

Solar thermal conversion: Flat Plate and Concentrating Collectors – Solar direct Thermal Applications– Solar thermal Power Generation

Photo voltaic Conversion: Fundamentals of Solar Photo Voltaic Conversion – Solar Cells – Solar PV Power Generation – Solar PV Applications

UNIT-III

Wind Energy: Wind Formation - Site Selection for Wind Turbine – wind speed and power relations, power extracted from the wind.

Wind Energy System: Types of Wind Energy Systems – Components of Wind Turbine – Horizontal Vs Vertical axis turbine -Performance –Safety and Environmental Aspects.

UNIT-IV

Bio – Energy: Origin of biomass, Bioenergy conversion technology – Biomass gasifiers: classification of biomass gasifiers, Biogas plants: classification of biogas plant

Bio Fuel: Ethanol production – Biodiesel – Cogeneration - Applications of Biofuel

UNIT-V

Hydrogen Energy: production of Hydrogen-Storage and Transportation of Hydrogen, Safety aspects and Applications of hydrogen.

Other Sources of Energy: Tidal energy – Wave Energy –OTEC Cycles - Open and Closed OTEC cycles, Geothermal Energy- Types of cycles

TEXT BOOKS

1. R. K.Rajput, *Non-conventional Energy Sources and Utilization,* S. Chand Publishers, 2nd Edition, 2014.
2. G. D Rai, *Non-Conventional Energy Sources*, Khanna Publishers, 1st Edition, 2010.
3. Nicholas Jenkins & Janaka Ekanayake, *Renewable Energy Engineering*, Cambridge University Press; 1st Edition, 2017.

REFERENCES

1. Dr. R K Singal, *Non-Conventional Energy Resources*, S.K Kataria & Sons, 4th Edition, 2014.
2. John Twidell & Tony Weir, *Renewable Energy Sources*, Routledge publisher, 3rd Edition, 2015.
3. Sukhatme. S.P, *Solar Energy, Principles of Thermal Collection and Storage,* Tata McGraw Hill Publishing Company Limited, 6th Edition, 1990.

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(20EC0451) INTRODUCTION TO COMMUNICATION SYSTEMS
(OPEN ELECTIVE-I)
(Common to all branches)

COURSE OBJECTIVES
The objectives of this course:

1. *To study the fundamental concepts of the analog communication system.*
2. *To analyze various analog modulation and demodulation techniques.*
3. *The students to be able to understand, analyze, and design fundamental digital communication systems.*
4. *The course focuses on developing digital communication systems.*
5. *To understand basics of various Communication.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *Demonstrate knowledge in elements of Analog Digital and Wireless Communication Systems.*
2. *Analyze the analog modulated and demodulated systems.*
3. *Understand the principle involved in different modulation techniques.*
4. *Understand the basic principles of baseband and pass band digital modulation schemes.*
5. *Analyze probability of error performance of digital systems and are able to design digital communications.*
6. *Implement various Keying and accessing techniques in real time wireless communication systems.*

UNIT- I
Communication: Introduction, Elements of communication systems, wired Communications systems, Wireless Communications systems, Modulation, Need of modulation, modulation Methods, difference between Analog and Digital communication

Amplitude Modulation & Demodulation: DSB-FC(AM) modulation& its demodulation, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Single sideband (SSB) transmission, Comparison of various amplitude modulation techniques.

UNIT- II
Angle Modulation & Demodulation: Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM) and Wide band FM (WBFM), Phase modulation(PM).

UNIT- III

Noise in Communication Systems: Types of noise, Noise figure.

Analog Pulse Modulation Schemes: Pulse amplitude modulation (PAM), Pulse Width modulation (PWM) and Pulse Position modulations (PPM)

UNIT IV

Digital Communication: Introduction-Elements of digital communication systems, sampling process, quantization, quantization noise.

Source Coding Systems: Pulse-Code Modulation (PCM), Differential PCM (DPCM), Delta modulation (DM), Comparison of PCM, DPCM, DM.

Pass Band Data Transmission: Introduction, Amplitude shift keying (ASK), binary phase shift keying (BPSK), Binary Frequency shift keying (BFSK) Comparison of ASK, PSK, FSK.

UNIT V

Introduction to Wireless Communication Systems: Evolution of Mobile Radio Communication Systems, Examples of wireless communication Systems – Paging Systems, Cordless Telephone, Cellular Telephone Systems, Overview of generation of cellular systems.

Multiple Access Techniques for Wireless Communications: Introduction to Multiple Access, FDMA, TDMA, CDMA, SDMA.

TEXT BOOKS

1. *Communication Systems*, Simon Haykin, Wiley India Edition, 4th Edition, 2011.
2. *Modern Digital & Analog Communication Systems*, B.P. Lathi, &Zhi Ding, Oxford University Press, International 4th edition, 2010.

REFERENCES

1. *Digital and Analog Communication Systems*, Sam Shanmugam, John Wiley, 2005.
2. *Communication Systems – An Introduction to Signals & Noise in Electrical Communication*, Bruce Carlson, & Paul B. Crilly, McGraw-Hill, 5th Edition, 2010
3. *Digital Communications*, Bernard Sklar, Prentice-Hall PTR, 2nd edition, 2001.
4. *Principles of Communication Systems*, Herbert Taub& Donald L Schilling, Tata McGraw-Hill, 3rd Edition, 2009.
5. *Modern Communication Systems Using MATLAB*, J.G.Proakis, M Salehi, Gerhard Bauch, CENGAGE, 3rd Edition, 2013.

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(20HS0813) MANAGEMENT SCIENCE
(OPEN ELECTIVE-I)
(Common to all branches)

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the basic concepts, principles and processes of management*
2. *To help the students gain an understanding of the functions, responsibilities of managers*
3. *To get an awareness about the latest developments and contemporary issues in the field of management*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Utilize appropriate theoretical frameworks to real life business and managerial problems*
2. *Identify appropriate operational risks and develop appropriate responses to them*
3. *Apply human resource principles to recruit, select and manage employees to achieve organizational goals*
4. *Enact strategy, including contingent plans for the effective management of the organization*
5. *Identify, plan, and implement the projects and evaluate the performance of the projects*
6. *Analyze effective application of latest developments to diagnose and solve organizational problems*

UNIT I

INTRODUCTION TO MANAGEMENT:

Management - Concept and meaning – Nature – Functions - Management as a science and art and both. Schools of management thought - Taylor‘s scientific theory - Henry Fayol‘s principles - Weber‘s Ideal Bureaucracy - Eltan Mayo‘s Human relations - Systems theory - Situational or Contingency theory - Social responsibilities of management.

Organizational structure and design: Features of organizational structure - work specialization - Departmentation - Span of control-Centralization and Decentralization. **Organizational designs** - Line organization-Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee form of organization.

UNIT II

OPERATIONS MANAGEMENT:

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study - Statistical Quality Control: C chart, P chart, (simple Problems) Deming’s contribution to quality. Material Management: Objectives - Inventory - Functions, types, inventory classification techniques - EOQ-ABC Analysis - Purchase Procedure and Stores Management. Marketing Management: Concept - Meaning – Nature - Functions of Marketing - Marketing Mix - Channels of distribution - Advertisement and sales promotion - Marketing Strategies based on Product Life Cycle.

UNIT III

HUMAN RESOURCES MANAGEMENT (HRM):

HRM - Definition and meaning – nature-Managerial and Operative functions -Evolution of HRM - Human Resource Planning(HRP) - Employee Recruitment - sources of recruitment- employee selection - process and tests in employee selection - Employee training and development - On-the- job and Off-the-job training methods - Performance Appraisal systems – Concept – Methods of Performance Appraisal – Placement – Employee Induction-Wage and Salary Administration – Objectives - Essentials of Wage and Salary Administration - Job Analysis - Process - Job Evaluation - Employee Grievances - techniques of handling Grievances.

UNIT IV

STRATEGIC MANAGEMENT:

Definition& meaning-Setting of Vision- Mission- Goals- Corporate Planning Process- Environmental Scanning-Steps in Strategy Formulation and Implementation - SWOT Analysis. **Project Management (PERT/CPM):**Network Analysis- Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying Critical Path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems).

UNIT V

CONTEMPORARY ISSUES IN MANAGEMENT:

The concept of MIS – Materials Requirement Planning(MRP) – Just-In-Time (JIT) System - Total Quality Management (TQM)- Six Sigma Concept- Supply Chain Management-Enterprise Resource Planning (ERP)- Performance Management- Business Process Outsourcing (BPO), Business Process Re-engineering and Bench Marking -Balanced Score Card-Knowledge Management.

TEXT BOOKS

1. A.R Aryasri: *Management Science*, TMH,2013
2. Stoner, Freeman, Gilbert, *Management*, Pearson Education, New Delhi,2012.

