K.R. MANGALAM UNIVERSITY

THE COMPLETE WORLD OF EDUCATION

Student Handbook
2018-19

School of Engineering & Technology

THE INSTITUTE FOR INVENTIONS, INNOVATIONS AND ENTREPRENEURSHIP (TIIIE)

From July 2018 K.R. Manglam University has gotten off to a very energetic start for the following reasons:

- **New Powerful Academic Team.** A very powerful and well known team of scientists and academics has now joined K. R. Mangalam University from Delhi University, Nalanada University and from other very famous places.

- **Active Partnership with Middlesex University.** The University has entered into a partnership with Middlesex University, London. The Middlesex University is a leading British university and there are many joint programs in the sciences, humanities and technology that are now available to you. This includes taking credit from Middlesex University courses or finishing your degree at Middlesex University or just taking up an internship at Middlesex University.

- **Our New Institute TIIIE offers Two Highly Powerful Degrees that are recognized worldwide:**

    o   **B. Tech Digital Humanities**

    o   **B. Tech. Innovation & Entrepreneurship with Mathematical Modeling & IT.**

These two programs have a very exciting content and project based pedagogy. They shall offer you enormous job and entrepreneurship opportunities in India and even abroad both in the private sector and the government sector. In case you want to go for higher studies abroad these two programs shall offer huge benefits.

- **Take Credit for Your Degree from TIIIE Courses.** You can also take credit for your non-TIIIE degree from various TIIIE courses.

- **Enjoy The Hackspace at TIIIE.** You are welcome to take part in developing any of your ideas in any subject from English Literature to Economics to Robotics to Film Making at the Open Hackspace at TIIIE.

K.R. MANGALAM UNIVERSITY

THE COMPLETE WORLD OF EDUCATION

SCHOOL OF ENGINEERING & TECHNOLOGY

**B.Tech., B.Sc.(H) & BCA Programmes
2018-19**

CONTENTS

1.   Introduction

The K.R. Mangalam Group has made a name for itself in the field of education. Over a period of time, various educational entities of the group have converged into fully functional corporate institutions. Resources at KRM have been continuously upgraded to optimize opportunities for the students. Our students are groomed in a truly inter-disciplinary environment where they grow up with integrative skills through interaction with students from engineering, social sciences, management and other study streams.

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. With mushrooming of institutions of Higher Education in the National Capital Region, the university considered it very important that students take informed decisions and pursue career objectives in an institution where the concept of education has evolved as a natural process.

K. R. Mangalam University is 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.

KRM University is unique because of its

i.   Enduring legacy of providing education to high achievers who demonstrate leadership in diverse fields.

ii.   Protective and nurturing environment for teaching, research, creativity, scholarship, social and economic justice.

Objectives

To impart undergraduate, post graduate and doctoral education in identified areas of higher education.

i.   To undertake research programmes with industrial interface.

ii.   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.

iii. To act as a nodal center for transfer of technology to the industry.

iv.   To provide job oriented professional education to the Indian student community with particular focus on Haryana.

2.   About the School of Engineering & Technology (SOET)

The School offers three undergraduate programmes: four years B.Tech., three years BCA, B.Sc. (H) in four specialization courses (Electronics Science/Computer Science/Data Sciences/Cyber Security) and postgraduate Programme: M.Tech. in various disciplines. These Engineering programs have the distinct objective of equipping the students with knowledge, skills and attitude in engineering and technology, so as to make them capable of successfully meeting the present requirements and future challenges in engineering profession. SOET brings together outstanding academics, industry professionals, 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 syllabus and curriculum are 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.

3.The Programmes offered by School of Engineering & Technology:

3.1 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.

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.

Programme scheme: -

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

3.2 B.Tech in Mechanical Engineering

This programme prepares the students for conceptualization, design, manufacturing and testing of a wide range of machines, materials, including automobiles, power plants, structures etc. it also trains the students in the area of Mechatronics, Automation, advanced manufacturing technology, renewable/alternate energy sources, engines for rockets and airplanes, ships, computer integrated manufacturing, CAD/CAM, apart from refrigeration and air conditioning systems etc.

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.

Programme scheme: -

For B.Tech   ME programme scheme is attached in Annexure A2.

3.3 B.Tech in Electrical and Electronics Engineering

This programme enables students to understand the systems of Electrical Machines, Power, Power Electronics & Drives, Microprocessors & Microcontrollers, Digital &Analog Electronics and related areas, etc.

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.

Programme scheme: -

For B.Tech EEE programme scheme is attached in Annexure A3.

3.4 B.Tech in Electronics and Communication Engineering

This programme provides a solid foundation of theoretical and practical knowledge of Electronic Devices & Circuits, Communication Systems, Microprocessors, VLSI Design and Embedded Systems. It also enables students to acquire knowledge of Wireless Communication, Digital

Signal Processing and Embedded Systems etc.

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.

Programme scheme: -

For B.Tech ECE programme scheme is attached in Annexure A4.

3.5 B.Tech in Civil Engineering

The Domain of Civil Engineering engulfs all the basic elements of safety, survival & sustenance of human life. This programme prepares students for conceptualization, design & construction of all the Civil engineering structures viz. Buildings, Roads and Fly Overs, etc. It also provides them with the professional input in Environmental Science along with River/ Dam Engineering and Mega Civil Projects.

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.

Programme scheme: -

For B.Tech CE program scheme attached in Annexure A5.

3.6 Bachelor of Computer Applications (BCA)

This Programme is aimed at developing a sound knowledge and understanding of concepts in key areas of Computer Science, Industrial Computing, Analysis and Synthesis involved in Computer Systems, Information Systems and Computer Applications, etc.

Duration: - 3 Years (6 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 with Mathematics/Computer Science/Informatics Practice/ on as one of the subjects and with an overall minimum aggregate of 50% or more.

For BCA program scheme attached in Annexure A6.

3.7 B.Sc.(H)(Computer Science)

This Programme is aimed at developing a sound knowledge and understanding of concepts in key areas of Operating System, Database System Concepts, Computer Networks, Web Technologies, Java Programming, Python Programming, etc.

Duration: - 3 Years (6 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 with Mathematics/Computer Science/Informatics Practice/ on   as one of the subjects and with an overall minimum aggregate of 50% or more.

