K.R. MANGALAM UNIVERSITY
THE COMPLETE WORLD OF EDUCATION

SCHOOL OF ENGINEERING AND TECHNOLOGY

Bachelor of Engineering (Computer Science & Engineering)
B.Tech (CSE)

Program Code: 01

2019-23

Approved in the 20th Meeting of

Academic Council Held on 16 July

2019

Academic Council
Member Secretary
K.R. Mangalam University

Registrar
K.R. Mangalam University
Sohna Road, Gurugram, (Haryana)

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About K.R Mangalam University

The K.R. Mangalam Group has made a name for itself in the field of education. The K.R. Mangalam story goes back to the chain of schools that offered an alternative option of world-class education, pitching itself against the established elite schools, which had enjoyed a position of monopoly till then. Having blazed a new trail in school education, the focus of the group was aimed at higher education.

K.R. Mangalam University is the fastest-growing higher education institute in Gurugram, India. K. R. Mangalam University was established under the Haryana Private University Act 2006, received the approval of Haryana Legislature vide Amendment Act # 36 of 2013 and consent of the Hon'ble Governor of Haryana on 11th April 2013, which was published in the Gazette notification vide Leg. No.10/2013, dated 3rd May 2013.

Since its inception in 2013, the University has been striving to fulfil its prime objective of transforming young lives through ground-breaking pedagogy, global collaborations, and world-class infrastructure. Resources at K.R Mangalam University have been continuously upgraded to optimize opportunities for the students. Our students are groomed in a truly interdisciplinary environment where they grow up with integrative skills through interaction with students from engineering, social sciences, management and other study streams.

K.R Mangalam University is unique because of its:

1. Enduring legacy of providing education to high achievers who demonstrate leadership in diverse fields.
2. Protective and nurturing environment for teaching, research, creativity, scholarship, social and economic justice.

Objectives

i. To impart undergraduate, post graduate and doctoral education in identified areas of higher education.
ii. To undertake research programmes with industrial interface.
iii. To integrate its growth with the global needs and expectations of the major stake holders through teaching, research, exchange & collaborative programmes with foreign, Indian Universities/Institutions and MNCs.
iv. To act as a nodal center for transfer of technology to the industry.
v. To provide job oriented professional education to the Indian student community with particular focus on Haryana.

About School of Engineering & Technology (SOET)

School of Engineering and Technology (SOET), K.R. Mangalam University is dedicated to fostering innovation, excellence, and advancement in engineering and technology. Empowering the new generation of change-makers by imparting exceptional understanding and intellect to facilitate the creation of highly sophisticated futuristic solutions. Our well-qualified academicians, accomplished researchers and industry insiders are focused on imparting their extensive knowledge and expertise to students through various lectures, workshops, industrial visits, projects, and competitions throughout the year ensuring that students receive a comprehensive education that blends theory with practical application.

These programs offered at SOET have the distinct objective of equipping the students with knowledge, skills and attitudes in engineering and technology, to make them capable of successfully meeting the present requirements and future challenges in the engineering profession. SOET brings together outstanding academics, industry professionals, and experienced researchers to deliver a unique hands-on and multi-disciplinary learning experience.

The curriculum of programmes has been designed to cater to the ever changing needs and demands of the industry. The curriculum is regularly updated. The school has best infrastructure including domain-specific labs. SOET aims to provide exposure to the principles and practices of Design / Developments and Projects in the area of engineering. SOET is offering Ph.D programs also.

School Vision

To create, disseminate, and apply knowledge in science and technology to meet the higher education needs of India and the global society, To serve as an institutional model of excellence in scientific and technical education characterized by integration of teaching, research and innovation.

School Mission

M1: To create an environment where teaching and learning are prioritized, with all support activities being held accountable for their success.

M2: To strengthen the institution's position as the school of choice for students across the State & Nation.

M3: To promote creative, immersive, and lifelong learning skills while addressing societal concerns.

M4: To promote co- and extra-curricular activities for overall personality development of the students.

M5: To promote and undertake all-inclusive research and development activities.

M6: To instill in learners an entrepreneurial mindset and principles.

M7: Enhance industrial, institutional, national, and international partnerships for symbiotic relationships.

M8: To help students acquire and develop knowledge, skills and leadership qualities of the 21st Century and beyond.

Programs offered by the School

B.Tech. in Computer Science & Engineering

This programme is designed to provide a sound knowledge of computing principles and applications in scientific and engineering domains. It develops the ability to analyze problems and generate solutions in the areas of computing. It also aims to provide exposure to the principles and practices of design and development of computing system. An initiative to make the teaching-learning framework better and enhance the student learning outcomes, Department of Computer Science engineering (B. Tech-CSE) has taken a thoughtful step by introducing the concept of Choice Based Credits System (CBCS) system.

Program Duration: 4 Years (8 Semesters)

Eligibility Criteria: The student should have passed the 10+2 examination conducted by the Central Board of Secondary Education or equivalent examination from a recognized Board in Science with mathematics as one of the subjects and with an overall aggregate of 50% or more.

Class Timings

The classes will be held from Monday to Friday from 9.10 am to 4.10 pm.

Scheme of Studies and Syllabi

For B.Tech CSE programme scheme is attached in Annexure A1.

The syllabi of all courses for first year for all the programmes offered by the school are given in the following pages. These are arranged as: (a) common course (b) degree specific course, in numeric order of the last three digits of the course code. For each course, the first line contains; Course Code, Tittle and Credits (C) of the course. This is followed by detailed syllabi.

Four Year B.Tech (CSE) Programme at a Glance

	Sem I	**Sem II**	**Sem III**	**Sem IV**	**Sem V**	**Sem VI**	**Sem VII**	**Sem VIII**	**Total**
Course	9	10	10	9	10	9	5	4	**66**
Credit	26	26	30	26	25.5	24.5	20	18	**196**

Scheme of Studies as per Choice Based Credit System (CBCS)

B.Tech (CSE)	Year 2019-2023 (Scheme of Studies)	SOET

ODD SEMESTER

Year	SNo	Category	Course Code	Course Title	L	T	P	C
First	1	SE	ETMA 105A	Applied Mathematics-I	3	1	-	4
	2	SE	ETPH109A	Engineering Physics	3	1	-	4
	3	SE	ETCH 125A	Environmental Studies	3	-	-	3
	4	EMP	ETCS103A	Programming for Problem Solving	3	1	-	4
	5	SE	ETME101A	Basics of Mechanical Engineering	3	1	-	4
	6	OE		Open Elective-I	4	-	-	4
	7	SE	ETPH151A	Engineering Physics Lab	-	-	2	1
	8	SE	ETME151A	Basics of Mechanical Engineering Lab	-	-	2	1
	9	EMP	ETCS153A	Programming for Problem Solving Lab	-	-	2	1
	TOTAL				**19**	**4**	**9**	**26**

EVEN SEMESTER

SNo	Category	Course Code	Course Title	L	T	P	C
1	SE	ETMA 104A	Applied Mathematics-II	3	1	-	4
2	SE	ETEC101A	Basics of Electrical & Electronics Engineering	3	1	-	4
3	EMP	ETCS112A	Object Oriented Programming	3	1	-	4
4	SE	ETEL110A	Communication Skills	4	-	-	4
5	OEC		Open Elective-II	4	-	-	4
6	SE	ETME155A	Engineering Graphics Lab	-	-	3	1.5
7	SE	ETEC151A	Basics of Electrical & Electronics Engineering Lab	-	-	2	1
8	EMP	ETCS166A	Object Oriented Programming Lab	-	-	2	1
9	SE	ETEL171A	Communication Skills Lab	-	-	2	1
10	SE	ETME157A	Workshop Practices	-	-	3	1.5
TOTAL				**16**	**3**	**12**	**26**