REFERENCES

1. Kotler Philip & Keller Kevin Lane: *Marketing Management*, PHI, 2013.
2. Koontz & Weihrich: *Essentials of Management*, 6/e, TMH,2005.
3. Thomas N.Duening & John M.Ivancevich *Management Principles and Guidelines*, Biztantra.
4. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2004.
5. Memoria & S.V.Gauker, *Personnel Management*, Himalaya, 25/e,2005

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(20CS0531) SOFT COMPUTING
(Professional Elective Course-I)

COURSE OBJECTIVES

The objectives of this course:

1. *To learn the basic concepts of Soft Computing*
2. *To become familiar with various techniques like neural networks, geneticalgorithms and fuzzy systems*
3. *To apply soft computing techniques to solve problems*

COURSE OUTCOMES

On successful completion of this course, student will be able to

1. *Apply suitable soft computing techniques for various applications*
2. *Integrate various soft computing techniques for complex problems*
3. *Analyze a given computational task to solve it through neural network*
4. *Demonstrate different Genetic Algorithm operations for solving a computational task*
5. *Design and implement a soft computing system to achieve a computational solution*
6. *Understand the usage of hybrid systems*

UNIT- I

INTRODUCTION TO SOFT COMPUTING: Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta-Perceptron Network-Adaline Network-Madaline Network.

UNIT- II

ARTIFICIAL NEURAL NETWORKS: Back propagation Neural Networks -Kohonen Neural Network -Learning Vector Quantization -Hamming Neural Network -Hopfield Neural Network-Bi-directional Associative Memory -Adaptive Resonance Theory Neural Networks-Support Vector Machines -Spike Neuron Models.

UNIT- III

FUZZY SYSTEMS: Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets -Classical Relations and Fuzzy Relations -Membership Functions -Defuzzification -Fuzzy Arithmetic and Fuzzy Measures - Fuzzy Rule Base and Approximate Reasoning -Introduction to Fuzzy Decision Making.

UNIT -IV

GENETIC ALGORITHMS: Basic Concepts-Working Principles -Encoding-Fitness Function -Reproduction -Inheritance Operators -Cross Over -Inversion and Deletion -Mutation Operator -Bit-wise Operators - Convergence of Genetic Algorithm.

UNIT- V

HYBRID SYSTEMS: Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination -LR-Type Fuzzy Numbers -Fuzzy Neuron -Fuzzy BP Architecture -Learning in Fuzzy BP-Inference by Fuzzy BP -Fuzzy ArtMap: A Brief Introduction -Soft Computing Tools -GA in Fuzzy Logic Controller Design -Fuzzy Logic Controller

TEXT BOOKS

1. N.P.Padhy, S.P.Simon, *Soft Computing with MATLAB Programming*, Oxford University Press, 2015.
2. S.N.Sivanandam , S.N.Deepa, *Principles of Soft Computing*, Wiley India Pvt. Ltd.,2nd Edition, 2011.
3. S.Rajasekaran, G.A.Vijayalakshmi Pai, *Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications*, PHI Learning Pvt. Ltd., 2017.

REFERENCES

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, *Neuro-Fuzzy and Soft Computing*, Prentice-Hall of India, 2002.
2. Kwang H.Lee, *First course on Fuzzy Theory and Applications*, Springer, 2005.
3. George J. Klir and Bo Yuan, *Fuzzy Sets and Fuzzy Logic-Theory and Applications*, Prentice Hall, 1996.
4. James A. Freeman and David M. Skapura, *Neural Networks Algorithms, Applications, and Programming Techniques*, Addison Wesley, 2003.

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(20CS0912) NATURAL LANGUAGE PROCESSING
(Professional Elective Course-I)

COURSE OBJECTIVES
The objectives of this course:

1. *To learn the fundamentals of natural language processing.*
2. *To understand the Morphology and POS Tagging*
3. *To understand the Syntax Parsing, Semantic Analysis*
4. *To understand and work on the Applications of NLP.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to

1. *To tag a given text with basic Language features and components*
2. *To implement a rule based system to tackle morphology and POS*
3. *To implement a rule based system to tackle parsing syntax of a language*
4. *To design a tag set to be used for semantic analysis*
5. *To compare and contrast the use of different statistical approaches for different types of NLP applications.*

UNIT – I
INTRODUCTION
Natural Language Processing tasks in syntax, semantics, and pragmatics – Issues - Applications - The role of machine learning - Probability Basics –Information theory – Collocations -N-gram Language Models - Estimating parameters and smoothing - Evaluating language models

UNIT – II
MORPHOLOGY AND PART OF SPEECH TAGGING
Linguistic essentials - Lexical syntax- Morphology and Finite State Transducers - Part of speech Tagging - Rule-Based Part of Speech Tagging - Markov Models - Hidden Markov Models – Transformation based Models - Maximum Entropy Models. Conditional Random Fields

UNIT – III
SYNTAX PARSING
Syntax Parsing - Grammar formalisms and tree banks - Parsing with Context Free Grammars - Features and Unification -Statistical parsing and probabilistic CFGs (PCFGs)-Lexicalized PCFGs.

UNIT – IV
SEMANTIC ANALYSIS
Representing Meaning – Semantic Analysis - Lexical semantics –Word-sense disambiguation - Supervised – Dictionary based and Unsupervised Approaches - Compositional semantics Semantic Role Labeling and Semantic Parsing – Discourse Analysis.

UNIT – V

APPLICATIONS

Named entity recognition and relation extraction- IE using sequence labeling-Machine Translation (MT) - Basic issues in MT-Statistical translation-word alignment- phrase-based translation

TEXT BOOKS

1. Daniel Jurafsky, James H. Martin—*Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech*, Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, —*Natural Language Processing with Python*‖, First Edition, O_Reilly Media, 2009.
3. Roland R. Hausser, *Foundations of Computational Linguistics: Human- Computer Communication in Natural Language*, Paperback, MIT Press, 2011

REFERENCES

1. Pierre M. Nugues, *An Introduction to Language Processing with Perl and Prolog*: An Outline of Theories, Implementation, and Application with Special Consideration of English, French, and German (Cognitive Technologies) Softcover reprint, 2010.
2. James Allen, *Natural Language Understanding*, Addison Wesley; 2 edition 1994 3. NLTK –
3. *Natural Language Tool Kit* - http://www.nltk.org/

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(20CS0913) COMPUTER VISION
(Professional Elective Course-I)

COURSE OBJECTIVES

The objectives of this course:

1. *To review image processing techniques for computer vision.*
2. *To understand shape and region analysis.*
3. *To understand Hough Transform and its applications to detect lines, circles, ellipses.*
4. *To understand three-dimensional image analysis techniques.*
5. *To understand motion analysis.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Implement fundamental image processing techniques required for computer vision.*
2. *Perform shape analysis*
3. *Implement boundary tracking techniques.*
4. *Apply Hough Transform for line, circle, and ellipse detections.*
5. *Apply 3D vision techniques and Implement motion related techniques.*
6. *Develop applications using computer vision techniques.*

UNIT – I
IMAGE PROCESSING FOUNDATIONS

Review of image processing techniques – classical filtering operations – thresh holding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture.

UNIT – II
SHAPES AND REGIONS

Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors

UNIT – III
HOUGH TRANSFORM

Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection

UNIT – IV
3D VISION AND MOTION

Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based

representation – volumetric representations – 3D object recognition – 3D reconstruction

UNIT – V

MOTION

Introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – spline-based motion – optical flow – layered motion.

TEXT BOOKS:

1. D. L. Baggio et al., *Mastering OpenCV with Practical Computer Vision Projects*, Packt Publishing, 2012.
2. E. R. Davies, *Computer & Machine Vision*, Fourth Edition, Academic Press, 2012.

REFERENCES:

1. Jan Erik Solem, ―*Programming Computer Vision with Python*: Tools and algorithms for analyzing images, O'Reilly Media, 2012.
2. Mark Nixon and Alberto S. Aquado, ―*Feature Extraction & Image Processing for Computer Vision*, Third Edition, Academic Press, 2012.
3. R. Szeliski, ―*Computer Vision: Algorithms and Applications*‖, Springer 2011.
4. Simon J. D. Prince, ―*Computer Vision: Models, Learning, and Inference*, Cambridge University Press, 2012.

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(20CS0905) MACHINE LEARNING LAB

COURSE OBJECTIVES

1. *To understand the basic concepts of machine learning and Regression*
2. *To implement the predicative analysis using Linear Regression*
3. *To Apply Logistic regression for solving the classification problems*
4. *Discuss decision making under uncertainty and estimate probabilities*
5. *Analyze learning from multiple inputs and feature selection methods*

COURSE OUTCOMES:

At the end of the course, the students will be able to

1. *Design and program efficient algorithms related to recent machine learning techniques.*
2. *To train the models, conduct experiments, and develop real-world ML-based applications and products*
3. *Apply the Bayesian concepts to machine learning in the classification.*
4. *Analyze and suggest appropriate Perceptrons Algorithm for various ML problems*
5. *Open source tool for implement classification or regression problems in ML*
6. *The ability to capture design intent easily to define how the model should behave when something is changed*

List of Experiments:

1. Implement linear regression using python.
2. 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 the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result.
3. Implement Naïve Bayes theorem to classify the English text
4. Write a program to demonstrate the working of the decision tree algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
5. Write a program for implementing the Back propagation algorithm and test the same using appropriate data sets.
6. Write a program for implementing the classification using Multilayer perceptron.
7. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
8. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
9. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select the appropriate data set for your experiment and draw graphs

TEXT BOOKS

1. Ethem Alpaydin, *Introduction to Machine Learning*, Third Edition, MIT Press, 2014.
2. Tom M. Mitchell, *Machine Learning*, McGraw Hill Education (India) Edition, 2013.