For B.Sc.(H)(Computer Science) program scheme attached in Annexure A7.

3.8 B.Sc.(H)(Data Sciences)

This Programme is aimed at developing a sound knowledge and understanding of concepts in key areas of Operating Systems, Database System Concepts, Computer Networks, Web Technologies, Data Mining and Predictive Modelling, Big Data Analytics, etc.

Duration: - 3 Years (6 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 with Mathematics/Computer Science/Informatics Practice/ on as one of the subjects and with an overall minimum aggregate of 50% or more.

For B.Sc.(H)(Data Sciences) program scheme attached in Annexure A8.

3.9 B.Sc.(H)(Cyber Security)

This Programme is aimed at developing a sound knowledge and understanding of concepts in key areas of Software Engineering, Network Security and Stenography, Cyber Forensics, Computer Graphics and Multimedia, Ethical Hacking, IT Enabled Services, etc.

Duration: - 3 Years (6 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 with Mathematics/Computer Science/Informatics Practice/ on as one of the subjects and with an overall minimum aggregate of 50% or more.

For B.Sc.(H)(Cyber Security) program scheme attached in Annexure A9.

3.10 B.Sc.(H)(Electronics Science)

This Programme is aimed at developing a sound knowledge and understanding of concepts in key areas of Electronics Devices and Circuits, Communication Engineering, Microprocessor and Microcontroller, Information Theory and Coding, Mobile and Wireless Communication, etc.

Duration: - 3 Years (6 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 with Mathematics/Computer Science/Informatics Practice/ on as one of the subjects and with an overall minimum aggregate of 50% or more.

For B.Sc.(H)(Electronics Science)program scheme attached in Annexure A10.

4. Career Options

For B.Tech (CSE): - Opportunities are there in the field of IT Consulting, Solution Development , Design Engineering, Network Administrator, IT Manager, Hardware and Software Domains, PSUs, Defense & Civil Services.

For B.Tech (ME): - General industries Automobile, Aerospace, Power Sector, Railways, In specifics- R&D organizations, Academics , NTPC , ONGC , SAIL , DRDO, ISRO, BARC and all major auto manufacturers such as Maruti, Tata Motors , Escorts, Mahindra & Mahindra,Thermax,

Kalyani Forge , Hundai , Honda Motors , Defense and Civil Services, PSUs etc.

For B.Tech (EEE): - Power generation (NTPC, NHPC), Transmission (Power Grid) and Distribution (ABB); Design and Development, Manufacturing, utomation, Production and Maintenance, Operation and Control of any equipment or product which works on electricity (BHEL, ONGC, HPCL, BPCL, ISRO, IOCL, GAIL); Instrumentation Engineering, Communication Engineering and Computer Engineering; Research and Development organizations (CSIR, DRDO, BARC), PSUs, Academics, Defense& Civil Services, etc.

For B.Tech (ECE):- Telecom Industry (TRAI, BSNL, BBNL, MTNL, Ericsson, Nokia, Siemens, Honeywell, Alcatel¬ Lucent, ZTE); Hardware Designing (Mentor Graphics, Cadence, Delta Energy Systems, Silicom); Fabrication Industry (Intel, BEL, IBM, Freescale); Research and Development Laboratories (ISRO, CSIR, DRDO, BARC); Embedded Systems (ARCON, L&T); informatics (Google, Microsoft, NIELIT, DOEACC, C-DAC); Defense& Civil Services, (IMA, Indian Navy, Indian Air Force), Academics, Aviation Industry (AAI, Air India), PSUs, Defense & Civil Services, etc.

For B.Tech (CE): - All the major Infrastructure Developers; Railways, Govt. Departments other than CPWD I PWDs, PSUs, Environmental Agencies/ Industry, Defense & Civil Services, etc.

For BCA: -IT Sector requiring Application Developments, Software Testing and Maintenance, PSUs, Academics, Defense & Civil Services.

For B.Sc. (H)(Computer Science):- System integrator, Hardware Designer, Logic Designer, Systems Analyst, System Administrator, Computer programmer, Computer Scientist.

For B.Sc.(H)(Data Sciences):- Data Analyst, Data Scientist, Data Wrangler/Munger/Miner, Chief Technology Officer (CTO), Data Analytics Manager, Business Process Engineer, Machine Learning Scientist, Analytics Manager

For B.Sc.(H)(Cyber Security):- Systems Security, Information Security Management , forensic Science, Cyber Security, Ethical Hacking.

For B.Sc.(H)(Electronics Science):- Telecom Industry (TRAI, BSNL, BBNL, MTNL, Ericsson, Nokia, Siemens, Honeywell, Alcatel¬ Lucent, ZTE); Hardware Designing (Mentor Graphics, Cadence, Delta Energy Systems, Silicom); Fabrication Industry (Intel, BEL, IBM, Freescale); Research and Development Laboratories (ISRO, CSIR, DRDO, BARC); Aviation Industry (AAI, Air India), PSUs, Defense & Civil Services, etc.

5. Class Timings

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

6. Syllabi

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 the course objectives, syllabus (Unit I to IV), Text book and Reference books.

ETCS 103   INTRODUCTION TO COMPUTER SYSTEMS & PROGRAMMING   (Credits-4)

Course Objective: The objective of the course module is to introduce basics of Computers and its architecture. The course also covers Programming using C.

UNIT - I

Introduction to Computer and Programming: Overview of Computer organization and historical perspective computer applications in various fields of science and management. Data

representation: Number systems, character representation codes, Binary, hex, octal codes and their inter conversions, ASCII, EBCDIC, Gray code Binary arithmetic, Floating-point arithmetic, signed and unsigned numbers. Concept of algorithms, Flow Charts, Data Flow diagrams etc.

Introduction to the Editing tools such MS-VC editors, Concepts of the finite storage, bits bytes, kilo, mega and gigabytes, Concepts of character representation.

UNIT II

Programming using C: Example of some simple C program. Concept of variables, program statements and function calls from the library (printf for example) C data types, int, char, float etc., C expressions, arithmetic operation, relational and logic operations, C assignment statements, extension of assignment of the operations. C primitive input output using getchar and putchar, exposure to the scanf and printf functions, C Statements, conditional executing using if, else. Optionally switch and break statements may be mentioned.