Second	1	SE	ETMA 201A	Applied Mathematics–III	3	1	-	4		1	EMP	ETCS222A	Computer Organization & Architecture	3	1	-	4
	2	SE	ETEC 233A	Analog Electronics	3	1	-	4		2	SE	ETMA 208A	Numerical Analysis	3	1	-	4
	3	SE	ETEC 210A	Digital Electronics	3	1	-	4		3	SE	ETEC202A	Signals and Systems	3	1	-	4
	4	SE	ETCS231A	Discrete Mathematics	3	1	-	4		4	EMP	ETCS220A	Analysis and Design of Algorithm	3	1	-	4
	5	EMP	ETCS217A	Data Structures	3	1	-	4		5	EMP	ETCS307A	Database Management Systems	3	1	-	4
	6	EMP	ETCS211A	Operating Systems	3	1	-	4		6	SE	ETMC 226A	Fundamentals of Management	3	-	-	3
	7	SE	ETEC 263A	Analog Electronics Lab	-	-	2	1		7	EMP	ETCS260A	Computer Organization & Architecture Lab	-	-	2	1
	8	SE	ETEC 256A	Digital Electronics Lab	-	-	2	1		8	EMP	ETCS 355A	Database Management Systems Lab	-	-	2	1
	9	EMP	ETCS257A	Data Structures Lab	-	-	2	1		9	EMP	ETCS262A	Analysis and Design of Algorithm Lab			2	1
	10	SE	ETDM301A	Disaster Management	3	-	-	3									
	TOTAL				**18**	**6**	**6**	**30**		**TOTAL**				**18**	**5**	**6**	**26**

Note: Practical training will be of minimum six weeks duration at the end of fourth semester during summer break and the evaluation will be done at the end of fifth semester.

Third	1	EMP	ETCS 323A	Java Programming	3	1	-	4		1	EMP	ETCS 412A	Compiler Design	3	1	-	4
	2	EMP	ETCS 214A	Theory of Computation	3	1	-	4		2	EMP	ETCS 401A	Artificial Intelligence	3	1	-	4
	3	SE	ETEC 311A	Microprocessor Systems	3	1	-	4		3	EMP	ETCS 202A	Software Engineering	3	1	-	4
	4	EMP	ETCS 206A	Computer Graphics	3	1		4		4	EMP	ETCS 454A	Compiler Design Lab	-	-	2	1
	5	EMP	ETCS 304A	Computer Networks	3	1		4		5	EMP	ETCS 451A	Artificial Intelligence Lab	-	-	2	1
	6	EMP	ETCS 365A	Computer Networks Lab	-	-	2	1		6	EMP	ETCS 374A	Advanced iOS Development Lab	-	-	3	1.5
	7	EMP	ETCS 361A	Java Programming Lab	-	-	2	1		7	EMP	ETCS 555A	Python Programming Lab	-	-	2	1
	8	EMP	ETCS 363A	Fundamentals of iOS Development Lab	-	-	3	1.5		8	SE	ETCS 375A	Mini Project	-	-	8	4
	9	EMP	ETCS 258A	Computer Graphics Lab	-	-	2	1		9		**Elective**					
	10	SE	ETCS 381A	Practical Training I	-	-	-	1		(i)	PEC	ETCS 316A	Web Technologies	3	1	-	4
										(iii)	PEC	ETCS 415A	Advanced Computer Architecture	3	1	-	4
	TOTAL				**15**	**4**	**9**	**25.5**		**TOTAL**				**12**	**4**	**17**	**24.5**

Note: Practical training will be of eight weeks duration at the end of sixth semester during summer break and the evaluation will be done at the end of seventh semester.

Fourth	1	SE	ETMC310A	Chasing The Rainbow: The Entrepreneurial Streak	3	-	-	3	1	SE	ETCS464A	Major Project	-	-	12	6
	2	SE	ETCS462A	Minor Project	-	-	12	6								
	3	SE	ETCS481A	Practical Training II	-	-	-	2	2	OEC	**Open Elective (Subject offered by other Schools)**		3	-	-	3
	4		**Elective (without Lab)**													
	(i)	PEC	ETCS312A	Information and Network Security	3	1	-	4	3		**Elective (without Lab)**					
	(ii)	PEC	ETCS420A	Graph Theory	3	1	-	4	(i)	PEC	ETCS428A	Natural Language Processing	3	1	-	4
	(iii)	PEC	ETCS430A	Advanced Database Management Systems	3	1	-	4	(ii)	PEC	ETCS405A	Digital Image Processing	3	1	-	4
									(iii)	PEC	ETCS414A	Neural Network	3	1	-	4
	5		**Elective (with Lab)**						4		**Elective (with Lab)**					
	(i)	PEC	ETCS413A	Advanced Computer Networks	3	1	-	4	(i)	PEC	ETCS422A	Cloud Computing	3	1	-	4
		PEC	ETCS459A	Advanced Computer Networks Lab	-	-	2	1		PEC	ETCA362A	Cloud Computing Lab	-	-	2	1
	(ii)	PEC	ETCS427A	Mobile and Wireless Communication	3	1	-	4	(ii)	PEC	ETCS306A	Data Warehousing and Data Mining	3	1	-	4
		PEC	ETCS473A	Mobile and Wireless Communication Lab	-	-	2	1		PEC	ETCS362A	Data Warehousing and Data Mining Lab	-	-	2	1
	(iii)	PEC	ETCS425A	Machine Learning	3	1	-	4	(iii)	PEC	ETCS480A	Internet of Things	3	1	-	4
		PEC	ETCS471A	Machine Learning Lab	-	-	2	1		PEC	ETCS482A	Internet of Things Lab	-	-	2	1
	TOTAL				**9**	**2**	**14**	**20**	**TOTAL**				**9**	**2**	**14**	**18**
									Total Credits [C]				**196**			

ETCS103A PROGRAMMING FOR PROBLEM SOLVING (Credits-4)

UNIT I

Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)

Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm:

Flowchart / Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code- Arithmetic expressions and precedence

UNIT II

Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops. Arrays: Arrays (1-D, 2-D), Character arrays and Strings

UNIT III

Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

Function: Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference.

Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function, Quick sort or Merge sort.

UNIT IV

Structure: Structures, Defining structures and Array of Structures

Pointers: Idea of pointers, defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

Suggested Textbooks

1. Byron Gottfried, Schaum‘s Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

ETCH 125A ENVIRONMENTAL STUDIES (Credits-3)

UNIT I

Introduction of Environmental Studies: Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development.

Natural Resources: Renewable and Non-renewable Resources

Land resources: land use change; Land degradation, soil erosion and desertification.

Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.

Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).

Energy resources: Renewable and non- renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

UNIT II

Ecosystems: Definition and Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession.
Case studies of the following ecosystems:

- Forest ecosystem
- Grassland ecosystem
- Desert ecosystem
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biological Diversity: Levels of biological diversity; genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots; India as a mega-biodiversity nation; Endangered and endemic species of India; Threats to biodiversity. Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity; Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

UNIT III

Environmental Pollution: Types, causes, effects and controls; Air, water, soil and noise pollution. Nuclear hazards and human health risks; Solid waste management: Control measures of urban and industrial waste; Pollution case studies.

Environmental Policies and practices: Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture.

Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context. International agreements: Montreal &Koyoto protocol and convention on biological diversity. Nature reserves, tribal population and rights, human wildlife conflicts in Indian context.

UNIT IV

Human Communities and the Environment: Human population growth: Impacts on environment, human health and welfare; Resettlement and rehabilitation of project affected persons; case studies; **Disaster management:** floods, earthquake, cyclones and landslides; Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan; Environmental ethics: Role of Indian and other religions and cultures in environmental conservation; Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Field work:

Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
Study of common plants, insects, birds and basic principles of identification.
Study of simple ecosystems-pond, river, Delhi Ridge, etc.

TEXTBOOKS:

1. ErachBharucha, Textbook of Environmental Studies, Universities Press (P) Ltd., Hyderabad, India.
2. Anubha Kaushik and C. P. Kaushik, Environmental Studies, New Age International Publishers (P) Ltd. New Delhi.