REFERENCES

1. Stephen Marsland, *Machine Learning: An Algorithmic Perspective*, Chapman Hall/CRC Second Edition, 2015, ISBN 978-1-4200-6718-7.
2. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar *Foundations of Machine Learning*, MIT Press 2012, ISBN 978-0-262-01825-8.

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(20CS0519) OBJECT ORIENTED ANALYSIS AND DESIGN LAB

COURSE OBJECTIVES

The objectives of this course:

1. *Illustrate the requirements specification for an intended software system*
2. *Demonstrate the UML diagrams for the given specification*
3. *Map the design properly to the code*

COURSE OUTCOMES

On successful completion of this course, the student will be able to

1. *Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, state chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation*
2. *Describe the importance of systems analysis and design in solving complex problems*
3. *Explain how the object-oriented approach differs from the traditional approach to systems analysis and design*
4. *Understand the role and function of each UML model in developing object oriented software*
5. *Exhibit software development process*
6. *Recognize the difference between various object relationships: inheritance,association, whole-part, and dependency relationships*

List of Experiments:

Draw standard UML diagrams using an UML modeling tool for a given case study and map design to code and implement a 3 layered architecture. Test the developed code and validate whether the SRS is satisfied.

1. Identify a software system that needs to be developed.
2. Document the Software Requirements Specification (SRS) for the identified system.
3. Identify use cases and develop the Use Case model.
4. Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.
5. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams
6. Draw relevant State Chart and Activity Diagrams for the same system.
7. Implement the system as per the detailed design
8. Test the software system for all the scenarios identified as per the use case diagram
9. Improve the re usability and maintainability of the software system by applying appropriate design patterns.
10. Implement the modified system and test it for various scenarios

OOAD Problems that may be considered are

1. College information system
2. Hostel management
3. ATM system

4. Library management system
5. Passport Automation System
6. Political Administration System.

TEXT BOOKS

1. Grady Booch, James Rumbaugh, Ivar Jacobson, *The Unified Modeling Language,User Guide*, 2nd edition, Pearson Education, 2005.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, *UML 2 Toolkit*, WILEY-Dreamtech India Pvt. Ltd, 2009.

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(20CS0548) APP DESIGN FOR ANDROID
(**Skill Oriented Course)**

COURSE OBJECTIVES
The objectives of this course

1. *Outline the basic concepts of Learning the language(kotlin) and basic data types.*
2. *Illustrate the fundamental concepts in Android programming*
3. *Understand to activities and intents,designing user interface using views*
4. *Design & program real working education based mobile application projects.*

COURSE OUTCOMES
On successful completion of this course, students will be able to

1. *Know and apply the components of the screen*
2. *Describe the limitations and challenges of working in a mobile and wireless environment as well as the commercial and research opportunities presented by these technologies*
3. *Correlate and apply the different types of application models/architectures used to develop mobile software applications*
4. *Illustrate the components and structure of a mobile development frameworks (Android SDK and Eclipse Android Development Tools (ADT))*
5. *Demonstrate their ability to deploy software to mobile devices*
6. *Identify how and when to apply the different components to develop a working system*

CONTENTS:
1. Introduction to Kotlin: Features of kotlin, History of Kotlin.
2. Installation of interlay: Working of the Intellij IDE, Write code and Run the Code
3. Learning the language(kotlin): Data types, conditionals, loops, operators, arrays, functions
4. Hello Toast
5. Basic Android concepts: Activity, Views And View Group, Menus & Pickers, Intents, Context Text and Scroll View, Navigation Components.
6. Activity Life Cycle
7. User Interface Components
8. Buttons and Clickable Images
9. Using more Android capabilities: Providing feedback to the user, Sounds, Flash, Raw camera usage Touch gestures.
10. Create your first project

TEXT BOOKS
1. John Horton ,*Android-Programming-with-Kotlin-for-Beginners*, published by Packt Publishing April 2019
2. Pierre-Olivier Laurence, Amanda Hinchman-Dominguez, G. Blake Meike, Mike Dunn *Programming Android with Kotlin*, published by O'Reilly Media.

REFERENCE

1. Stephen Samuel, Stefan Bocutiu, *programming kotlin*, published by Packt Publishing.

WEB REFERENCES

1. https://developer.android.com/courses/fundamentals-training/overview-v
2. https://developer.android.com/codelabs/build-your-first-android-app-kotlin#
3. https://www.tutorialkart.com/kotlin-android-tutorial/

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III B. Tech – I Sem.

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(20HS0817) ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (NON-CREDIT COURSE)

COURSE OBJECTIVES

The objectives of this course:

1. *To impart basic principles of thought process, reasoning and inference.*
2. *To connect society and nature through sustainability.*
3. *To know Holistic life style of yogic science and wisdom capsules in Sanskrit literature.*
4. *To introduce Indian knowledge system and Indian perspective of modern scientific world-view*
5. *To learn the basic principles of Yoga and holistic health care system.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *To connect up the basic principles of thought process.*
2. *To understand Holistic life style of yogic science and wisdom capsules in Sanskrit literature.*
3. *To analyze the society and nature through sustainability.*
4. *To explain Indian knowledge system and Indian perspective of modern science.*
5. *To use the basic principles of Yoga and holistic health care system*

UNIT – I

Part-1

Basic structure of Indian Knowledge System: Introduction to vedic Knowledge - 4 ved(The Rig Veda ***:*** The Book of Mantra, The Yajur Veda : The Book of Ritual, SamaVeda:The book of Chants & songs and The Atharva Veda : The Book of Spell - The Age of the 4 Vedas The structure of the Vedic books.

Part-2

4Upaved (Ayurved, Dhanurved, GandharvaVed&SthapthyaAdi.,) The Vedas place in Hindu Philosophy

UNIT – II

Part-1

Vedangas: Introduction to Vedangas – The Importance of Vedangas - 6 Six Philosophical system (Shisha, Kalppa, Nirukha, VYkaran, Jyothish&Chand) Vedangas compared to Limbs of Human body.

Part-2

Upanga : Introduction to Upanga - Meaning of Upangas of Veda – Subsidiary parts of the veda - (Dharma Shastra, Meemamsa, Purana&TharkaShastra)

UNIT – III

Part-1;Modern Science and Indian KnowledgeSystem : India`s Contribution to Science and Technology(From Ancient to Modern) - Development in Different Branches of Science and Technology.

Part-2: Yoga and Holistic Healthcare: Introduction to Yoga – Its History – Importance of Yoga - Yogic concepts of Holistic Health care – Potentiality of Yoga – Personality development through Yoga.

UNIT – IV

Part-1: Philosophical Tradition: Introduction to Indian Philosophy (Charvaka Philosophy, Samkhya Philosophy, Yoga Philosophy, Nyaya Philosophy, Mimansa Philosophy, Vaisesika Philosophy, Buddhist Philosophy and Jaina Philosophy.

Part-2: Indian Linguistic Tradition: Introduction to Linguistics - Aspects of Linguistic Behaviour (Phonology, morphology, syntax andsemantics)

UNIT – V

Indian Artistic Tradition : Introduction to Indian Arts – Religious and cultural diversities – Stylistic Variations - Chitrakala,Vasthukala, Sangeetha, NruthyaSahithya and Jyothisha – Tradition to Modern - Casestudies

TEXT BOOKS

1. V. Sivaramakrishnan (Ed.), *Cultural Heritage of India-course material*, BharatiyaVidyaBhavan, Mumbai. 5th Edition,2014
2. S.C. Chaterjee& D.M. Datta, *An Introduction to Indian Philosophy*, University of Calcutta, 1984

REFERENCES

1. VNJha (Eng. Trans.), *Tarkasangraha of Annam Bhatta*, International Chinmay Foundation, Velliarnad,Arnakulam
2. Ramakrishna Mission *Yoga Sutra of Patanjali*, Kolkata GN Jha (Eng. Trans.), Ed. RN Jha, *Yoga-darshanam with VyasaBhashya*, VidyanidhiPrakashan, Delhi2016
3. RNJha, *Science of Consciousness Psychotherapy and Yoga Practices*, VidyanidhPrakashan, Delhi2016
4. KrishnaChaitanya, *Arts of India*, Abhinav Publications,1987

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III B. Tech – I Sem.

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(20CS0521) SUMMER INTERNSHIP

- 2 Months (Mandatory) after second year (to be evaluated during V semester)

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(20CS0906) ADVANCED MACHINE LEARNING

COURSE OBJECTIVES

Machine Learning course will

1. *Develop an appreciation for what is involved in learning from data.*
2. *Demonstrate a wide variety of learning algorithms.*
3. *Understand the important of supervised learning and their applications.*
4. *Understand unsupervised learning like clustering and EM algorithms.*
5. *Demonstrate how to apply a variety of learning algorithms to various fields.*

COURSE OUTCOMES

After the completion of the course, student will be able to

1. *To articulate a machine learning problem*
2. *Domain Knowledge for Productive use of Machine Learning and Diversity of Data.*
3. *Apply Supervised, unsupervised algorithms for real time applications*
4. *Analyze on Statistics in learning techniques and Logistic Regression*
5. *Develop various models using Support Vector Machines and Perceptron Algorithm*
6. *Select an appropriate pattern analysis tool for analysing data in a given feature space.*

UNIT I

Introduction: Towards Intelligent Machines Well posed Problems, Example of Applications in diverse fields, Data Representation, Domain Knowledge for Productive use of Machine Learning, Diversity of Data: Structured / Unstructured, Forms of Learning, Machine Learning vs Data Mining, Basic Linear Algebra in Machine Learning.