UNIT III

Iterations and Subprograms: Concept of loops, example of loops in C using for, while and do-while. Optionally continue may be mentioned. One dimensional arrays and example of iterative programs using arrays & 2-d arrays, Use in matrix computations.

Concept of Sub-programming, functions Example of functions and Argument passing mainly for the simple variables.

UNIT IV

Pointers, Strings and Structures: Pointers, relationship between arrays and pointers Argument passing using pointers Array of pointers, passing arrays as arguments, Strings and C string library, Structure and Unions, Defining C structures, passing strings as arguments Programming examples.

Text Books:

1. Yashwant Kanetkar, "Let us C", BPB Publications.

Reference Book:

1. Kernighan & Ritchie, "C Programming Language", The (ANSI C Version), PHI
2. J B Dixit, "Fundamental of Computers and Programming in C".
3. Herbert Schildt, "C: The complete reference", Osbourne McGraw Hill.
4. V Raje Raman : "Computer Programming in C"
5. Rajaraman, "Fundamentals of Computers", Prentice Hall of India.

ETMC 121	PRINCIPLES OF MANAGEMENT	(Credits-3)

Course Objective: The basic objective of this course is to provide fundamental knowledge about business management & organization.

UNIT I:

Evolution of Management Thought: Introduction: Concept, Nature, Scope and Significance of Management, Contribution of Taylor and Fayol to Management, Management -As an Art and Science, Management Skills, Role of managers and importance of management, Corporate Social Responsibility.

UNIT II:

Planning Nature, scope and objectives of planning; Types of plans; planning process; Decision Making, Concept and Nature, Process and techniques of decision-making, Organizing Concept, nature, process and significance; Span of Management; Depart mentation; Types of an organization; Authority-Responsibility; Delegation and Decentralization; Formal and Informal Organization.

UNIT III:

Staffing: Concept, Nature and Importance of Staffing, Motivating and Leading: Nature and Importance of motivation; Types of motivation; Leadership - meaning and importance; Traits of a leader; Leadership Styles - Likert's Systems of Management, Managerial Grid, Coordination.

UNIT IV:

Controlling: Nature and Scope of control; Types of Control; Control process; Control techniques – traditional and modern; Effective Control System.

Text Books:

1.   Stoner, Freeman & Gilbert Jr, Management, Prentice Hall of India.

Reference Books
1.   Robbins S.P. & Decenzo David A., Fundamentals of Management: Essential Concepts and Applications, Pearson Education.
2.   Hillier Frederick S. & Hillier Mark S., Introduction to Management Science: A Modeling and Case Studies Approach with Spreadsheets, Tata McGraw-Hill.
3.   Robbins & Coulter, Management, Prentice Hall of India.
4.   Koontz, Principles of Management, Tata McGraw Hill.

ETMA 104	MATHEMATICS - II	(Credits-4)

Course Objective: Mathematics being mother of all sciences, knowledge of Mathematics is essential for a better understanding of almost all Engineering and Science subjects. Through this course module it is intended to make students well versed with the concept of basic topics from Mathematics to enable them pursue their Engineering degree in different disciplines.

UNIT-I

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 undetermined multipliers.

UNIT- II

Functions of Complex Variables: Limit, Continuity and Derivatives of complex functions, Analytic functions, Cauchy-Riemann equations, Harmonic functions, 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.

UNIT- III

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 - IV

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.

Text Books:

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

ETMA 105   **MATHEMATICS – I**   **(Credits-4)**

Course Objective: Knowledge of Mathematics is essential for proper understanding of all the engineering and Science subjects. Through this course it is intended to make the students in various disciplines get acquainted with basic concepts of different topics from Mathematics, which is needed to pursue their engineering degree in different disciplines.

UNIT - I

Complex Numbers and Infinite Series: De Moivre's theorem, Roots of complex numbers, Euler's theorem, Logarithmic Functions, Circular and Hyperbolic Functions, Convergence and Divergence of Infinite series, Necessary condition for convergence, Positive term infinite series test, Alternating series, Lebnitz test, Absolute and Conditional Convergence.

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

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- IV

Ordinary Differential Equations : Exact differential equations of first order and first degree, Linear differential equations of higher order with constant coefficients, Variation of parameters, Solution of simultaneous linear differential equations, Solution of homogeneous differential equations - Cauchy and Legendre forms.

Text Books:

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.

ETME 106   **ENGINEERING MECHANICS**   **(Credits-3)**

Course Objective: Engineering Mechanics is one of the core subjects that introduces the student to analysis of forces and motion and prepares the student for further studies and better understanding of engineering subjects like strength of materials and theory of machines.

UNIT - I

Force system: Free body diagram, Equilibrium equations and applications.

Friction: Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, friction of flat pivot and collared thrust bearings, Belt drive-derivation of equation. T1/T2 =e$\mu\theta$ and its application.

UNIT - II

Structure: Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

Distributed Force: Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass and moment of inertia area by direct integration, composite body method, radius of gyration, parallel axis theorem, Pappus theorems and polar moment of inertia.

UNIT - III

Kinematics of Particles: Rectilinear motion, plane curvilinear motion-rectangular coordinates, normal and tangential component.

Kinetics of Particles: Equation of motion, rectilinear motion and curvilinear motion, work energy equation, conservation of energy, impulse and momentum conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact.

UNIT - IV

Kinematics of Rigid Bodies: Concept of rigid body, type of rigid body motion, absolute motion, introduction to relative velocity, relative acceleration (Corioli's component excluded) and instantaneous center of velocity, Velocity and acceleration polygons for four bar mechanism and single slider mechanism.

Kinetics of Rigid Bodies: Equation of motion, translatory motion and fixed axis rotation, application of work energy principles to rigid bodies' conservation of energy.

Text Books:

1. Engineering Mechanics by A. K. Tayal (Umesh Publications).

Reference Books:

1. Engineering Mechanics by Irving H. Shames (PHI publications).
2. Engineering Mechanics by U.C .Jindal (Galgotia Publications).
3. Engineering Mechanics by Beer & Johnston, TMH
4. Engineering Mechanics by Subramanyam
5. Engineering Mechanics by D S Kumar
6. Engineering Mechanics by R S khurmi

ETME 107   **MANUFACTURING PROCESS**   **(Credits-3)**

Course Objective: The course module is designed to acquaint the engineering student perusing various disciplines, with basic manufacturing process like casting, forging, metal joining and sheet metal used in industries.