REFERENCE BOOKS:

1. A.K. De, Environmental Chemistry, New Age International Publishers (P) Ltd. New Delhi.
2. P. H. Raven, D. M. Hassenzahl& L. R. Berg, Environment, John Wiley & Sons, New Delhi.
3. J. S. Singh, S. P. Singh and S. R. Gupta, Ecology, Environmental Science and Conservation, S. Chand Publication, New Delhi.

ETMA105A APPLIED MATHEMATICS – I (Credits-4)

UNIT I

Matrices and its application: Elementary transformation, Inverse of matrix by elementary operations, Rank, Linear and orthogonal transformations, Hermitian and skew - Hermitian forms, Solutions of simultaneous linear equations, Eigen values, Eigen vectors and its properties, Caley - Hamilton theorem (without proof), Diagonalization of a matrix.

UNIT II

Application of Differential Calculus: Successive differentiation, Leibnitz theorem (without proof), Taylor‘s and Maclaurin‘s theorem and expansion of functions, Asymptotes (Cartesian and polar), Curve Tracing, Curvature, Radius of Curvature.

UNIT III

Calculus of several Variables: Partial differentiation, Euler‘s theorem on homogeneous functions, Composite functions, Jacobians, Taylor‘s theorem of two variables and its application to approximate errors, Maxima-Minima for two variables, Lagrange‘s method of undermined multipliers.

UNIT IV

Multiple Integration: Beta and Gamma integrals, Differentiation under integral sign, Double and Triple integrals computation of surface areas and volumes, change of variables in double and triple integrals.

TEXTBOOKS:

Kresyzig, , ―Advanced Engineering Mathematics‖, Narosa Publication.

REFERENCES BOOKS:

1. B.S.Grewal, “ Higher Engineering Mathematics”, Khanna Publishers.
2. H.K. Dass, “Advanced Engineering Mathematics”, S. Chand & Company.

ETME 101A BASICS OF MECHANICAL ENGINEERING (Credits-4)

UNIT I

Introduction to Machine Tools and Commonly used Machine Tools in a Workshop: Lathe, Shaper, Planer, Milling, Drilling, Slotter, Introduction to Metal Cutting.

Basic concept of thermodynamics: Introduction, States, Work, Heat, Temperature, Zeroth, 1st, 2nd and 3rd law of thermodynamics, Concept of internal energy, enthalpy and entropy. Problems Properties of Steam & Steam Generator Formation of steam at constant pressure, Thermodynamic properties of Steam, Use of steam tables, Measurement of dryness fraction by throttling calorimeter.

UNIT II

Refrigeration & Air-conditioning: Introduction to refrigeration and air -conditioning, Rating of refrigeration machines, Coefficient of performance, Simple refrigeration vapor compression cycle, Psychrometric charts and its use, Human comforts.

Hydraulic Turbines & Pumps: Introduction, Classification, Construction details and working of Pelton, Francis and Kaplan turbines, Specific speed and selection of turbines, Classification of water pumps and their working.

UNIT III

Power Transmission Methods and Devices: Introduction to Power transmission, Belt, Rope, Chain and Gear drive, Types and functioning of clutches

Stresses and Strains: Introduction, Concept & types of Stresses and strains, Poison‘s ratio, stresses and strains in simple and compound bars under axial, flexure & torsional loading, Stress-strain diagrams, Hooks law, Elastic constants & their relationships.

UNIT IV

Introduction to Manufacturing Systems: Fundamentals of Numerical Control (NC), Advantage of NC systems, Classifications of NC, Comparison of NC and CNC

TEXTBOOKS:

1. Elements of Mechanical Engineering – R.K.RajputLakmi Pub., Delhi
2. Elements of Mechanical Engineering – D.S.Kumar, S.K. Kataria and Sons

ETPH109A ENGINEERING PHYSICS (Credits-4)

UNIT-I:

Simple harmonic motion damped and forced simple harmonic oscillator.

Mechanical and electrical simple harmonic oscillators damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor.

UNIT-II:

Non-dispersive transverse and longitudinal waves in one dimension and introduction to dispersion

Transverse wave on a string, the wave equation on a string, Harmonic waves, reflection and transmission of waves at a boundary. Longitudinal waves and the wave equation for them, acoustics waves and speed of sound, wave groups and group velocity.

UNIT-III:

The propagation of light and geometric optics

Laws of reflection and refraction, Light as an electromagnetic wave and Fresnel equations, reflectance and transmittance, Brewster‘s angle, total internal reflection.

Wave optics

Huygens‘ principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young‘s double slit experiment, Newton‘s rings, Farunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

UNIT-IV:

Lasers

Amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO2),

solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

Suggested Reference Books

1. Ian G. Main, Oscillations and waves in physics
2. H.J. Pain, The physics of vibrations and waves (iii)E. Hecht, Optics
3. A. Ghatak, Optics
4. O. Svelto, Principles of Lasers

ETPH 151A ENGINEERING PHYSICS LAB (Credits-1)

LIST OF EXPERIMENTS

1. To determine the value of acceleration due to gravity using Bar pendulum.
2. To determine the value of acceleration due to gravity using Kater's pendulum.
3. To determine the wavelength of sodium light using Newton`s ring apparatus.
4. To determine the wavelength of prominent lines of mercury by plane diffraction grating.
5. To determine the refractive index of the material of the prism for the given colours (wavelengths) of mercury light with the help of spectrometer.
6. To determine the specific rotation of cane sugar solution with the help of half shade polarimeter.
7. To determine the wavelength of He-Ne LASER using transmission diffraction grating.

Suggested Reference Books

1. C. L.Arora, B.Sc Practical Physics (S Chand and Co. Ltd., New Delhi).
2. Harnam Singh, Hemne P S, B.Sc. Practical Physics (S. Chand & Co).
3. Indu Prakash, Ramakrishna, A Textbook of Practical Physics (Kitab Mahal, New Delhi).

ETME 151A BASICS OF MECHANICAL ENGINEERING LAB (Credits-1)

LIST OF EXPERIMENTS

1. To verify the law of Force Polygon
2. To verify the law of Moments using Parallel Force apparatus. (simply supported type)
3. To determine the co-efficient of friction between wood and various surface (like Leather, Wood, Aluminum) on an inclined plane**.**
4. To find the forces in the members of Jib Crane.
5. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.
6. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the
7. Wheel and Axle
8. To verify the law of moments using Bell crank lever.
9. To calculate the Mechanical Advantage, Velocity Ratio and Efficiency of Single Start, Double
10. Start and Triple Start Worm & Worm Wheel.
11. To Study Two-Stroke & Four-Stroke Diesel Engines.
12. To Study Two-Stroke & Four-Stroke Petrol Engines.
13. To Study the vapor compression Refrigeration System.

ETCS153A PROGRAMMING FOR PROBLEM SOLVING LAB (Credits-1)

LIST OF EXPERIMENTS

Lab1: Familiarization with programming environment
Lab 2: Simple computational problems using arithmetic expressions
Lab 3: Problems involving if-then-else structures
Lab 4: Iterative problems e.g., sum of series
Lab 5: 1D Array manipulation
Lab 6: Matrix problems, String operations
Lab 7: Simple functions
Lab 8 and 9: Programming for solving Numerical methods problems
Lab 10: Recursive functions
Lab 11: Pointers and structures
Lab 12: File operations

ETEC101A BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING

(Credits-4)

UNIT I

Circuit Analysis: Ohm‘s Law, KCL, KVL Mesh and Nodal Analysis, Circuit parameters, energy storage aspects, Superposition, Thevenin‘s, Norton‘s, Reciprocity, Maximum Power Transfer Theorem, Millman‘s Theorem, Star-Delta Transformation. Application of theorem to the Analysis of D.C. circuits.

UNIT II

A.C. Circuits: R-L, R-C, R-L-C circuits (series and parallel), Time Constant, Phasor representation, Response of R-L, R-C and R-L-C circuit to sinusoidal input Resonance-series and parallel R-L-C Circuits, Q-factor, Bandwidth.