UNIT II

Supervised Learning:

Linear Models for Regression – Linear Basis Function Models – The Bias-Variance Decomposition – Bayesian Linear Regression – Common Regression Algorithms – Simple Linear Regression – Multiple Linear Regressions – Linear Models for Classification – Discriminant Functions-LDA – Probabilistic Generative Models – Probabilistic Discriminative Models.

UNIT III

UNSUPERVISED LEARNING: clustering- Introduction- Mixture Densities- k-Means Clustering- Expectation-Maximization Algorithm- Mixtures of Latent Variable Models Supervised Learning after Clustering- Hierarchical Clustering

DIMENSIONALITY REDUCTION-Subset Selection-Principal Components Analysis Factor Analysis-Multidimensional Scaling-Linear Discriminant Analysis

UNIT IV

NONPARAMETRIC METHODS- Nonparametric Density Estimation- k-Nearest Neighbor Estimator- Nonparametric Classification- Condensed Nearest Neighbor

REINFORCEMENT LEARNING: Introduction- Single State Case: K-Armed Bandit Elements of Reinforcement Learning- Model-Based Learning- Temporal Difference Learning- Generalization- Partially Observable States

UNIT V

Kernel Machines: Kernel Tricks, SVMs: Introduction, Linear Discriminant Functions for Binary Classification, -K-SVR, K-PCA

Artificial Neural Networks: MLP, Backprop, and RBF-Net

TEXT BOOKS

1. M.Gopal, *Applied Machine Learning*,1st edition, McGraw Hill Education,2018
2. Ethem Alpaydin, *Introduction to Machine Learning*, Third Edition, Prentice Hall of India, 2015.
3. Stephen Marsland, *Machine Learning: An Algorithmic Perspective*, Taylor & Francis (CRC) 1st Edition-2014

REFERENCES

1. William WHsieh *Machine Learning Methods in the Environmental Sciences, Neural Networks*, Cambridge Univ Press. 1 edition (August 31, 2009)
2. Richard o. Duda, Peter E. Hart and David G. Stork, *pattern classification*, John Wiley &SonsInc., 2nd Edition-2001
3. Chris Bishop, *Neural Networks for Pattern Recognition*, Oxford University Press, 1995.
4. Peter Flach, *Machine Learning* Cambridge-1st Edition 2012

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(20CS0523) DESIGN AND ANALYSIS OF ALGORITHMS

COURSE OBJECTIVES

The objectives of this course:

1. *Demonstrate the importance of algorithms in computing.*
2. *Explain the analysis of algorithms*
3. *Illustrate the method of finding the complexity of algorithms*
4. *Describe the advanced algorithm design and analysis techniques*
5. *Introduce special classes of algorithms NP completeness and the classes P &NP*

COURSE OUTCOMES

On successful completion of this course, student will be able to

1. *Determine the time complexity of an algorithm by solving the corresponding Recurrence equation*
2. *Apply the Divide and Conquer strategy to solve searching, sorting and matrix multiplication problems.*
3. *Analyze the efficiency of Greedy and Dynamic Programming design techniques to solve the optimization problems.*
4. *Illustrate Backtracking technique for solving constraint satisfaction problems.*
5. *Differentiate the LC and FIFO branch and bound solutions for optimization problems, and compare the time complexities with Dynamic Programming techniques.*
6. *Define and Classify deterministic and Non-deterministic algorithms; P, NP, NP –hard and NP-complete classes of problems.*

UNIT- I

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis- Space complexity, Time complexity, Order of growth, Asymptotic Notation-Big oh (O) notation, Omega notation, Theta notation and Little oh (o) notation. Recurrences - Towers of Hanoi. Disjoint Sets -disjoint set operations, union and find algorithms.

UNIT- II

Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs, Connected Components and Spanning Trees.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen‘s matrix multiplication**.**

UNIT- III

Greedy method: General method, applications-Job sequencing with dead-lines, knapsack problem, Minimum-cost spanning trees, Single source shortest path.

Dynamic Programming: General method, applications-Optimal binary search trees, 0/1 knapsack, All pairs shortest path, The Travelling sales person problem.

UNIT- IV

Backtracking: General method, applications-8-queen problem, sum of subsets, graph coloring, Hamiltonian cycles.

Branch and Bound: General method, Applications -Travelling sales person, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

UNIT- V

NP-Hard and NP-Complete problems: Basic concepts, nondeterministic algorithms, The classes-NP-Hard and NP Complete, Cook's theorem, Reduction Source Problems, Reductions: Reductions for some known problems.

TEXT BOOKS

1. Ellis Horowitz, S. Satraj Sahni and Rajasekharam, *Fundamentals of Computer Algorithms*, Galgotia Publications Pvt. Ltd., 4th Edition, 1998.
2. Parag Himanshu Dave, Himanshu Bhalchandra Dave, *Design and Analysis Algorithms* - Pearson Education India, 2007.

REFERENCES

1. Anany Levitin, *Introduction to the Design and Analysis of Algorithms*, ThirdEdition, Pearson Education, 2012.
2. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, *Introduction to Algorithms*, Third Edition, PHI Learning Private Limited, 2012.
3. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, *Data Structures and Algorithms*, Pearson Education, Reprint 2006.
4. Donald E. Knuth, *The Art of Computer Programming*, Volumes 1& 3 Pearson Education, 2009.
5. Steven S. Skiena, Second Edition, *The Algorithm Design Manual*, Springer, 2008.

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(20CS0907) WEB PROGRAMMING FOR ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES

The objectives of this course is to

1. *To comprehend the advanced concepts of web programming and internet*
2. *To perceive how to use techniques, skills and apply algorithmic principles while analyzing their appropriateness*
3. *To apprehend one or more of the tools to develop interactive, client-side, server-side executable web applications using advanced technologies and evaluate its effectiveness.*

COURSE OUTCOMES (COs)

After successfully completing the course the student should be able to

1. *Understand advanced web Technologies concepts and write a well formed XML document and manipulate the Document Object Model to fetch and display information using jQuery.*
2. *Develop build practical, real world web applications using AJAX.*
3. *Generate dynamic page content using Node.js, use JSON to pass AJAX updates between Client and Server.*
4. *Create application using Node.js with popular NOSQL database, MongoDB.*
5. *Build scalable web apps quickly and efficiently using appropriate toolkits and framework.*
6. *Efficiently create mobile and desktop apps using Frontend Web framework.*

UNIT-I- HTML5, CSS3, XML, JavaScript and JQuery

Internet Application –Web architecture – HTML5 – Geolocation - HTML5 API – XHTML CSS3 - Client side and Server Side Programming - Extensible Markup Language – Document structure,– DOM methods -JSON-Jquery- JQuery UI and templates

UNIT-II- Web Applications and services

Web applications- Frameworks-MVC (Model-View-Controller) framework- Laravel framework - Angular JS – Single Page Applications-Responsive Web Design

UNIT-III- Web Communication Processes and Technologies

HTTP- Request/Response Model- HTTP Methods- Java Servlets- Architecture -Overview-A Servlet-Generating Dynamic Content-Life Cycle- Implementing AJAX Frameworks - applications and its security

UNIT-IV- Web Servers

Node.js-Node Package Manager–REPL(Read-Evaluate-Print-Loop) Terminal, Node.js, Webserver – Call backs -Events- Express framework- Data-Sessions-Cookies-URL Rewriting, Rendering JSON Data

UNIT-V- Storage, Web toolkits - Backend and Frontend Web frameworks

MongoDB-Manipulating and Accessing MongoDB Documents from Node.js,

Backend Web frameworks, Django, Ruby on Rails, Frontend Web frameworks: Angular, Meteor - Meteor JS framework

TEXT BOOKS

1. Brad Dayley, Node.js, MongoDB, and *AngularJS Web Development*; 2 edition, Addison Wesley, 2017
2 Jon Duckett, JavaScript and JQuery: *Interactive Front-End Web Development*,Wiley,2014

REFERENCES

1. 1.John Duckett, *HTML and CSS: Design and Build Websites*. ISBN 1118907442, 2014
2. Hartl, Michael. Ruby on Rails Tutorial: *Learn Web Development with Rails*. Addison-Wesley Professional, 2015.
3. Zammetti, Frank, *Modern Full-Stack Development*, Apress, 2020

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(20CS0534) HUMAN COMPUTER INTERACTION
(Professional Elective Course-II)

COURSE OBJECTIVES
The objectives of this course

1. *Gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface Design*
2. *Become familiar with the vocabulary associated with sensory and cognitive systemsas relevant to task performance by humans*
3. *Be able to apply models from cognitive psychology to predicting user performance in various human computer interaction tasks and recognize the limits of human performance as they apply to computer operation*
4. *Be familiar with a variety of both conventional and non-traditional user interface Paradigms*

COURSE OUTCOMES
On successful completion of this course, the student will be able to

1. *Prioritize innovative ways of interacting with computers*
2. *Illustrate the disabled by designing non-traditional ways of interacting*
3. *Use cognitive psychology in the design of devices for interaction*
4. *Apply conventional and non-traditional user interface Paradigms*
5. *Describe how testing is applied in computer interaction*
6. *Understand different software tools used in computer interaction*

UNIT - I
Introduction: Importance of user Interface: Definition, Importance of Good Design,Benefits of Good Design, A Brief History of Screen Design.
The Graphical User Interface: Popularity of Graphics, the Concept of Direct Manipulation, Graphical System, Characteristics.
Web User – Interface Popularity, Characteristics- Principles of User Interface

UNIT - II
Design Process – Understanding how people interact with computers, importance of human characteristics human consideration, Human interaction speeds, and understanding business functions.
Screen Designing: Design goals – Screen meaning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design

UNIT - III

System menus: Structures of Menus, Functions of Menus, Content of Menus, Kinds of Graphical menus

Windows: Window characteristics, Components of a window, Window presentation styles, Types of windows, Windom management

Controls: Characteristics of device based controls, Selecting the proper device based controls, Operable controls, Text Entry/Read-only controls, Selection controls, Combination Entry/selection controls, Selecting the proper controls

UNIT - IV

Graphics: Icons, Multimedia, Color-what is it, Color uses, Color and Human vision,Choosing colors

Testing: The purpose and importance of usability testing, Scope of testing, Prototypes, Kindsof Tests, Developing and conducting the test.