UNIT - I

Introduction: Manufacturing process, common Engineering materials, their properties and application.

Casting Processes: Principles of metal casting, Pattern materials, types and allowance, composition and properties of molding sand, foundry tools, concept of cores and core print, elements of gating system, description and operation of cupola, special casting processes e.g. die-casting; permanent mould casting; centrifugal casting; investment casting; casting defects.

UNIT - II

Smithy and Forging: Forging tool, Basic operations e.g. upsetting; fullering; flattening; drawing; swaging; drop; Forging; press forging.

Bench Work and Fitting: Fitting shop tools, operation: Fitting; sawing; chipping; thread cutting (with taps and dies); Marking and marking tools

UNIT - III

Metal joining: Welding Principles, classification of welding techniques, Oxyacetylene Gas welding, equipment And field of application, Arc-welding, metal arc, Carbon arc welding, submerged arc welding and Atomic hydrogen welding, TIG and MIG welding, electric resistance welding: spot; seam; flash; Butt and percussion welding, Flux: composition; properties and function, Electrodes, Types of Joints and edge preparation, Brazing and soldering, welding defects.

UNIT - IV

Sheet Metal Work: Tools and equipments, metals used for sheets, standard specification for sheets, Common.

Processes: blanking, punching, drawing, rolling; spinning; bending; embossing and coining.

Modern Trends In Manufacturing: Introduction to numerical control (NC) and computerized numerical control (CNC) machines.

Text Books:

1. Elements of Manufacturing Processes by Parashar, B. S. Nagendra, Mittal R. K. (PHI Publications)
2. Manufacturing Technology by P.N. Rao (TMH Publications)

Reference Books:

1. Workshop Technology by Hazra-Chowdhary
2. Production Engineering by R.K. Jain
3. Workshop Technology by Chapman
4. Manufacturing Process by Raghuvanshi.
5. Workshop Practice (Manufacturing Process) by S. K. Garg (Laxmi Publication)

ETPH 108   **PHYSICS II**   **(Credits-4)**

Course Objective: Objective of this course to acquaint engineering students with advanced mathematical concepts applicable to Electromagnetic wave propagation, solid state physics and

quantum mechanics, which is very relevant for students pursuing various engineering disciplines.

UNIT - I

Crystal structure: Bravais Lattice, inter planer distance, Miller indices, packing in solids, Point defects in crystal-Frankel and Schottky defects, chemical bonding in solids.

Experimental X-ray diffraction methods: production and properties of X-rays, X-ray diffraction, Bragg`s law, determination of crystal structure- powder method and rotating crystal method

UNIT - II

Quantum Mechanics & Statistical Physics: De-Broglie Hypothesis, Davisson Germer experiment, wave function and its properties, Wave Packet, group and phase velocity, Uncertainty principle. Time Dependent and independent Schrodinger Equation, Particle in a box (1-D), Qualitative Features of Maxwell Boltzmann, Bose-Einstein and Fermi-Dirac statistics distribution, functions & their comparison (no derivation)

Solid State Physics: Formation of energy bands in metals, semiconductors and insulators; intrinsic and extrinsic semiconductors, Fermi energy levels for doped, Un-doped semiconductors and P-N junction; Tunnel diode, Zener diode.

UNIT - III

Electromagnetic theory: Maxwell`s equations in integral and differential form, simple plane wave equation, Maxwell`s equations in different media, Poynting theorem and Poynting vector, physical significance of Maxwell`s equations.

Magnetism: Atomic magnetic moments, types of magnetism, Classical theory of diamagnetism, Classical theory of para magnetism, ferromagnetism, hysteresis, domain theory

UNIT IV

Free electron theory: Classical free electron theory, Drude Model for electrical conduction, Weidman- Franz law, drawbacks of classical free electron theory and quantum free electron theory, Fermi level, density of states, thermionic emission, Richardson`s equation

Superconductivity: Meissen Effect, Type I and Type II Superconductors, BCS theory (Qualitative only), London's equation, properties of superconductors & applications.

Text Books:
1. Materials Science and Engineering: An Introduction, VII Ed by William D. Callister, Jr.
2. Solid State Physics: S.O. Pallai.

Reference Books:
1. Electromagnetic waves and Radiating Systems :Jordan & Bal main
2. Concept of Modern Physics : A. BEISER
3. Solid State Physics : Kittle

ETPH 109   **PHYSICS I**   **(Credits-4)**

Course Objective: The objective of the course is to acquaint students with fundamental of graduate level physics which is the very basics of applied Science and Engineering

UNIT - I

Interference of Light: Wave theory, Huygen wave theory, Superposition theorem, Interference ,types of interference, Young`s double slit experiment, Fresnel Biprism, Interference due to thin

films, Wedge shaped film, Newton`s ring, Michelson Interferometer.

Diffraction: Diffraction, Types of diffraction, Fraunhoffer diffraction due to single slit, Diffraction due to N slits, absent spectra, Dispersive power, resolving power, Rayleigh criterion.

UNIT - II

Polarization: Polarization, Brewster and Malus law, phenomenon of double refraction, Nicol`s prism, production and detection of polarized light, Specific rotation, Laurent half shade polarimeter, biquartz-polarimeter.

Laser: Spontaneous and stimulated emission, population inversion, principle of LASER action, properties of LASER- coherence, intensity, mono-chromacity, He-Ne LASER, semiconductor LASER, applications.

UNIT - III

Fiber Optics: Introduction, numerical aperture and acceptance angle, types of optical fiber, V-number, attenuation and dispersion (Qualitative only), applications

Dielectrics: Molecular theory, different types of polarizations (Qualitative), dielectric constant, permittivity, displacement vector, electric susceptibility and various relations among them, Gauss law in dielectrics, energy stored in a capacitor, Classius-Mossotti equation, applications of dielectrics.

UNIT - IV

Mechanics: Central and non-central forces, inverse square law, SHM, damped, un-damped and forced oscillations.

Special Theory Of Relativity: inertial and non inertial frames of references, Michelson- Morley experiment, postulates of special theory of relativity, Lorentz transformation, length contraction, time dilation, addition of velocities, mass energy equivalence.