Cathode Ray Oscilloscope: Basic CRO circuit (Block Diagram), Cathode ray tube (CRT) & its component

UNIT III

Semiconductor Physics: Basic concepts, Intrinsic and extrinsic semiconductors, diffusion and drift currents.

P-N junction diode: Ideal diode, P-N junction under open-circuit and closed-circuit, Diode Current Equation, Diode Resistance, Transition and Diffusion Capacitance, Effect of Temperature, Carrier Lifetime, Continuity Equation.

Special Diodes: Zener Diode, Photodiode, Light Emitting Diodes, applications of Diodes.

UNIT IV

Digital Electronics: Boolean algebra, Truth tables of logic gates (AND, OR, NOT), NAND, NOR as universal gates

Bipolar junction transistor: Introduction to transistors: construction, transistor operations, BJT characteristics, load line, operating point, leakage currents**.**

Application of BJT: CB, CE configurations, Introduction to FETs and MOSFETs.

TEXTBOOKS:

1. D.P. Kothari & I J Nagrath , Basic Electrical Engineering , Tata McGraw Hill , New Delhi.
2. B L Thareja – A textbook of Electrical Technology
3. Boylestad&Nashelsky, “Electronic Devices & Circuits”, Pearson Education, 10th Edition.
4. V. K. Mehta & Rohit Mehta, “Principles of Electronics”, S. Chand Publishers, 27th Edition.

REFERENCE BOOKS:

1. Electrical Engineering Fundamentals, V.Del Toro
2. Problems in Electrical Engineering – Parker Smith.S.
3. Sedra A S and Smith K C, “Microelectronic Circuits” 4th Ed., New York, Oxford University Press, New York.
4. Tocci R J and Widmer N S, “Digital Systems – Principles and Applications”, 8th Ed., Pearson Education India, New Delhi.
5. A.K. Sawhney, “A course in Electrical & Electronics Measurements & Instrumentation”, Dhanpat Rai & Sons.

ETMA104A APPLIED MATHEMATICS – II (Credits-4)

UNIT I

Laplace Transformation: Existence condition, Laplace transform of standard functions, Properties, Inverse Laplace transform of functions, Convolution theorem, solving linear differential equations using Laplace transform. Heaviside unit step function, Impulse function, Periodic function and their transforms.

UNIT II Vector Calculus:

Scalar and vector point functions, Gradient, Divergence, Curl with their physical significance, Directional derivatives, Properties, Line integrals, Surface integrals and Volume integrals, Gauss theorem, Green‘s theorem and Stoke‘s theorem (without proof).

UNIT III Ordinary Differential Equations:

Exact differential equations of first order and first de-gree, Linear differential equations of higher order with constant coefficients, Variation of parame-ters, Solution of simultaneous linear differential equations, Solution of homogeneous differential equations - Cauchy and Legendre forms.

UNIT IV

Partial Differential Equations and its applications: Formation of partial differential equations, Lagrange‘s linear equation, Charpit‘s method of non-linear partial differential equations, Method of separation of variables, Solution of wave and heat conduction equations, Initial and boundary value problems.

TEXTBOOKS:

1. Kresyzig, “Advanced Engineering Mathematics”, John Wiley and Sons.
2. Jain and Iyengar, “Advanced Engineering Mathematics”, Narosa Publication.

REFERENCES BOOKS:

1. B.S.Grewal, “ Higher Engineering Mathematics”, Khanna Publishers.
2. H.K. Dass, “Advanced Engineering Mathematics”, S. Chand & Company.

ETEL101A COMMUNICATIONSKILLS (Credits-4)

UNIT I

Introduction to Communication: Meaning, Forms & Types of Communication; Process of Communication; Principles of Effective Communication/7Cs, Barriers in Communication; Literature: A Bird Came Down the Walk by Emily Dickinson

UNIT II

Essentials of Grammar: Parts of Speech: Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction, Interjection; Using tenses; Articles; Types of sentences; Reported Speech; Punctuation; Literature: Stopping by Woods on A Snowy Evening by Robert Frost

UNIT III

Building Vocabulary: Word Formation (by adding suffixes and prefixes); Common Errors; Words Often Confused; One word substitution, Homonyms and Homophones; Antonyms &Synonyms, Phrasal Verbs, Idioms & Proverbs (25 each); Commonly used foreign words(15 in number); Liter-ature: The Gift of Magi by O'Henry

UNIT IV

Personality Development: Etiquette & Manners; Leadership; Inter & intrapersonal skills;

Attitude, Self-esteem & Self-reliance; Public Speaking; Body Language: Posture, Gesture, Eye Contact, Facial Expressions; Presentation Skills/ Techniques; Literature: My Prayer to Thee by Rabindranath Tagore;

TEXTBOOK:

Kumar, Sanjay and Pushplata. Communication Skills. Oxford University Press.

REFERENCE BOOKS / SITES:

1. Tickoo, M.L, Subramanian A. E. and Subramaniam P.R. Intermediate Grammar, Usage and Composition. Orient Blackswan.
2. Mitra, Barun K. Personality Development and Soft Skills. Oxford University Press.
3. "Best Poems", http://100.best-poems.net/. 20 July 2016.
4. "Classic English Short Stories", http://www.eastoftheweb.com/short-stories/Collections/ ClasEngl.shtml, 20 July 2016.

ETEL 171A COMMUNICATION SKILLS LAB (Credits-1)

Communication Skills Lab Activity

Activity 1: Self- introduction: Informal introduction & formal introduction; A detailed write up on formal ‗Self Introduction'; Formal Introduction of oneself in front of the group.

Activity 2: News Reading: Introduction to ‗online News papers'; Browsing and selecting the preferred Newspaper; Browsing through the News Headlines; Selecting interested News items; Comprehending the content, writing down the essence and reading the News in front of the Group. Discuss 5 to 8 new words or terms, 4 to 5 important personalities of that day's news etc.

Activity 3: JAM: Introduction to ‗Just A Minute speech' and the ‗Extempore speech'; Preparation of speech on given topic (different topic for each student); delivery of the speech; Feedback (on content, time management, body language etc. highlighting the positive aspects first.)

Activity 4: News Discussions: Selecting News of the day, Discussing among the group, prepare the news content and prepare the group opinion about the issue and present it in front of the class by the group involving each member; select 5 new words & new usages from the selected news item

Activity 5: Conversation ability: Characteristics of effective conversation; Listening to a few sample conversations; preparing conversation based on the given situation; enacting the situation through effective delivery of the script; feedback & suggestions for improvement.

Activity 6: Role Play: Characteristics of Role Play; assigning roles; developing the content to deliver; enacting the role with effective delivery; feedback & suggestions for improvement.

Activity 7: Public Speaking: Characteristics of effective Public speaking; possible barriers; watching demo online; topic assignment, information gathering & recording; delivery in front of the class; feedback & suggestions for improvement. (Different topic for each student)

Activity 8: Group Discussion: Importance and characteristics; Dos & Don'ts in GD; Demo display; assign topic for the group, Preparation & performance; feedback & suggestions for improvement.

Activity 9: Debate: Difference between Group Discussion & Debating; Watching demo of Debating; Topic for the group of 2 or 4; preparation and performance; feedback & suggestions for improvement.

Activity 10: Interview: Importance & purpose of Job Interview; Interview etiquettes; Watch demo interview; Appear for formal mock interview; feedback & suggestions for improvement.

ETEC151A BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING LAB

(Credits-4)

LIST OF EXPERIMENTS

1. To get familiar with the working knowledge of the following instruments:

a) Cathode ray oscilloscope (CRO)

b) Multimeter (Analog and Digital)

c) Function generator

d) Power supply

2.To measure phase difference between two waveforms using CRO

To measure an unknown frequency from Lissajous figures using CRO

3.To Verify the Thevenin‘ s and Norton‘s theorem

4.To Verify the Superposition theorem

5.To measure voltage, current and power in an A.C. circuit by LCR impedance method

6.To study the frequency response curve in series and parallel R-L-C circuit

a) Plot the forward and reverse V-I characteristics of P-N junction diode

b) Calculation of cut-in voltage

c) Study of Zener diode in breakdown region

8. To plot and study the input and output characteristics of BJT in common-emitter configuration.

9.Verification of truth tables of logic gates (OR, AND, NOT, NAND, NOR).