UNIT - V

Software tools – Specification methods, interface – Building Tools.

Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

TEXT BOOK

1. Wilbert O Galitz, *The essential guide to user interface design*, 2nd edition, 2013, Wiley.

REFERENCES

1. Ben Shneidermann, *Designing the user interface*, 3rd Edition, Pearson Education Asia.
2. D.R.Olsen, *Human –Computer Interaction*, Cengage Learning.
3. I.Scott Mackenzie, *Human – Computer Interaction*, Elsevier Publishers.
4. Prece, Rogers, Sharps, *Interaction Design*, Wiley Dreamtech.
5. Smith - Atakan, *Human –Computer Interaction*, Cengage Learning

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(20CS0914) DATA SCIENCE AND ITS APPLICATIONS
(Professional Elective Course-II)

COURSE OBJECTIVES
The objectives of this course:

1. *To understand the concept of data science*
2. *Determine the appropriate natural language processing, machine learning and deep learning models to solve the business-related challenges.*
3. *Indicate proficiency with statistical analysis of data to derive insight from results and interpret the data findings visually.*
4. *Demonstrate skills in data management by obtaining, cleaning and transforming the data.*
5. *Discuss how social networks appraise the ways in which the social clustering shape individuals and groups in contemporary society.*

COURSE OUTCOMES
On successful completion of this course, the student will be able to:

1. *Interpret the concepts and methods of mathematical disciplines relevant to data analytics and statistical modeling.*
2. *Examine, visualize, curate, and prepare data and recognize how the quality of the data and the means of data collection may affect interpretation.*
3. *Determine the machine learning, deep learning and natural language processing skills to design and implement efficient, data-driven solutions for real world problems.*
4. *Illustrate how network analysis and recommender systems can contribute to increasing knowledge about diverse aspects of societal clustering.*
5. *To understand the purpose of Natural level processing with applications.*
6. *To build machine learning models for real time applications.*

UNIT - I
Introduction: Data Science, Visualizing Data, Linear, Algebra Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem.

UNIT -II
Hypothesis and Inference: Statistical Hypothesis Testing, Confidence Intervals, Bayesian Inference. Gradient Descent: Introduction, Estimating the Gradient, Using the Gradient, Choosing the Right Step Size, Getting Data: stdin and stdout, Reading Files, Scraping the Web, Using APIs,

UNIT – III
Machine Learning: Modeling, over fitting and Under fitting, Correctness, The Bias-Variance Tradeoff. K-Nearest Neighbors: The Curse of Dimensionality. Naive Bayes, a Really Dumb Spam Filter, Simple Linear Regression: Using Gradient Descent. Multiple Regressions: Least Squares Model, Fitting the Model, Interpreting the Model. Logistic Regression, The Logistic

Function: The logistic function, applying the Model.

UNIT – IV

Decision Trees: Entropy, Random Forests. Neural Networks: Back propagation, Deep Learning: The Tensor, The Layer Abstraction, The Linear Layer, Neural Networks as a Sequence of Layers, Loss and Optimization, Cross-Entropy, Dropout, Saving and Loading Models, Clustering.

UNIT – V

Natural Language Processing: Word Clouds, n-Gram Models, An Aside: Gibbs Sampling, Topic Modeling, Network Analysis: Between Centrality, Eigenvector Centrality, Recommender Systems: User-Based Collaborative Filtering, Item-Based Collaborative Filtering, Matrix Factorization.

TEXTBOOK:

1. Joel Grus, *Data Science from Scratch*, 2ndEdition, O'Reilly Publications/Shroff Publishers and Distributors Pvt. Ltd., 2019. ISBN-13: 978-9352138326.
2. Emily Robinson and Jacqueline Nolis, *Build a Career in Data Science*, 1st Edition, Manning Publications, 2020. ISBN: 978-1617296246.

REFERENCES:

1. Aurélien Géron, *Hands-On Machine Learning with Scikit-Learn, Keras, and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems*, 2nd Edition, O'Reilly Publications/Shroff Publishers and Distributors Pvt. Ltd., 2019. ISBN-13: 978-1492032649.
2. François Chollet, *Deep Learning with Python*, 1st Edition, Manning Publications, 2017. ISBN-13: 978-1617294433
3. Jeremy Howard and Sylvain Gugger, *Deep Learning for Coders with fastai and PyTorch*", 1st Edition, O'Reilly Publications/Shroff Publishers and Distributors Pvt. Ltd., 2020. ISBN-13: 978-1492045526.
4. Sebastian Raschka and Vahid Mirjalili, *Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and Tensor Flow 2*, 3rd Edition, Packt Publishing Limited, 2019.ISBN-13: 978-1789955750

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(20CS0915) DATA VISUALIZATION
(Professional Elective Course-II)

COURSE OBJECTIVES

The objectives of this course:

1. *To understand the essential acquisition techniques*
2. *To analyze and visualize data*
3. *To learn modern tools for data visualize*
4. *To know about the libraries*
5. *To gain hands-on experience of using software tools for data analytics*

COURSE OUTCOMES

At the end of the course students should be able to:

1. *Understand the importance of data visualization*
2. *Understand and use various plot types with Python*
3. *Explore and work with different plotting libraries*
4. *Create effective visualizations*
5. *Implement exemplary applications related to Network Programming and Web Service*
6. *Exhibit the awareness of the importance and limitation of the exploratory data analysis* paradigm.

UNIT – I

Introduction: Data Visualization, Importance of Data Visualization, Data Wrangling, Tools and Libraries for Visualization Overview of Statistics: Measures of Central Tendency, Measures of Dispersion, Correlation, Types of Data, Numpy: Operations - Indexing, Slicing, Splitting, Iterating, Filtering, Sorting, Combining, and Reshaping Pandas: operation - Indexing, Slicing, Iterating, Filtering, Sorting.

UNIT - II

Comparison Plots, Relation Plots, Composition Plots, Venn Diagram, Distribution Plots, Geo Plots, Connection Map, Pyplot, Basic Text and Legend Functions: Labels, Basic Plots: bar chart, pie chart, Layouts, Images: Basic Image Operations.

UNIT- III

Seaborn: Introduction, Advantages of Seaborn, Controlling Figure Aesthetics: Seaborn Figure Styles, Removing Axes Spines, Color Palettes: Categorical Color Palettes, Sequential Color Palettes, Diverging Color Palettes, Interesting Plots in Seaborn: Bar Plots.

UNIT – IV

Introduction to Geoplotlib: The Design Principles of Geoplotlib, Geospatial Visualization, Tile Providers, Custom Layers, Bokeh: Introduction to Bokeh, Concepts of Bokeh, Interfaces in Bokeh, Output, Bokeh Server, Presentation, Integrating, Adding Widgets

UNIT – V

Networked Programs HyperText Transfer Protocol – HTTP, The World's Simplest Web Browser, Retrieving an image over HTTP, Retrieving web pages with urllib, Parsing HTML and scraping the web, Parsing HTML using regular expressions, Using Web Services, eXtensible Markup Language – XML, Parsing XML, Looping through nodes, JavaScript Object Notation – JSON, Parsing JSON

TEXT BOOKS

1. Tim Grobmann and Mario Dobler, Data Visualization workshop, Packt Publishing
2. Charles R. Severance, Python for Everybody: Exploring Data Using Python 3, Create Space Independent Publishing Platform, 1st Edition, 2016

REFERENCES

1. Kirk, Andy, *Data Visualization: A Successful Design Process*, Packt Publishing Ltd,2012
2. Allen B. Downey, *Think Python: How to Think Like a Computer Scientist*, Green Tea Press, 2nd Edition, 2015
3. Murray, Scott, *Interactive Data visualization for the Web*, O'Reilly Media, Inc., 2013
4. Fry, Ben, *Visualizing Data: Exploring and Explaining Data with The Processing Environment,* O'Reilly Media, Inc., 2007

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(20CE0147) FUNDAMENTALS OF URBAN PLANNING
(OPEN ELECTIVE-II)
(Common to all branches)

COURSE OBJECTIVES

The objectives of this course

1. *To understand the concept of balanced town by ensuring that new and existing facilities are complimentary to each other*
2. *To provide sustainable buildings by considering the environmental, social and economic conditions*
3. *To create awareness about the traffic management within the town*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Recognize issues related to town planning and discuss the objectives, necessity and stages of town planning*
2. *Summarize importance of zoning, can classify various town planning practices and can conduct surveys for town planning*
3. *Classify the residential building, list the agencies involved in improving house and review the problems associated with residential housing*
4. *Discuss the issues associated with slums and recognize the methods to improve condition of slums*
5. *Interpret norms laid down for public and industrial building and can summarize building bye-laws*
6. *List and discuss various urban roads and the concepts of traffic management in a town*

UNIT – I

Introduction to Town Planning: Objects of town planning - Necessity of town planning - Principles of town planning - Stages of Town Planning - Origin and growth of towns - Development of towns - Modern town planning in India - Socio - Economic aspects of town planning - Selection of site for an ideal town – Cost of town planning.