Text Books:
1. Optics by A. Ghatak
2. Optics by N. Subramanyam and Brij Lal

Reference Books:
1. Fundamentals of Optics by Jenkins and White
2. Mechanics: Berkeley Physics Course, vol.1 by C. Kittle
3. Mechanics by D.S. Mathur

| ETCS 112 | OBJECT ORIENTED PROGRAMMING | (Credits-3) |

Course Objective: The objective of the course module is to acquaint students with object-oriented programming using Programming C++.

UNIT – I

Introduction: Introducing Object-Oriented Approach related to other paradigms (functional, data decomposition), Characteristics of Object-Oriented Languages.

Basic terms and ideas: Abstraction, Encapsulation, Information hiding, Inheritance, Polymorphism, Review of C, Difference between C and C++, Cin, Cout, new, delete operators.

UNIT – II

Classes and Objects: Abstract data types, Object & classes, attributes, methods, C++ class

declaration, State identity and behavior of an object, Constructors and destructors, instantiation of objects, Default parameter value, Copy Constructor, Static Class Data, Constant and Classes, C++ garbage collection, dynamic memory allocation.

UNIT – III

Inheritance and Polymorphism: Inheritance, Types of Inheritance, Class hierarchy, derivation – public, private & protected, Aggregations', composition vs classification hierarchies, Polymorphism, Type of Polymorphism – Compile time and runtime, Method polymorphism, Polymorphism by parameter, Operator overloading, Parametric polymorphism, Generic function – template function, function name overloading, Overriding inheritance methods

UNIT – IV

Files and Exception Handling: Persistent objects, Streams and files, Namespaces, Exception handling, Generic Classes

Standard Template Library: Standard Template Library, Overview of Standard Template Library, Containers, Algorithms, Iterates, Other STL Elements, The Container Classes, General Theory of Operation, Vectors.

Text Books:

1. A.R. Venugopal, Raj Kumar, T. Ravishanker "Mastering C++", TMH.
2. R. Lafore, "Object Oriented Programming using C++", BPB Publications.

Reference Books:

1. D. Parasons, "Object Oriented Programming with C++", BPB Publication.
2. Steven C. Lawlor, "The Art of Programming Computer Science with C++", Vikas Publication.
3. Yashwant Kanethkar, "Object Oriented Programming using C++".
4. Schildt Herbert, "C++ Programming", 2nd Edition, Wiley DreamTech.

| ETEC 119 | ELECTRICAL SCIENCE | (Credits-4) |

Course Objective: The objective of the course is to provide a brief knowledge of Electrical Engineering technology to students of various engineering disciplines. The course module includes basic theorems, basic knowledge of current flow and voltages as well as basic knowledge of electrical network and sources of electrical energy.

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 and Application of theorem to the Analysis of DC 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.

UNIT – III

Measuring Instruments: Principles, Construction and application of moving coil, moving iron, dynamometer type, induction type instruments, extension of range of ammeter, voltmeter (shunt and multiplier), Two-wattmeter method, for the measurement of power, Cathode-ray Oscilloscope

and Applications.

UNIT - IV

Transformers: Construction and Working principles and phasor diagrams of Single-phase Transformer, E.M.F equation, Equivalent circuit, Regulation and efficiency, and Auto transformer.

Electrical Machines & Power Supply Systems: Construction and working, principles of dc motor and generator and its characteristics. Applications of DC machines, Power transmission through overhead lines and underground cables ,Construction and working principles of 3-cp-Induction motor, Torque- speed characteristics, and Industrial applications.

Text Books:

1. Vincent DEL TORO "Electrical Engineering Fundamental's Prentice Hall India".

Reference Books:

1. Electrical Engineering Fundamentals, V. Del Toro
2. Problems in Electrical Engineering – Parker Smith.S.
3. P.C. Sen "Principles of Electric Machines and Power Electronics", Wiley Eastern.
4. B L Thareja – A text book of Electrical Technology.

| ETCH 115 | ENGINEERING CHEMISTRY | (Credits-4) |

Course objective: The objective of this course is to introduce basics of engineering chemistry and the thermo chemistry and their application in engineering science.

UNIT - I

Water Technology: Introduction and characteristics of water; Hardness and its determination (EDTA method only); Alkalinity and its determination; Boiler feed water; Boiler problems - scale, sludge, priming & foaming, their causes & prevention; Caustic embrittlement & corrosion -Causes & prevention; Removal of silica & dissolved gases; Water softening processes : Lime - soda process, Ion exchange method, carbonate & phosphate conditioning, colloidal conditioning & calgon treatment; Water for domestic use.

UNIT – II

Fuels: Classification; Calorific value of fuel and its determination; Bomb calorimeter; Boy's Gas calorimeter; Solid fuels- Proximate and ultimate analysis, High & Low temperature carbonization, manufacture of coke (Otto-Hoffmann oven); Liquid Fuels - Petroleum-Chemical composition, fractional distillation, Thermal & catalytic cracking, Octane & Cetane No. and its significance; Power alcohol, Analysis of flue gases (Orsat's apparatus).

UNIT – III

Gaseous State And Thermo Chemistry: Gas laws and kinetic theory of gases; Distribution of molecular velocities; Mean free path; Real gases-non ideal behavior; Causes of deviation from ideal behavior; Vander Waal's equation; liquefaction of gases.

Hess's Law; Heat of Reaction; Heat of dilution; Heat of Hydration; Heat of neutralization and Heat of Combustion; Effect of temperature on heat of reaction at constant pressure (Kirchhoff s equation); Flame Temperature

UNIT - IV

The Phase Rule And Polymers: Definition of various terms, Gibb's Phase rule, Application of phase rule to one component system- The water system and carbon dioxide system, Two

component system:Lead-silver, Na2SO4-water.

Polymers and its classification, Mechanism of addition and condensation polymers, Coordination polymerization, Synthesis, properties and uses of urea formaldehyde, phenol formaldehyde, poly vinyl acetate and polythene; Conducting and bio-polymers.