10. To get familiar with the working and use of seven-segment display.

ETME 155A ENGINEERING GRAPHICS LAB (Credits-1.5)

UNIT I

Introduction: Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning line conventions and free hand practicing, AUTO CAD, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes, Definitions of HP, VP, RPP & LPP, Creation of 2D/3D environment, Selection of drawing size and scale, Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints.

Orthographic Projections: Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes.

UNIT II

Orthographic Projections of Plane Surfaces (First Angle Projection Only): Introduction, Definitions– projections of plane surfaces–triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only.

UNIT III

Projections of Solids (First Angle Projection Only):

Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions.

Sections and Development of Lateral Surfaces of Solids: Introduction, Section planes, Sections, Section views, Sectional views, Apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP.

UNIT IV

Isometric Projection (Using Isometric Scale Only)

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres.

TEXTBOOKS:

1. Engineering Drawing - N.D. Bhatt & V.M. Panchal, Charotar Publishing House, Gujarat
2. Computer Aided Engineering Drawing - S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, revised edition.

REFERENCE BOOKS:

1. Engineering Graphics - K.R. Gopala Krishna, edition Subash Publishers Bangalore.
2. Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production-Luzadder Warren J., Duff John M., Eastern Economy Edition, -Prentice-
3. Hall of India Pvt. Ltd., New Delhi.

ETME 157A WORKSHOP PRACTICES (Credits-1.5)

UNIT I

Materials: Spectrography method for finding composition of materials.

Wood Working Shop: Making of various joints, Pattern making.

UNIT II

Foundry Shop: Bench molding with single piece pattern and two-piece pattern. Floor moulding - Making of bend pipe mould etc. Machine moulding - Making of mould using Match-plate pattern. Core making- Making and baking of dry sand cores for placing in horizontal, vertical and hanging positions in the mould cavity Fitting Shop: Learning use of fitting hand tools, marking tools, marking gauge. Exercises: Jobs made out of MS Flats, making saw - cut filling V-cut taper at the corners, circular cut, fitting square in square, triangle in square.

UNIT III

Welding Shop: Electric Arc Welding, Edge Preparations, Exercises making of various

joints. Bead Formation in horizontal, Vertical and Overhead positions. Gas Welding: Oxy-Acetylene welding and cutting of ferrous metals. Soldering: Dip soldering. Brazing: With Oxy-Acetylene gas.

UNIT IV

Sheet Metal Shop: Learning use of sheet-metal tools, Exercises: Making jobs out of GI sheet metal. Cylindrical, Conical and Prismatic shapes. Project Shop: Extrusion of soft metals, Plastic coating of copper wires,Plastic.

ETMA201A Applied Mathematics – III (Credits-4)

Unit I: **8 lecture hours**

Fourier series and its applications: Euler's formulae, Dirichlet's conditions, Change of interval, Fourier expansion of even and odd functions, Fourier expansion of square wave, Rectangular wave; Saw-toothed wave; half & full rectified wave functions, Harmonic analysis.

Unit II: **12 lecture hours**

Fourier integrals and Transforms: Fourier integral theorem, Fourier sine integral, Fourier cosine integral, Fourier sine Transform, Fourier cosine transform, Fourier transform and its properties, Finite Fourier sine transform, Finite Fourier cosine transform, Fourier transforms of derivatives.

Unit III: **12 lecture hours**

Complex Numbers and Functions of Complex Variables: De Moivre's theorem, Roots of complex numbers, Euler's theorem, Logarithmic Functions, Circular and Hyperbolic Functions, Limit, Continuity and Derivatives of complex functions, Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems

Unit IV: **8 lecture hours**

Complex Integration and Conformal mapping: Standard mappings (linear, square, inverse and bilinear), Complex line integral, Cauchy's integral theorem, Cauchy's integral formula, Zeroes and Singularities, Taylor series, Laurent's series, Calculation of residues, Residue theorem, Application of residue theorem to solve real integrals.

TEXTBOOKS

1. Kresyzig, "Advanced Engineering Mathematics", John Wiley and Sons.
2. Jain and Iyengar, "Advanced Engineering Mathematics", Narosa Publication.

Reference Books/Materials

1. B.S.Grewal, " Higher Engineering Mathematics", Khanna Publishers.
2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company.

ETCS219A Foundation of Computer Systems Credits-4

Unit I: **10 lecture hours**

Set Theory: Introduction to set theory, Set operations, Algebra of sets, Duality, Finite and Infinite sets, Classes of sets, Power Sets, Multi sets, Cartesian Product, Representation of relations, Types of relation, Equivalence relations and partitions , Partial ordering relations and lattices Function and its types, Composition of function and relations, Cardinality and inverse relations

Unit II: **10 lecture hours**

Graphs And Trees: Introduction to graphs, Directed and Undirected graphs, Homomorphic and Isomorphic graphs, Subgraphs, Cut points and Bridges, Multigraph and Weighted graph, Paths and circuits, Shortest path in weighted graphs, Eurelian path and circuits, Hamilton paths and circuits, Planar graphs, Euler's formula, Trees, Spanning trees, Binary trees and its traversals.

Unit III: **10 lecture hours**

Propositional logic: Basic operations: AND(^), OR(v), NOT(~), Truth value of a compound statement, propositions, tautologies, contradictions, Validity of Arguments

Group theory: Definition and examples of a monoid, Semigroup, Groups and rings, Homomorphism, Isomorphism and Auto morphism, Subgroups and Normal subgroups, Cyclic groups, Co-Sets, Lagrange's theorem.

Unit IV: **10 lecture hours**

Recursion and Recurrence Relation: linear recurrence relation with constant coefficients, Homogeneous solutions, Solutions, Total solution of a recurrence relation using generating functions.

Techniques Of Counting: Permutations with and without repetition, Combination.

Text Books

1. Keneth H. Rosen, "Discrete Mathematics and Its Applications", TMH.
2. C.L. Liu, "Elements of Discrete Mathematics", TMH.

Reference Books/Materials

1. Kolman, Busby & Ross, "Discrete Mathematical Structures", PHI.
2. NarsinghDeo, "Graph Theory with Application to Engineering and Computer Science", PHI.

ETCS217A Data Structures Credits-4

Unit I: **8 lecture hours**

Introduction to Data Structures: Definition of data structures and abstract data types, Static and Dynamic implementations, Examples and real life applications; Arrays**:** ordered lists, representation of arrays, sparse matrices, polynomial arithmetic

Running time: Analysis of Algorithms and their complexities: Time Complexities, Big – Oh - notation, Running Times, Best Case, Worst Case, Average Case, Factors depends on running time, Introduction to Recursion, Divide and Conquer Algorithm, Time & Space Tradeoff.

Unit II: **12 lecture hours**

The Stacks: ADT Stack and its operation, Array based implementation of stacks, Linked List based implementation of stacks, Examples: Infix, postfix, prefix representation, Conversions, Applications, Algorithms and their complexities

Queues and Lists: ADT Queue and its operation, Array based implementation of linear Queues, Circular implementation of Queues, Linked Lists: Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list Linked List implementation of Queues and Stacks Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority Queues, Applications, Algorithms and their complexities

Unit III: **12 lecture hours**

Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, Extended binary trees, traversing binary trees, Searching, Insertion and Deletion in binary search trees (with and without recursion), AVL trees, Threaded trees, B+ trees, algorithms and their analysis.

Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees, Shortest path, algorithms and their analysis.