UNIT – II

Surveys & Planning: Various types of surveys to be conducted for town planning project - Data to be collected in different types of town planning survey - Types of planning - A brief note on urban, rural and regional planning.

Zoning: Definition - Objects and principles of zoning - Advantages of zoning - Special Economic Zone (SEZ) - Maps for zoning.

UNIT – III

Housing: Classification of residential building as per HUDCO norms - Low Cost Housing -

Housing policy - Different types of housing agencies involved in housing - Investment in Housing - Housing Problems in India.

Slums: Causes - growth - Characteristics - Effects - Slum clearance and re-housing - Prevention of slum formation - Financial assistance for slum clearance.

UNIT – IV

Public Buildings & Industries: Classification - Location - Design Principles of public building - Grouping of public buildings - Effects of Industries on towns and cities - Classification of industries – Requirements of an industry - Regulation of their location.

Building Bye-Laws: Objectives of bye-laws - Importance of bye-laws - Function of local authority - Responsibility of owner - Applicability of bye-laws - Principles underlying building bye-laws.

UNIT – V

Urban Roads: Objectives – Requirements - Classification - Types of street systems - Through and bypass roads - Outer and inner ring roads - Expressways - Freeways.

Traffic Management: Objectives - Traffic surveys - Traffic congestion - Traffic control - Parking - Road accidents - Traffic capacity of roads - Road intersections - Traffic islands - Roundabouts - Traffic signals - Road signs - Road markings - Street lighting in a town.

TEXT BOOKS

1. Rangwala, *Town Planning*, Charotar Publishing,30th edition, 2018
2. G K Hiraskar, *Fundamentals of Town Planning*, Dhanpat Rai Publications, New Delhi, 17th edition, 2018

REFERENCES

1. Abirb and yopadhyay, *Text book of Town Planning*, Books & Allied (P) Ltd, 2000
2. Peter Hall and Mark Tewdwr-Jones, *Urban and Regional Planning*, Routledge Publications, 5th edition, 2010
3. Catanese A J, *Urban Planning*, McGraw Hill Publications, 2nd edition, 2014

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(20EE0235) INDUSTRIAL INSTRUMENTATION
(OPEN ELECTIVE-II)
(Common to all branches)

COURSE OBJECTIVES

The objectives of this course are:

1. *To Analyse the Common errors that occur in measurement systems, and their classification.*
2. *To understand the characteristics of signals, their representation, and signal modulation techniques.*
3. *To learn the Methods of Data Transmission, Telemetry, and Data acquisition.*
4. *To study working principles of different Signal Analyzers and Digitalmeters.*
5. *To learn about several types of transducers and their use for measurement of non-electrical quantities.*

COURSE OUTCOMES: (COs)

On successful completion of this course, the student will be able to

1. *Identify and explain the types of errors occuring in measurement systems.*
2. *Differentiate among the types of data transmission and modulation techniques.*
3. *Apply digital techniques to measure voltage, frequency and speed.*
4. *Analyse the working principles of different Signal Analyzers and Digitalmeters.*
5. *Understand the operation of several types of transducers.*
6. *Choose suitable Transducers for the measurement of non-electrical quantities.*

UNIT-I

Characteristics of Signals and their representation: Measuring Systems, Performance Characteristics, Static Characteristics, Dynamic Characteristics; Errors in Measurement Gross Errors, Systematic Errors, Statistical Analysis of Random Errors. Signals and their Representation: Standard Test, Periodic, Aperiodic, Modulated Signal, Sampled Data, Pulse Modulation and Pulse Code Modulation.

UNIT-II

Data Transmission, Telemetry and DAS: Methods of Data Transmission–General Telemetry System .Frequency Modulation (FM), Pulse Modulation (PM), Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Telemetry. Comparison of FM, PM, PAM and PCM. Analog and Digital Data Acquisition Systems –Components of Analog DAS–Types of Multiplexing Systems: Time Division and Frequency Division Multiplexing –Digital DAS–Block Diagram—Modern Digital DAS (Block Diagram)

UNIT-III

Signal Analyzers, Digital Meters: Wave Analyzers- Frequency Selective Analyzers, Heterodyne, Application of Wave Analyzers-Harmonic Analyzers, Total Harmonic Distortion, Spectrum Analyzers, Basic Spectrum Analyzers, Spectral Displays, Vector Impedance Meter, QMeter. Peak Reading and RMS Voltmeters, Digital Voltmeters- Successive Approximation, Ramp and Integrating Type- Digital Frequency Meter- Digital Multimeter- Digital Tachometer

UNIT-IV

Transducers: Definition of Transducers, Classification of Transducers, Advantages of Electrical Transducers, Characteristics and Choice of Transducers; Principle of Operation of Resistive, Inductive, Capacitive Transducers, LVDT, Strain Gauge and its Principle of Operation, Gauge Factor, Thermistors, Thermocouples, Synchros, Piezo electric Transducers, Photovoltaic, Photo Conductive Cells, Photodiodes.

UNIT-V

Measurement of Non-Electrical Quantities: Measurement of strain, Gauge Sensitivity, Measurement of Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque, Temperature, Pressure, Flow, Liquid level.

TEXTBOOKS

1. *A course in Electrical and Electronic Measurements and Instrumentation,* A.K. Sawhney, Dhanpat Rai & Co., 2012.
2. *Transducers and Instrumentation,* D.V.S. Murty, Prentice Hall of India,2nd Edition,2004.

REFERENCES

1. A. Dhelfrick and W.D. Cooper *Modern Electronic Instrumentation and Measurement technique,* Pearson/Prentice Hall of India., 1990.
2. H.S. Kalsi *Electronic Instrumentation,* Tata McGraw-Hill Edition, 2010.
3. T.R. Padmanabhan. *Industrial Instrumentation–Principles and Design,* Springer

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(20ME0354) GENERAL MECHANICAL ENGINEERING
(OPEN ELECTIVE-II)
(Common to all branches)

COURSE OBJECTIVES

Objective of this course is to

1. *Impart knowledge on Selection of Engineering materials and* Mechanical Handling Equipment.
2. *Understand about Automation, CAD, CAM and CIM.*
3. *Know the various Industrial Robot applications.*
4. *Learn about advanced manufacturing systems like NC, CNC and DNC system.*
5. *Study the construction details of the Automobile systems like engines.*
6. *Learn about Refrigeration and Air conditioning systems.*

COURSE OUTCOMES

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

1. *List the types of Engineering materials and Manufacturing Processes.*
2. *Apply Automation, CAD, CAM and CIM in the manufacturing.*
3. *Explicate the various Industrial Robot applications.*
4. *Classify various Machining processes like NC, CNS and DNC system and determine the best suitable process to machine a component.*
5. *Recognize the different parts of the automobile system and know the importance of IC Engines in automobiles.*
6. *Distinguish various types of Refrigeration and Air conditioning systems.*

UNIT-I

Material and selection, Mechanical Handling Equipment- belts, conveyors, hosty, power transmission

UNIT-II

CAD/CAM: Role of computers in manufacturing - CAD, Design process – CAM - CIM, Scope of CIM - Advantages - Benefits.

Introduction to Automation: Automation, Need - Types - Basic Elements - Strategies and Levels of Automation.

UNIT-III

Introduction to Industrial Robotics: Classification of Robot Configurations, functional line diagram - Principle components - Degrees of freedom – Joints - Advantages, Applications.

Machine Tools: Conventional Machine Tools, Types - Traditional Vs NC machining – Advanced Machine Tools, Classifications - NC, CNC and DNC systems – Advantages, Disadvantages.

UNIT-IV

I.C. Engines- Definition of Engine and Heat Engine, I.C Engine Classification –Parts of an IC Engine, Working of Two Stroke and Four Stroke Engines.

Automobile Engineering: Layout of Automobile, Types, Components - Vehicle chassis, frame and body construction.

UNIT-V

Refrigeration: Introduction to Refrigeration- Classifications of Refrigeration systems-Vapour compression and Vapour absorption systems.

Air conditioning: Introduction to Air conditioning - Classifications of Air conditioning systems-window air conditioning system, split conditioning system, Central air conditioning system.

TEXT BOOKS

1. Mikel P.Groover *Automation, Production systems and Computer Integrated Manufacturing Systems, Pearson Higher Education, Inc., 3rd Edition, 2014.*
2. R. K. Rajput, *Engineering Materials and Metallurgy,* S. Chand Publishers, 3rd Edition, 2008.
3. C.P. Arora & Domkundwar, *Refrigeration and Air conditioning*, McGraw Hill, 3rd Edition, 2010.