Text Book:

1. Chemistry in Engineering & Technology (Vol. I & II) (Latest ed.), By J.C. Kuriacose & J. Rajaram.

Reference Books:

1. Principles of Physical Chemistry, (Latest ed.), Puri B.R., Sharma L.R. and Pathania, M.S.
2. Text book of Engg. Chemistry, S. Chand & Co., (Latest ed.), S.S. Dara

| ETEL 117 | COMMUNICATION SKILLS | (Credits-4) |

Course Objective: The purpose of this course is to

- Understand the basics of Grammar to improve communication and speak correct form of English
- Improve students' personality and enhance their self-confidence

UNIT I

Introduction to Communication: Meaning, Forms & Types of Communication; Process of Communication; Principles of Effective Communication/7Cs, Barriers in Communication

UNIT II

Essentials of Grammar: Parts of Speech: Noun, Pronoun, Adjective, Verb, Adverb, Preposition, Conjunction, Interjection; Using tenses; Articles; Reported Speech; Punctuation

UNIT III

Building Vocabulary: Word Formation (by adding suffixes and prefixes); Common Errors; Words Often Confused; Homonyms and Homophones; Antonyms/Synonyms, Phrasal Verbs

UNIT IV

Personality Development: Public Speaking; Body Language: Posture, Gesture, Eye Contact, Facial Expressions; Presentation Skills/ Techniques

Text Book:

1. Sanjay Kumar and Pushp Lata, Communication Skills, Oxford University Press.
   References Books:
2. M.L.Tickoo, A. E. Subramanian and P.R. Subramanian, Intermediate Grammar, Usage and Composition, Orient Blackswan.
3. Barun K Mitra, Personality Development and Soft Skills, Oxford University Press.

| ETCA118 | DATA STRUCTURES | (Credits-4) |

Course Objective: The main objective of this course is to provide an introduction to basic data structures, and algorithms for manipulating them, by using C programming language. This course specifically has the following objectives: The fundamental design, analysis, and implementation of basic data structures and algorithms; the analysis and evaluation of the data structure needs of particular problems; the design, analysis, and implementation of C programs by using basic data

structures and algorithms.

UNIT I

Introduction to Data Structures: Basic Terminology, Elementary Data Organizations, Classification of data structures and its operations.

Arrays: Representation of single and multidimensional arrays

Arrays - Lower and upper triangular matrices and Tri-diagonal matrices; addition and subtraction of two sparse arrays, Multidimensional, and, sparse arrays, to be given elementary treatment.

Stacks and Queues: Introduction and primitive operations on stack; Stack applications: Polish Notation; Evaluation of postfix expression; Conversion from infix to postfix; Introduction and Primitive operations on queues, circular queue and priority queue.

UNIT II

Lists: Introduction to linked lists; Sequential linked lists, operations: traversal, Insertion, deletion, searching, doubly linked list.

Trees: Introduction and terminology; binary tree, Traversal of binary trees: inorder, preorder, postorder and their algorithms. Binary tree operations: insertion and deletion;

UNIT III

Binary search tree, Searching and inserting in binary search, B-tree and AVL-Tree.

Graph:- Introduction, graph theory terminologies, insertion and deletion in graph, breath first search, depth first search, spanning tree, kruskal algorithm, Prim's Algorithm.

UNIT IV

Searching Techniques: Linear search and binary search.

Sorting Techniques: Insertion sort, selection sort, bubble sort, merge sort. Indexing and Hashing.

Text Books:

1. Ashok N. Kamthane, "Introduction to Data Structures in C", Pearson Edu.
2. Y. Langsam, Tananbaum et. al., "Data Structures using C and C++", PHI.

References Books:

1. Yashwant Kanetkar, "Data Structures Through C", BPB Publications.
2. A.K. Sharma, " Data Structure Using C", Pearson
3. P. S. Deshpande and O.G. Kakde, "C & Data Structure", Wiley Dreamtech.
4. E. Horowitz and S. Sahani, "Fundamentals of Data Structures", Galgotia Book Source Pvt. Ltd.
5. Schaum's outline series, Data Structure, TMH.

ETCA 121   INTRODUCTION TO COMPUTERS & IT, OFFICE AUTOMATION   (Credits-5)

Course Objective: This course on fundamental of computers and data handling would ensure that the students get first-hand exposure to the fundamentals of computers and get acquainted with handling of the same. Also, it would make them at ease with data-related abilities.

UNIT – I

Introduction to Computers:

The Evolution of Computers: Computer Generation from First Generation to Fifth Generation. Classifications of Computers: Micro, Mini, Mainframe and super computers, Distributed

Computer System, Parallel Computers. Computer Hardware: Major Components of a digital computer, Block Diagram of a computer Input devices, Output Device. Computer Memory: Memory Cell, Overview of Memory Organization and Primary Memory: RAM & ROM, Secondary memory: Magnetic tapes, Magnetic disk, CD-ROM, DVD.

UNIT – II

Introduction to System Software and Operating System:

Computer Software: Machine language, assembly language, high-level languages, fourth generation language, assemblers, compilers, interpreters, linkers, loaders.

Operating System concepts: different types of operating systems, functions of operating system, concept of multiprogramming, multitasking, multithreading, multiprocessing, time-sharing, real time, single-user & multi-user operating system.

UNIT – III

Programming Concepts & Techniques:

Algorithms, flow chart, decision tables, pseudo code, characteristics of a good programming language, planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming, Advantages and disadvantages of Structured programming.

UNIT – IV

Computer Networks & the Internet:

Basic elements of a communication system, Data transmission modes, Data transmission media, Network topologies, Network Types (LAN, WAN and MAN), Client and Servers, Intranet, Extranet.

Internet: Terminology related to Internet: Protocols, TCP/IP, HTTP, Internet addressing, Domain Names, DNS, URL, World Wide Web. Overview of various services on Internet: Webservers, E-mail, FTP, Telnet.

Text Books

1. P. K. Sinha & Priti Sinha, "Computer Fundamentals", BPB Publications.
2. Anita Goel "Computer Fundamentals", Pearson.

Reference Books

1. B. Ram Computer fundamentals Architecture and Organization, New Age Intl.
2. Alex Leon & Mathews Leon, "Introduction to Computers", Vikas Publishing.
3. Norton Peter, "Introduction to computers", TMH.
4. Vikas Gupta, "Comdex Computer Kit", Wiley Dreamtech, Delhi.

ETCA 124   COMPUTER ORGANIZATION AND ARCHITECTURE   (Credits-5)

Course Objective: The objective of the course is to acquaint students with the basic architecture of the computer system. The course module includes Sequential Logic, Sequential Circuits, Memory & I/O Devices and Instruction Design & I/O Organization.