Unit IV: **8 lecture hours**

Sorting Algorithms: Introduction, Sorting by exchange, selection sort, insertion sort, Bubble sort, Straight selection sort, Efficiency of above algorithms, Shell sort, Performance of shell sort, Merge sort, Merging of sorted arrays& Algorithms; Quick sort Algorithm analysis, heap sort: Heap Construction, Heap sort, bottom – up, Top – down Heap sort approach;

Searching Algorithms: Straight Sequential Search, Binary Search (recursive & non–recursive Algorithm

Text Books

1. E. Horowitz and S. Sahani, “Fundamentals of Data Structures”, Galgotia Book source Pvt. Ltd.
2. R. L. Kruse, B. P. Leung, C. L. Tondo, “Data Structures and program design in C”, PHI

Reference Books/Materials

1. Schaum’s outline series, “Data Structure”, McGraw Hills.
2. Y. Langsamet. al., “Data Structures using C and C++”, PHI.

ETCS257A Data Structures Lab Credits-1

List of Experiments (Indicative)

1	Write a program for multiplication and transpose of array.	2 lab hours
2	Write a program to compute the transpose of a sparse matrix	2 lab hours
3	Write a program to implement push and pop operation in Stack.	2 lab hours
4	Write a program to convert a Infix notation to post fix notation using stacks	2 lab hours
5	Write a program to evaluate postfix notation using stacks	2 lab hours
6	Write a program to implement a linear queue	2 lab hours
7	Write a program for swapping two numbers using call by value and call by reference strategies.	2 lab hours
8	Write a program to insert and delete a node in linked list. The number of nodes to inserted and deleted should be governed by user.	3 lab hours
9	Write a program to implement a linear search arrays and linked list.	2 lab hours
10	Using iteration and recursion concepts write programs for finding the element in the array using the Binary search method.	2 lab hours
11	Write the programs to implement bubble sort.	2 lab hours
12	Write a program using iteration and recursion concepts for quick sort.	2 lab hours
13	Write a program to implement merge sort.	2 lab hours
14	Write a program to simulate various tree traversal techniques.	3 lab hours
15	Write a program to simulate various BFS and DFS.	4 lab hours

ETCS222A Computer Organization and Architecture Credits-4

Unit I: **12 lecture hours**

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

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

Unit II: **10 lecture hours**

Introduction to x86 architecture.

CPU control unit design: hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU.

Memory system design: semiconductor memory technologies, memory organization.

Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers–program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes–role of interrupts in process state transitions, I/O device interfaces – SCII, USB

Unit III: **8 lecture hours**

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.

Unit IV: **10 lecture hours**

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

Text Books

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

Reference Books/Materials

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.

2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

ETCS220A Analysis and Design of Algorithms Credits-4

Unit I: **8 lecture hours**

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

Unit II: **12 lecture hours**

Fundamental Algorithmic Strategies: Brute -Force, Greedy, Dynamic Programming, Branch-and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

Unit III: **12 lecture hours**

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

Unit IV: **8 lecture hours**

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques. Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE

Text Books

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

Reference Books/Materials

1. Schaum's outline series, "Data Structure", McGraw Hills.
2. Y. Langsamet. al., "Data Structures using C and C++", PHI.

ETCS307A Database Management Systems Credits-4

Unit I: **12 lecture hours**

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit II: **8 lecture hours**

Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Unit III: **12 lecture hours**

Storage strategies: Indices, B-trees, hashing, Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery

Unit IV: **8 lecture hours**

Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection. Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

Text Books

1.“Database System Concepts”, 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

2. “Principles of Database and Knowledge – Base Systems”, Vol 1 by J.D. Ullman, Computer Science Press.

Reference Books/Materials

1. “Fundamentals of Database Systems”, R. Elmasri and S. Navathe, Pearson Education

ETMC226A Fundamentals of Management Credits-3

Unit I: **8 lecture hours**

Meaning of management, Definitions of Management, Characteristics of management, Management vs. Administration. Management-Art, Science and Profession. Importance of Management. Development of Management thoughts. Principles of Management. The Management Functions, Inter-relationship of Managerial functions. Nature and Significance of staffing, Personnel management, Functions of personnel management, Manpower planning, Process of manpower planning, Recruitment, Selection; Promotion - Seniority Vs. Merit. Training - objectives and types of training.

Unit II: **12 lecture hours**

Production Management: Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control. Brief introduction to the concepts of material management, inventory control; its importance and various methods.

Unit III: **12 lecture hours**

Marketing Management - Definition of marketing, marketing concept, objectives & Functions of marketing. Marketing Research - Meaning; Definition; objectives; Importance; Limitations; Process. Advertising - meaning of advertising, objectives, functions, criticism.

Unit IV: **8 lecture hours**

Introduction of Financial Management, Objectives of Financial Management, Functions and Importance of Financial Management. Brief Introduction to the concept of capital structure and various sources of finance.

Text book [TB]: Robbins S. P. (2009). Fundamentals of Management (6th Edition). Delhi Pearson.

Reference book(s) Text book [TB]: Robbins S. P. (2009). Fundamentals of Management (6th Edition). Delhi Pearson.

Reference book(s) [RB]:

Gupta R. S., Sharma B. D., & Bhalla N. S. (2011). Principles and Practice of Management (11th Edition), Kalyani Publishers.

Prasad L.M. (2016). Principles & Practices of Management (1st Edition). Sultan Chand & Sons.

Gupta C. B. (2013). Management: Principles and Practice (3rd Edition). Sultan Chand and Sons.

Tripathi, P.C. & Reddy P. N. (5th Edition). Principles of Management (5th Edition). McGraw Hill Education.

ETCS355A Database Management Systems Lab Credits-1

LIST OF EXPERIMENT

S.No	Experiment	No of Hours
1	Design a Database and create required tables. For e.g. Bank, College Database	4
2	Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.	2
3	Write a SQL statement for implementing ALTER, UPDATE and DELETE.	2
4	Write the queries to implement the joins.	4
5	Write the queries for implementing the following functions: MAX (), MIN (), AVG (), COUNT ().	2
6	Write the queries to implement the concept of Integrity constrains	4
7	Write the queries to create the views.	2
8	Perform the queries for triggers.	4
9	Perform the following operation for demonstrating the insertion, updating and deletion using the referential integrity constraints.	2
10	Do some more practice based on your class work.	2

Text Books

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

Reference Books/Materials

1. "Principles of Database and Knowledge – Base Systems", Vol 1 by J.D. Ullman, Computer Science Press.

2. "Fundamentals of Database Systems", R. Elmasri and S. Navathe, Pearson Education.

ETCS262A Analysis and Design of Algorithms Lab Credits-1

List of Experiments

1	To analyze time complexity of insertion sort	**2 lab hours**
2	To analyze time complexity of Quick sort	**2 lab hours**
3	To analyze time complexity of merge sort	**2 lab hours**
4	Implement Largest Common Subsequence.	**2 lab hours**
5	To Implement Optimal Binary Search Tree.	**2 lab hours**
6	To Implement Matrix Chain Multiplication.	**2 lab hours**
7	To Implement Strassen's matrix multiplication Algorithm.	**2 lab hours**
8	To implement Knapsack Problem.	**2 lab hours**
9	To implement Activity Selection Problem.	**2 lab hours**
10	To implement Dijkstra's Algorithm.	**2 lab hours**
11	To implement Warshall's Algorithm.	**2 Labs**
12	To implement Bellman Ford's Algorithm.	**2 Labs**
13	To implement Depth First Search Algorithm.	**1 Lab**
14	To implement Breadth First Search Algorithm.	**1 Lab**
15	To implement NaïveString MatchingAlgorithm.	**1 Lab**
16	To implement Rabin Karp String MatchingAlgorithm	**1 Lab**

ETCS214A Theory of Computation Credits-4

Unit I: **12 lecture hours**

Introduction to formal proof: Additional forms of proof, Inductive proofs, Finite Automata (FA), Deterministic Finite Automata (DFA), Non-deterministic Finite Automata (NFA), Finite Automata with Epsilon transitions.