REFERENCES

1. Kirpal Singh, *Automobile Engineering,* Vol.1 & Vol.2, Standard Publishers Distributors, 13th Edition, 2013
2. R.K.Rajput, *Thermal Engineering*, Laxmi Publications, 6th Edition, New Delhi, 2010.
3. R.K. Jain, *Production Technology*, Khanna Publishers, 17th edition, 2012

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(20EC0452) ELEMENTS OF EMBEDDED SYSTEMS
(OPEN ELECTIVE-II)
(Common to all branches)

COURSE OBJECTIVES
The objectives of this course:
1. *Able to understand the fundamental concepts of embedded systems.*
2. *Able to learn the core of embedded systems.*
3. *Able to learn to program the open source electronics.*
4. *Able to understand the principles of Internet of Things (IoT).*
5. *Able to understand the concepts of Internet of Things (IoT).*

COURSE OUTCOMES
On successful completion of this course, students will be able to
1. *Differentiate between general computing system and the embedded system, also recognize the classification of embedded systems.*
2. *Enumerate and describe the components of an embedded system.*
3. *Learnabout open source electronics platform.*
4. *Program an embedded system by interfacing sensors & actuators.*
5. *Identify the basic building blocks of Internet of Things and characteristics.*
6. *Implement their own ideas invarious application areas of Embedded systems and IoT.*

UNIT – I
Introduction to Embedded Systems: Definition –Embedded systems vs General computing systems – History – Classification – Purpose - Major application areas – Characteristics – Architectureof embedded system – CPU, RAM & ROM, timers, clocks, address bus&data bus – overview of design process of embedded systems – programming languages and tools for embedded design.

UNIT – II
Typical Embedded System: Core of the embedded system– RISC vs CISC design philosophy– Memory – Harvard and Von-Neuman architecture–sensors and actuators– Other system components – reset, brownout protection, oscillator, RTC, Watch dog timer. Embedded firmware.

UNIT – III
Communication: Communication Interfaces – Onboard (I2C, SPI, UART, 1-wire interface, parallel interface), External (RS-232 & RS-485, USB, IEEE 1394, IrDA, Bluetooth, Wi-Fi, ZigBee, GPRS.

UNIT – IV

Designing of Embedded Systems with Arduino Microcontrollers: Introduction to Arduino platform– Overview of Arduino UNO board–ATMega328/P Block diagram–Pin functions– Introduction to Arduino programming –Interfacing & programming sensors –Interfacing & programming actuators Interfacing & programming serial communication devices.

UNIT – V

Introduction to IOT: Introduction to Internet of Things– reference architecture of IoT– Internet principles – IPaddresses, MAC addresses, TCP and UDP ports– Application layer protocols– Data protocols– MQTT, XMPP, CoAP– challenges of IoT, Case studies demonstrating IoT – Home automation, cities, Environment, Agriculture.

TEXT BOOKS

1. Shibu K V, *Introduction to Embedded systems*, Tata McGraw-Hill Education, 1st Edition, 2009.
2. Raj Kamal, *Embedded systems*, Tata McGraw-HillEducation, 2ndEdition, 2011.
3. Arshdeep Bahga, Vijay Madisetti, *Internet of Things: A Hands-On Approach*, Universities Press/Orient Black Swan Pvt. Ltd, 1st Edition, 2015.

REFERENCES

1. Adrian McEwen & Hakim Cassimally, *Designing of Internet of Things*, John Wiley and sons Ltd, 1st Edition, 2014.

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(20HS0814) INTELLECTUAL PROPERTY RIGHTS
(OPEN ELECTIVE-II)

COURSE OBJECTIVES

The objectives of this course:

1. *To provide an understanding of the concept and significance of intellectual property rights*
2. *To understand the concept of trademarks, copy rights, patents and the need for their protection*
3. *To comprehend the concept of competition, unfair competition and the latest developments in the laws pertaining to intellectual property rights*

COURSE OUTCOMES (COs)

On successful completion of this course, students will be able to

1. *Become aware of intellectual property rights, concepts, treaties, agencies and international organizations involved in sanctioning IP rights*
2. *Identify different types of intellectual properties, ownership rights and the scope of the protection*
3. *Get an adequate knowledge on patents, trademarks, copy rights and to get property rights for their intellectual work*
4. *Able to identify, apply, and assess ownership rights, registration processes for IP rights*
5. *To discern the approaches for intellectual property management and intellectual property audits*
6. *Demonstrate knowledge and understanding on unfair competition and latest developments in IP rights at international level*

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 ownership issues, copy right registration, notice of copy right, international copy right law.

LAW OF PATENTS: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT-IV

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

UNFAIR COMPETITION: Misappropriation right of publicity, False advertising.

UNIT-V

NEW DEVELOPMENT OF INTELLECTUAL PROPERTY: new developments in trademark law; copyright law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copyright law, international patent law, international development in trade secrets law.

TEXT BOOKS

1. Deborah, E. Bouchoux, *Intellectual property right*, cengage learning
2. Nityananda KV, *Intellectual property rights: Protection and Management.* India, Cengage Learning India Private Limited.

REFERENCES

1. Prabuddha ganguli, *Intellectual property right - Unleashing the knowledge economy*, Tata McGraw Hill Publishing CompanyLtd.
2. Ahuja VK, *Law relating to Intellectual Property rights* India IN- Lexis Nexis.
3. Neeraj P &Khushdeep D, *Intellectual Property Rights*, India. PHI learning pvt limited.

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(20CS0908) ADVANCED MACHINE LEARNING LAB

COURSE OBJECTIVES

Machine Learning course will

1. *Develop an appreciation for what is involved in learning from data.*
2. *Demonstrate a wide variety of learning algorithms.*
3. *Understand the important of supervised learning and their applications.*
4. *Understand unsupervised learning like clustering and EM algorithms.*
5. *Demonstrate how to apply a variety of learning algorithms to various fields.*

COURSE OUTCOMES

After the completion of the course, student will be able to

1. *To articulate a machine learning problem*
2. *Domain Knowledge for Productive use of Machine Learning and Diversity of Data.*
3. *Apply Supervised, unsupervised algorithms for real time applications*
4. *Analyze on Statistics in learning techniques and Logistic Regression*
5. *Develop various models using Support Vector Machines and Perceptron Algorithm*
6. *Select an appropriate pattern analysis tool for analysing data in a given feature space.*

LIST OF EXPERIMENTS:

1) Implement k-nearest neighbours classification using python
2) Extract the data from database using python
3) Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file
4) Implement an algorithm to demonstrate the significance of genetic algorithm
5) Given the following data, which specify classifications for nine ombinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k-means clustering with 3 means (i.e., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

6) Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
7) Write a program to implement Principle Component Analysis for Dimensionality

Reduction.

8) Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
9) Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.
10) Write a program to demonstrate the working of the decision tree-based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample

TEXT BOOKS

1. M.Gopal, *Applied Machine Learning*,1st edition, McGraw Hill Education,2018
2. Ethem Alpaydin, *Introduction to Machine Learning*, Third Edition, Prentice Hall of India, 2015.
3. Stephen Marsland, *Machine Learning: An Algorithmic Perspective*, Taylor & Francis (CRC) 1st Edition-2014

REFERENCES

1. William WHsieh *Machine Learning Methods in the Environmental Sciences, Neural Networks*, Cambridge Univ Press. 1 edition (August 31, 2009)
2. Richard o. Duda, Peter E. Hart and David G. Stork, *pattern classification*, John Wiley &SonsInc., 2nd Edition-2001
3. Chris Bishop, *Neural Networks for Pattern Recognition*, Oxford University Press, 1995.
4. Peter Flach, *Machine Learning* Cambridge-1st Edition 2012

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(20CS0525) DESIGN AND ANALYSIS OF ALGORITHMS LAB

COURSE OBJECTIVES

The objectives of this course is to

1. *Analyze the asymptotic performance of algorithms.*
2. *Write rigorous correctness proofs for algorithms.*
3. *Demonstrate a familiarity with major algorithms and data structures.*
4. *Apply important algorithmic design paradigms and methods of analysis.*
5. *Synthesize efficient algorithms in common engineering design situations.*

COURSE OUTCOMES (COs)

On successful completion of the course, the students will be able to

1. *Understand the techniques of proof by contradiction, mathematical induction and recurrence relation, and apply them to prove the correctness and to analyze the running time of algorithms.*
2. *Design new algorithms, prove them correct, and analyze their asymptotic and absolute runtime and memory demands.*
3. *Interpret an algorithm to solve the problem (create) and prove that the algorithm solves the problem correctly (validate).*
4. *Relate the mathematical criterion for deciding whether an algorithm is efficient, and know many practically important problems that do not admit any efficient algorithms.*
5. *Infer the basic techniques for designing algorithms, including the techniques of recursion, divide-and-conquer, and greedy.*
6. *Analyze NP-Completeness, NP-complete problems and synthesize efficient algorithms in common engineering design situations.*

LIST OF EXPERIMENTS:

1. To obtain the Topological ordering of vertices in a given digraph.
2. Sort a given set of elements using the Quick sort method and determine the time required to sort the elements.
3. Sort a given set of elements using the Merge sort method and determine the time required to sort the elements.
4. Check whether a given graph is connected or not using DFS method.
5. Print all the nodes reachable from a given starting node in a directed graph using BFS method
6. Find Minimum Cost Spanning Tree of a given undirected graph using Prim’s algorithm.
7. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm. And Implement 0/1 Knapsack problem using Dynamic Programming.
8. Write a program to implement Travelling Sales Person problem using Dynamic programming.
9. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
10. Design and implement the presence of Hamiltonian Cycle in an undirected Graph G of n vertices.