UNIT I

Sequential Logic: Characteristics, Flip-Flops, Clocked RS, D type, JK, T type and Master-Slave flip-flops. State tables, State diagrams and State equations. Flip-Flop excitation tables

UNIT II

Sequential Circuits: Designing registers – Serial Input Serial Output (SISO), Serial Input Parallel Output (SIPO), Parallel Input Serial Output (PISO), Parallel Input Parallel Output (PIPO) and shift registers. Designing counters – Asynchronous and Synchronous Binary Counters, Modulo-N Counters and Up-Down Counters.

UNIT III

Memory & I/O Devices: Memory Parameters, Semiconductor RAM, ROM, Magnetic and Optical Storage devices, Flash memory, I/O Devices and their controllers.

UNIT IV

Instruction Design & I/O Organization: Machine instruction, Instruction set selection, Instruction cycle, Instruction Format and Addressing Modes. I/O Interface, Interrupt structure, Program-controlled, Interrupt-controlled & DMA transfer, I/O Channels, IOP.

Text Books:

1. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
2. V. Rajaraman, T. Radhakrishnan, an Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.

Reference Books:

1. Andrew S. Tanenbaum Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
2. Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill

| ETCH 125 | ENVIRONMENTAL STUDIES | (Credits-3) |

Course Objectives: This course in environmental studies will develop the:

- Basic understanding about the concept related to environment such as eco system and biodiversity.
- Insight about the various concerns regarding environment such as population and social issues.

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:

a) Forest ecosystem
b) Grassland ecosystem
c) Desert ecosystem
d) 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 wild life 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.

Text Books:

1. Erach Bharucha, 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.

ETCA 127	DIGITAL LOGIC	(Credits-5)

Course Objective: The objective of the course is to acquaint students with fundamental of digital electronics. The course module includes number systems, logical gates and circuits.

UNIT I

Information Representation: Number Systems, Binary Arithmetic, Fixed-point and Floating-point representation of numbers, BCD Codes, Error detecting and correcting codes, Character Representation – ASCII, EBCDIC, Unicode

UNIT II

Binary Logic: Boolean algebra, Boolean Theorems, Boolean Functions and Truth Tables, Canonical and Standard forms of Boolean functions, Simplification of Boolean Functions – Venn diagram, Karnaugh Maps.

UNIT III

Digital Logic: Basic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR etc. NAND, NOR, AND-OR-INVERT and OR-AND-INVERT implementations of digital circuits, Combinational Logic – Characteristics, Design Procedures, analysis procedures, Multilevel NAND and NOR circuits.

UNIT IV

Combinational Circuits: Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor, Encoders, Decoders, Multiplexers, Demultiplexers, Comparators, Code Converters, BCD to Seven-Segment Decoder, Flip-Flops, Master Slave Flip-Flop, Counters.

Text Books

1. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
2. V. Rajaraman, T. Radhakrishnan, an Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.

Reference Books

1. Andrew S. Tanenbaum Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
2. Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill

ETCA 129	INTRODUCTION TO PROGRAMMING	(Credits-5)

Course Objective: The objective of the course module is to introduce basics of 'C' Programming language.

UNIT-I

Overview of C: History of C, Importance of C, Structure of a C Program. Elements of C: C character set, identifiers and keywords, Data types, Constants and Variables, Assignment statement, Symbolic constant.

Input/output: Unformatted & formatted I/O function in C, Input functions viz. scanf (), getch (),

getche (), getchar (), gets (), output functions viz. Printf (), putch (), putchar (), puts ().

UNIT II

Operators & Expression: Arithmetic, relational, logical, bitwise, unary, assignment, conditional operators and special operators. Arithmetic expressions, evaluation of arithmetic expression, type casting and conversion, operator hierarchy & associativity.

Decision Making & Branching: Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, switch statement, goto statement.

UNIT III

Decision Making & Looping: For, while, and do-while loop, jumps in loops, break, continue statement.

Functions: Definition, prototype, passing parameters, call by value and call by reference, recursion.

UNIT IV

Arrays: Definition, types, initialization, processing an array, passing arrays to functions, Strings & arrays.

Pointers, Strings and Structures: Pointers, relationship between arrays and pointers Argument passing using pointers Array of pointers, passing arrays as arguments. Strings and C string library, Structure and Unions, Defining C structures, passing strings as arguments Programming examples.

Text Books

1. Gottfried, Byron S., Programming with C, Tata McGraw Hill
2. Balagurusamy, E., Programming in ANSI C, Tata McGraw-Hill

Reference Books

1. Jeri R. Hanly & Elliot P. Koffman, Problem Solving and Program Design in C, Addison Wesley.
2. Yashwant Kanetker, Let us C, BPB.
3. Rajaraman, V., Computer Programming in C, PHI.
4. Yashwant Kanetker, Working with C, BPB.

ETCA 136   **WEB TECHNOLOGIES**   **(Credits-4)**

UNIT I

History of the Internet and World Wide Web, Search Engines, News-group, E-mail and its Protocols, Web Portal, Browsers and their functions, URLs, web sites, Domain names.

Static Web Development: HTML - Introduction to HTML, HTML Document structure tags, HTML comments, Text formatting, inserting special characters, anchor tag, adding images and sound, lists: types of lists, tables, frames and floating frames, Developing Forms, Image maps.

UNIT II

Introduction to Java Script: Data Types, Control Statements, operators, Built in and User Defined Functions, Objects in Java Script, Handling Events.

Cascading Style Sheet: Types of Style Sheets – Internal, Inline and External style sheets; creating styles and link tag.

UNIT III

DHTML: Introduction to DHTML, JavaScript & DHTML, Document Object Model, Filters and Transitions, DHTML Events, Dynamically change style to HTML Documents.

UNIT IV

Introduction to WYSIWYG Design tools, Introduction to Dreamweaver, Website Creation and maintenance, Web Hosting and Publishing Concepts, **XML:** Introduction to XML-Mark up languages, Features of Mark up languages, XML Naming rules, Building block of XML, Document, Difference between HTML & XML, Components of XML, XML Parser, DTD's Using XML with HTML and CSS

Textbooks:

1. The complete reference HTML, by Thomas A Powell, TMH publication.
2. Mastering HTML 4.0 by Deborah S. Ray and Erich J. Ray. BPB Publication.