Unit II: **8 lecture hours**

Regular Expression: FA and Regular Expressions, Proving languages not to be regular, Closure properties of regular languages, Equivalence and minimization of Automata.

Unit III: **12 lecture hours**

Context-Free Grammar (CFG): Parse Trees, Ambiguity in grammars and languages, Definition of the Pushdown automata, Languages of a Pushdown Automata, Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata. Normal forms for CFG, Pumping Lemma for CFL, Closure Properties of CFL, Turing Machines, Programming Techniques for TM.

Unit IV: **8 lecture hours**

A language that is not Recursively Enumerable (RE): An undecidable problem that is RE, Undecidable problems about Turing Machine, Post's Correspondence Problem.

Text Books

1. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education.

Reference Books/Materials

1. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education.

ETCS304A Computer Networks Credits-4

Unit I: **8 lecture hours**

Data communication Components: Representation of data and its flow Networks , Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum

Unit II: **12 lecture hours**

Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD,CDMA/CA

Unit III: **12 lecture hours**

Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

Unit IV: **8 lecture hours**

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography

Text Books

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.

Reference Books/Materials

ETCS365A Computer Networks Lab Credits-1

List of Experiments (Indicative)

1	Study of Network devices in detail	**2 lab hours**
2	Connect the computers in Local Area Network using packet tracer	**2 lab hours**
3	Implementation of Data Link Framing method - Character Count.	**2 lab hours**
4	Implementation of Data link framing method - Bit stuffing and Destuffing.	**2 lab hours**
5	Implementation of Error detection method - even and odd parity.	**2 lab hours**
6	Implementation of Error detection method - CRC Polynomials.	**2 lab hours**
7	Implementation of Data Link protocols - Unrestricted simplex protocol	**2 lab hours**
8	Implementation of data link protocols - Stop and Wait protocol	**2 lab hours**
9	Implementation of routing algorithms - Dijkstra's algorithm	**2 lab hours**
10	Study of Network IP Addressing using packet tracer	**2 lab hours**
11	Design TCP client and server application to transfer file	**2 lab hours**
12	Design UDP client and server application to transfer file	**2 lab hours**
13	Working on Network Protocol Analyzer Tool (Ethereal/Wireshark)	**4 lab hours**
14	Working on NMAP Tool for Port scanning	**4 lab hours**

ETCS361A Java Programming Lab Credits-1

List of Experiments (Indicative)

1	Create a java program to implement stack and queue.	**2 lab hours**
2	Write a java program to demonstrate dynamic polymorphism.	**2 lab hours**
3	Write a java program to implement various shapes using Abstract class	**2 lab hours**
4	Write a java program to demonstrate interfaces.	**2 lab hours**
5	Write a java program to show multithreaded producer and consumer application.	**2 lab hours**
6	Create a java programs that make use of all the 5 exception keywords.	**4 lab hours**
7	Convert the content of a given file into the uppercase content of the same file.	**4 lab hours**
8	Develop a scientific calculator using swings.	**4 lab hours**
9	Create a servlet that uses Cookies to store the number of times a user has visited your servlet.	**4 lab hours**
10	Create a simple java bean having bound and constrained properties.	**4 lab hours**

ETCS 255A Operating Systems Lab Credits-1

List of Experiments (Indicative)

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	**4 lab hours**
2	Write a C program to simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories – system processes and user processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for the processes in each queue.	**2 lab hours**
3	Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.	**4 lab hours**
4	Write a C program to simulate the following file allocation strategies. a) Sequential b) Indexed c) Linked	**4 lab hours**
5	Write a C program to simulate the MVT and MFT memory management techniques.	**4 lab hours**
6	Write a C program to simulate the following contiguous memory allocation techniques a) Worst-fit b) Best-fit c) First-fit	**2 lab hours**
7	Write a C program to simulate paging technique of memory management	**4 lab hours**
8	Write a C program to simulate the following file organization techniques a) Single level directory b) Two level directory c) Hierarchical	**4 lab hours**
9	Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.	**4 lab hours**
10	Write a C program to simulate page replacement algorithms a) FIFO b) LRU c) LFU	**2 lab hours**

ETCS412A Compiler Design Credits-4

Unit I:

Introduction to Compiling: Compilers, Analysis of the source program, the phase of a compiler, Cousins of the compiler, the grouping of phases, Compiler-constructions tools.
A Simple One-Pass Compiler: Syntax definition, Syntax-directed translation, Parsing, A translator for simple expressions, Lexical analysis, Incorporating a symbol table, Abstract stack machines.

Unit II: **12 lecture hours**

Lexical Analysis: The role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, A language of specifying lexical analyzers, Design of a lexical analyzer generator.
Syntax Analysis: The role of the parser, writing a grammar, Top-down parsing; Bottom-up parsing, Operator-precedence parsing, LR parsers, Using ambiguous grammars, Parser generators.

Unit III: **12 lecture hours**

Syntax-Directed Translation: Syntax-direct definitions, Construction of syntax trees, Bottom-up evaluation of S- attributed definitions, L-attributed definitions, and Top-down translation.
Type Checking: Type systems, Specification of a simple type checker.
Run-Time Environments: Source language issues, Storage organization, Storage-allocation strategies, Access to nonlocal names, Parameter passing, Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation techniques.

Unit IV: **8 lecture hours**

Intermediate Code Generation: Intermediate languages, Declarations, Assignment statements, Boolean expressions.
Code Generation: Issues in the design of a code generator, Target machine, Run-time storage management, Basic blocks and flow graphs.
Code Optimization: Introduction, The Principle sources of optimization.

Text Books

1. Aho, Ullman & Ravi Sethi, "Principles of Compiler Design", Pearson Education.

Reference Books/Materials

1. Andrew L. Appel, "Modern Compiler Implementation in C",Delhi, Foundation Books.
2. Dick Gruneet. Al., "Modern Compiler Design", Wiley Dreamtech.
1. R. J. Schalkoff, "Artificial Intelligence – An Engineering Approach", McGraw Hill Int. Ed. Singapore.
2. M. Sasikumar, S. Ramani, "Rule Based Expert Systems", Narosa Publishing House.
3. Tim Johns, "Artificial Intelligence, Application Programming", Wiley Dreamtech.

ETCS401A Artifical Intelligence Credit-4

Unit I: **8 lecture hours**

Scope of AI: Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques-search knowledge, abstraction. Problem Solving (Blind): State space search; production systems, search space control; depthfirst, breadth-first search. Heuristic Based Search: Heuristic search, Hill climbing, best-first search, A* Algorithm, Problem Reduction, Constraint Satisfaction

Unit II: **12 lecture hours**

Knowledge Representation: Predicate Logic: Unification, Modus Ponens, Modus Tokens, Resolution in Predicate Logic, Conflict Resolution Forward Chaining, Backward Chaining, Declarative and Procedural Representation, Rule based Systems. Structured Knowledge Representation: Semantic Nets: Slots, exceptions and default frames, conceptual dependency

Unit III: **12 lecture hours**

Handling Uncertainty: Non-Monotonic Reasoning, Probabilistic reasoning: Bayesian Inference, use of uncertainty factors. Natural Language Processing: Introduction, Syntactic Processing, Semantic Processing, Pragmatic Processing.

Unit IV: **8 lecture hours**

Learning: Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets. Expert Systems: Need and justification for expert systems, knowledge acquisition, Case Studies: MYCIN, RI.