TEXT BOOKS

1. Ellis Horowitz, S.Satraj Sahni and Rajasekharam, *Fundamentals of Computer Algorithms*, Galgotia Publications Pvt. Ltd., 4th Edition, 1998.
2. Parag Himanshu Dave, Himanshu Bhalchandra Dave, *Design and Analysis Algorithms*, Pearson Education India, 2007.

REFERENCES

1. Anany Levitin, *Introduction to the Design and Analysis of Algorithms*, Third Edition, Pearson Education, 2012.
2. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, *Introduction to Algorithms*, Third Edition, PHI Learning Private Limited, 2012.
3. Alfred V. Aho, John E. Hopcroft and Jeffrey D.Ullman, *Data Structures and Algorithms*, Pearson Education.

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(20CS0909) WEB PROGRAMMING FOR ARTIFICIAL INTELLIGENCE LAB

COURSE OBJECTIVES

The objectives of this course is to

i. *Create web pages using HTML, DHTML and CSS.*
ii. *Develop a servelet program using Java servelets*
iii. *Develop online application using PHP*
iv. *Implement simple web service using XML*

COURSE OUTCOMES (COs)

On successful completion of the course, the students will be able to

1. *Create dynamic and interactive web sites using HTML*
2. *Design client side scripting using java sript and DHTML.*
3. *Implement servlet program using java servlets*
4. *Illustrate simple online application using servlets*
5. *Analyze JDBC concepts*
6. *Infer client program using AJAX*

LIST OF EXPERIMENTS:

1. Create a table to show your class time table.
2. Create a simple Job Registration Form.
3. Create a webpage using HTML5 Media Elements.
4. Add a Cascading Style sheet for designing the web page.
5. Write a Java Servlet Program to display the Current time on the server.
7. Write a Java Servlet Program session lifetime cookies
8. Design a shopping cart application using Laravel framework
9. Create a MongoDB collection of “Research articles” with required details
10. Design an application in node.js for student management.
11. Create an application using Meteor JS framework

TEXT BOOKS

1. Uttam K Roy, *Web Technologies*, Oxford University Press
2. Steven Holzner, *The Complete Reference PHP*,–Tata McGraw-Hill

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(20HS0859) ENGLISH FOR CORPORATE COMMUNICATION SKILLS LAB
(Skill advanced course/ soft skill course)

COURSE OBJECTIVES

The objectives of this course is to

1. *To improve the students' fluency in English, through a well-developed vocabulary*
2. *To enable them listening spoken English at normal conversational speed by English speakers*
3. *To respond appropriately in different social-cultural and professional contexts*
4. *To develop drafting skills among the students.*
5. *To develop Inter-personal and Intra-personal Skills*

COURSE OUTCOMES (COs)

On successful completion of the course, the students will be able to

1. *Use fluency in English for all kinds of professional communication*
2. *Enhancing job required skills for getting success in their professions*
3. *Improving Effective Speaking Abilities for their business or professional correspondence*
4. *prepare effective Interview techniques to get job in the present scenario*
5. *Using the appropriate skills in all kinds of professional activities*
6. *Use effective communicative approaches by preparing job application, report and other kinds of spoken and written correspondences.*

UNIT I
COMMUNICATIVE COMPETENCY

1. Functional English
2. Reading Comprehension
3. Vocabulary for competitive purpose
4. Spotting Errors

UNIT II
TECHNICAL WRITING

5. Cover Letter
6. Curriculum vitae
7. Report writing

UNIT III
PRESENTATIONAL SKILLS

8. Impromptu Speech
9. Oral presentation
10. Power point presentation
11. Poster presentation

UNIT IV

CORPORATE SKILLS

12. Problem Solving
13. Team Work
14. Leadership Skills

UNIT V

GETTING READY FOR JOB

15. Group Discussion
16. Interview skills

Minimum requirements for English for Corporate Communication Skills Lab

1. Computer Assisted Language Learning (CALL) Lab: The Computer Assisted Language Lab for 60 Students with 60 systems one Master Console, LAN facility and English Language Software for self-study by learners.

2. English for Corporate Communication Skills Lab with movable chairs and audio visual aids with a P. A. system, Projector, a Digital stereo audio & video system and Camcorder etc.

System Requirement (Hardware component):

Computer network, LAN with minimum 60 multimedia systems with the following

Specifications

i) a) Intel(R) core (TM) i3
   b) Speed 3.10 GHZ
   c) RAM – 4 GB
   d) Hard Disk – 320 GB

ii) Headphones with High quality

Software

Walden Info Tech Software

REFERENCES

1. Rizvi,*Effective Tech Communication*, Tata McGraw – Hill Education, 2007.
2. Sanjay Kumar &Pushpalatha,*Communication skills*, Oxford University Press, 2012.
3. *'Writing Tutor. Advanced English Learners' Dictionary*, 9th Edition, Oxford University Press, 2015.
4. AnjanaAgarwal,*Powerful Vocabulary Builder* ,New Age International Publishers, 2011.
5. Miles Craven, *Listening Extra*, Cambridge University Press, 2008.

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(20HS0801) ENVIRONMENTAL SCIENCE
(Non-Credit Course)

COURSE OBJECTIVES

The Objectives of this Course:

1. *Identify environmental problems arising due to engineering and technological activities and the science behind those problems.*
2. *To identify the importance of interlinking of food chains.*
3. *Learn about various attributes of pollution management and waste management practices.*

COURSE OUTCOMES (COs)

On successful completion of the course students will be able to

1. *Recognize the physical,chemical and biological components of the earth's systems and show how they function.*
2. *Characterize and analyze human impacts on the environment.*
3. *Integrate facts,concepts and methods from multiple disciplines and apply to environmental Problems.*
4. *Create informed opinions about how to interact with the environment on both a personal and a social level.*
5. *Perform independent research on human interactions with the environment.*
6. *Recognize the ecological basis for regional and global environmental issues*

UNIT – I

INTRODUCTION:

Definition, Scope and Importance of environmental science, Need for Public Awareness

NATURAL RESOURCES:

Forest resources: Use and over-exploitation, deforestation,Mining, dams and their effects on forests and tribal people.

Water resources: Use and over utilization of surface and ground water. Floods, drought, conflicts over water, dams benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral

Energy resources: Renewable and Non- Renewable sources of energy. Solar energy, Hydro electrical energy, Wind energy, Nuclear energy .

UNIT-II

ECOSYSTEMS:

Concept of an ecosystem,structure and function of an ecosystem. Producers, Consumers and Decomposers. Biogeochemical cycles, Ecological succession,energy flow in an ecosystem,Food chains, food webs and ecological pyramids.Types of ecosystems (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystem.

UNIT-III

BIODIVERSITY AND ITS CONSERVATION:

Introduction, Definition, genetic, species and ecosystem diversity, Bio-geographical classification of India, India as a Mega diversity Nation, Hot spots of biodiversity, Value of biodiversity, Threats to biodiversity, Endemic, Endangered and Extinct species of India, In-Situ and Ex-situ conservation of biodiversity.

UNIT-IV

ENVIRONMENTAL POLLUTION AND GLOBAL ENVIRONMENTAL ISSUES:

Natural Disasters: Droughts, Floods, Cyclone, Landslides, Earthquake.

Pollution episodes: Air pollution,Water pollution,Land pollution,Noise pollution,Automobile, Nuclear pollution.Global warming, Acid rain,Ozone layer depletion and controlling measures. Global Environmental Issues: Population Growth, Urbanizations, Land Management, Water and Waste Water Management. Climate change and impacts on human environment.

Solid Waste Management: causes, effects and control measures of Municipal solid wastes. E-waste and management, Role of an individual in prevention of pollution .

UNIT-V

ENVIRONMENTAL LEGISLATIONS, LAWS, POLICIES FOR SUSTAINABLE DEVELOPMENT:

Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water Act. Wildlife protection Act, Forest conservation Act. Municipal Solid Waste management. International conventions/Protocols Earth summit, Kyoto protocol and Montreal Protocol. Unsustainable to sustainable development, Role of NGO's for Sustainable development. Role of IT in Environment, GIS methods for Sustainable development.

Field work- visit to a local area to document environmental assets, river, forest, grassland/hill, mountain and polluted sites (urban/rural/industrial/Agriculture). study simple ecosystems.

TEXT BOOKS

1. A.Kaushik and C.P.Kaushik, *Environmental Sciences*, *5th edition*, New age international publishers, 2015.
2. M.Anji Reddy, *Text Book of Environmental Science and Technology*, BS Publications, 2016.

REFERENCES

1. Anil Kumar and Arnab Kumar De, *Environmental Studies*, New Age International Publishers, New Delhi, 3rd Edition 2015.
2. R.K. Trivedi, *"Handbook of Environmental Laws, Rules, Guidelines, Compliances andStandards"*, Vol.I and II, Enviro Media, 2016.
3. Rajagopalan.R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.