Text Books

1. Artificial Intelligence, E. Rich and K. Knight, TMH.

Reference Books/Materials

1. Artificial Intelligence, P. H. Winston,Pearson Education.
2. Introduction to AI and Expert Systems, D. W. Patterson, PHI.
3. Principles of AI, N. J. Nilsson, Narosa Publishing House

ETCS451A Artificial Intelligence Lab Credits-1

List of Experiments (Indicative)

1	Write a program to solve 8-queens problem in Prolog.	**2 lab hours**
2	Solve any problem using depth first search in Prolog.	**2 lab hours**
3	Solve any problem using best first search in Prolog.	**2 lab hours**
4	Solve 8-puzzle problem using best first search in Prolog.	**2 lab hours**
5	Solve Robot (traversal) problem using means End Analysis.	**2 lab hours**
6	Solve traveling salesman problem in Prolog.	**2 lab hours**
7	Write a Program to Implement Tic-Tac-Toe game in Prolog/python.	**2 lab hours**
8	Write a Program to Implement Water-Jug problem.	**3 lab hours**
9	Write a Program to Implement Monkey Banana Problem using Python.	**2 lab hours**
10	Write a Program to Implement N-Queens Problem.	**4 lab hours**
11	Write a Program to Implement Missionaries-Cannibals Problems.	**4 lab hours**
14	Make a minor project using AI.	**3 lab hours**
15	Study about various applications of AI.	**4 lab hours**

ETCS320A Distributed Computing Systems Credits-3

Unit I: **8 lecture hours**

Introduction: Distributed Systems, Examples of Distributed Systems, Resource Sharing and the Web Challenges, System Models- Introduction, Architectural Models, Functional Models, Characterization of Distributed Systems, Client-Server Communication, Distributed Objects and Remote Invocation, Communication Between Distributed Objects, Remote Procedure Call, Events and Notifications.

Unit II: **8 lecture hours**

Distributed Operating Systems: Introduction, Issues, Communication Primitives, Inherent Limitations, Lamport's Logical Clock, Vector Clock, Causal Ordering, Global State, Cuts, Termination Detection, Distributed Mutual Exclusion, Non-Token Based Algorithms, Lamport's Algorithm - Token-Based Algorithms, Distributed Deadlock Detection Algorithms and Issues, Centralized Deadlock-Detection Algorithms, Agreement Protocols- Classification, Solutions, Applications.

Unit III: **8 lecture hours**

Distributed Resource Management: Distributed File systems, Architecture, Mechanisms, Design Issues, Distributed Shared Memory, Architecture, Algorithm, Protocols, Design Issues, Distributed Scheduling – Issues, Components, Algorithms

Unit IV: **8 lecture hours**

Introduction to Distributed Algorithms, Kinds of Distributed Algorithm, Timing Models, Synchronous Network Algorithms: Synchronous Network Model, Leader Election in a Synchronous Ring, Algorithms in a General Synchronous Networks, Resource Security and Protection – Introduction, the Access Matrix Model, Implementation of Access Matrix Model, Safety in the Access Matrix.

Text Books

1. Ajay D. Kshemkalyani and MukeshSinghal, "Distributed Computing – Principles, Algorithms and Systems", Cambridge University Press.

Reference Books/Materials

1. George Coulouris, Jean Dellimore and Tim KIndberg, "Distributed Systems Concepts and Design", Pearson Education, 4th Edition.
2. MukeshSinghal and N. G. Shivaratri, "Advanced Concepts in Operating Systems", McGraw-Hill.

ETCS420A Graph Theory Credits-3

Unit I: **10 lecture hours**

INTRODUCTION: Graphs, Introduction, Isomorphism, Sub graphs, Walks, Paths, Circuits, Connectedness, Components, Euler Graphs , Hamiltonian Paths and Circuits, Operations on Graph, The Travelling Salesman Problem, Sperner'sLeema, Trees, Properties of trees, Distance and Centers in Tree, Rooted and Binary Trees, Cayley's Theorem, Spanning trees, Fundamental Circuits,Spanning Trees in a Weighted Graph

Unit II: **10 lecture hours**

CONNECTIVITY & PLANARITY:, Cut Sets, Properties of Cut Set, All Cut Sets, Fundamental Circuits and Cut Sets, Connectivity and Separability, Network flows, Isomorphism, Combinational and Geometric Graphs, Planer Graphs , Kuratowski's Two Graphs, Different Representation of a Planer Graph, Detection of Planarity, Applications-The Chinese Postman Problem

Unit III: **12lecture hours**

MATRICES, COLOURING AND DIRECTED GRAPH: Incidence matrix, Submatrices, Circuit Matrix, Cut-Set Matrix,Path Matrix, Adjacency Matrix, Chromatic Number, Chromatic partitioning, Chromatic polynomial, Matching, Covering, Four Color Problem, Directed Graphs, Types of Directed Graphs, Digraphs and Binary Relations, Directed Paths and Connectedness, Euler DiGraphs, Adjacency Matrix of a Digraph, Paired Comparison and Tournaments

Unit IV: **8 lecture hours**

GRAPH ALGORITHM: Algorithms: Connectedness and Components, Spanning tree, Finding all Spanning Trees of a Graph, Set of Fundamental Circuits, Cut Vertices and Separability, Directed Circuits, Shortest Path Algorithm, DFS, Planarity Testing.

Textbooks

1. Graph Theory: With Application to Engineering and Computer Science, Narsingh Deo, PHI.

Reference Books

1. Introduction to Graph Theory, R.J. Wilson, Pearson Education.
2. A First Look at Graph Theory, Clark J. & Holton D.A, Allied Publishers.
3. Elements of Discrete Mathematics, Liu C.L, McGraw Hill.

Annexure (A1)

Scheme of studies as per Learning outcome Based Curriculam Framework (LOCF) and Choice based credits System (CBCS)

B.Tech (CSE)			**Year 2019-2023 (Scheme of Studies)**				**SOET**				
ODD SEMESTER							**EVEN SEMESTER**				
Year	**SNo**		**Course Code**	**Course Title**	**C**		**SNo**		**Course Code**	**Course Title**	**C**
First	1	SE	ETMA105A	Applied Mathematics-I	4		1	SE	ETMA104A	Applied Mathematics-II	4
	2	SE	ETPH109A	Engineering Physics	4		2	SE	ETEC101A	Basics of Electrical & Electronics Engineering	4
	3	SE	ETCH 125A	Environmental Studies	3		3	CC	ETCS112A	Object Oriented Programming	4
	4	CC	ETCS103A	Programming for Problem Solving	4		4	SE	ETEL101A	Communication Skills	4
	5	SE	ETME101A	Basics of Mechanical Engineering	4		5	OE		Open Elective-II	6
	6	OE		Open Elective-I	6		6	SE	ETME 155A	Engineering Graphics Lab	1.5
	7	SE	ETPH109A	Engineering Physics Lab	1		7	SE	ETEC151A	Basics of Electrical & Electronics Engineering Lab	1
	8	SE	ETME151A	Basics of Mechanical Engineering Lab	1		8	CC	ETCS 166A	Object Oriented Programming Lab	1
	9	CC	ETCS153A	Programming for Problem Solving Lab	1		9	SE	ETEL 171A	Communication Skills Lab	1
							10	SE	ETME 157A	Workshop Practices	1.5
	TOTAL				**28**		**TOTAL**				**28**

Second	1	SE	ETMA 201A	Applied Mathematics –III	4		1	CC	ETCS222A	Computer Organization & Architecture	4
	2	SE	ETEC 233A	Analog Electronics	4		2	SE	ETMA 208A	Numerical Analysis	4
	3	SE	ETEC 210A	Digital Electronics	4		3	SE	ETEC202A	Signals and Systems	4
	4	SE	ETCS219A	Foundation of Computer Systems	4		4	CC	ETCS220A	Analysis and Design of Algorithm	4
	5	CC	ETCS217A	Data Structures	4		5	CC	ETCS307A	Database Management Systems	4
	6	CC	ETCS211A	Operating Systems	4		6	SE	ETMC 226A	Fundamentals of Management	3
	7	SE	ETEC 263A	Analog Electronics Lab	1		7	CC	ETCS260A	Computer Organization & Architecture Lab	1
	8	SE	ETEC 256A	Digital Electronics Lab	1		8	CC	ETCS 355A	Database Management Systems Lab	1
	9	CC	ETCS257A	Data Structures Lab	1		9	CC	ETCS262A	Analysis and Design of Algorithm Lab	1
	TOTAL				**27**		**TOTAL**				**26**