Reference Books:

1. HTML Black Book, Stephen Holzner, Wiley Dreamtech.
2. Rajkamal, "Web Technology", Tata McGraw-Hill.
3. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson.
4. XML How to Program by Deitel Nieto.
5. Internet and World Wide Web Deitel HM, Deitel ,Goldberg , Third Edition

| **ETMA 163** | **BASIC OF MATHEMATICS** | **(Credits-4)** |

Course Objective: The objective of the course is to provide a brief knowledge of Mathematics to the BCA students. The students will learn about the Matrices, Sequence and Series, Differentiation and Integration.

UNIT I:

Determinants: Definition, Minors, Co-factors, Properties of Determinants, Applications of determinants in finding area of triangle.

Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Solution of system of linear equation by Cramer's Rule.

UNIT II:

Sequence and Series: Introduction, Sequences, Series, Arithmetic Progression(A.P), Geometric Progression(G.P), Relationship Between A. M. and G.M., Sum to N terms of Special Series, Principle of Mathematical Induction.

UNIT III:

Differentiation: Derivative of a function, Derivatives of sum, differences, product, and quotient of functions, Derivative of polynomial, trigonometric, exponential, logarithmic, inverse trigonometric and implicit functions, Logarithmic Differentiation, Derivatives of functions in parametric forms, Differentiation by substitution.

UNIT IV:

Integration: Indefinite integrals, Methods of integration: by substitution, by parts, by partial fractions, Integration of algebraic and transcendental functions.

Text Books:

1. A Textbook of Mathematics for XI-XII Students, NCERT Publication Vol. I-II.

Reference Books:

1. Shanti Narayan, Integral calculus, Sultan Chand & Co.
2. Shanti Narayan, Differential calculus, Sultan Chand & Company.
3. Babu Ram, Engineering Mathematics, Pearson Education.

ETMA 144   DIFFERENTIAL EQUATIONS & OPTIMIZATION TECHNIQUES   (Credits-4)

Course Objective: The objective of the course is to provide a brief knowledge of Mathematics to the BCA students. The students will learn about the Limits and Continuity, Differential Equations, Statistics, Linear Programming.

UNIT I

Limits and Continuity: Limit at a point, Properties of limit, Computation of limits of various types of functions, Continuity of a function at a point, Continuity over an interval, sum, product and quotient of continuous functions, Intermediate Value Theorem, Types of discontinuities.

UNIT II

Ordinary Differential Equations : Introduction, Basic Concepts, General and particular solutions of a differential equation, Formation of a differential equation, Methods of solving first order, first degree differential equation- Separation of Variable, Homogeneous differential equations, Linear differential equations.

UNIT III

Statistics: Definition, Importance & Limitation of Statistics, Types of data, Data collection technique, Presentation of data- tabulation, bars, histogram, diagrammatic, Measures of central tendency – mean, median and mode.

UNIT IV

Linear Programming: Linear programming problems formulation, solution of linear programming problem using graphical method, simplex method, Big-M method, Duality concept.

Text Books

1. A textbook of Mathematics for XI-XII Students, NCERT Publication Vol. I-II.

Reference Books:

1. S.P. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons.
2. S.P. Gupta, and P.K. Gupta, Quantitative Techniques and Operations Research, Sultan Chand & Sons.
3. R.L. Rardin, Optimization in Operations Research, Prentice Hall.

BSMA133   CALCULUS   (Credits-4)

Course Objective: Study of the topics of the course will enable the students to

• Build knowledge about the basics of geometry and its applications.
• Tracing of a curve.

UNIT I

Definition of the limit of a function; Basic properties of limits; Continuous functions and classification of discontinuities; Differentiability; Successive differentiation; Leibnitz theorem; Maclaurin and Taylor series expansions.

UNIT II

Asymptotes in Cartesian coordinates; intersection of curve and its asymptotes; asymptotes in polar coordinates; Curvature, radius of curvature for Cartesian curves, parametric curves, polar curves; Newton's method; Radius of curvature for pedal curves; Tangential polar equations. Centre of curvature. Circle of curvature. Chord of curvature; evolutes; Tests for concavity and convexity; Points of inflexion; Multiple points; Cusps, nodes & conjugate points; Type of cusps.

UNIT III

Tracing of curves in Cartesian, parametric and polar co-ordinates; Reduction formulae; Rectification; intrinsic equations of curve

UNIT IV

Quardrature (area) Sectorial area; Area bounded by closed curves. Volumes and surfaces of solids of revolution

TEXT BOOKS:

1. Shanti Narayan; Differential Calculus; S.Chand New Delhi.
2. Shanti Narayan; Integral Calculus; S.Chand, New Delhi.

REFERENCE BOOKS:

1. Murray R. Spiegel; Theory and Problems of Advanced Calculus, Schaun's Outline series; Schaum Publishing Co., New York.
2. N. Piskunov; Differential and integral Calculus; Peace Publishers, Moscow.
3. Gorakh Prasad; Differential Calculus; Pothishasla Pvt. Ltd., Allahabad.
4. Gorakh Prasad; Integral Calculus; Pothishala Pvt. Ltd., Allahabad.

| ETCS135 | INTRODUCTION TO PROGRAMMING | (Credits-4) |

Course Objective: The objective of the course module is to introduce basics of 'C' Programming language.

UNIT-I

Overview of C: History of C, Importance of C, Structure of a C Program. Elements of C: C character set, identifiers and keywords, Data types, Constants and Variables, Assignment statement, Symbolic constant.

Input/output: Unformatted & formatted I/O function in C, Input functions viz. scanf(), getch(), getche(), getchar(), gets(), output functions viz. printf(), putch(), putchar(), puts().

UNIT-II

Operators & Expression: Arithmetic, relational, logical, bitwise, unary, assignment, conditional operators and special operators. Arithmetic expressions, evaluation of arithmetic expression, type casting and conversion, operator hierarchy & associativity.

Decision making & branching: Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, switch statement, goto statement.

UNIT III

Decision making & looping: For, while, and do-while loop, jumps in loops, break, continue statement.

Functions: Definition, prototype, passing parameters, call by value and call by reference, recursion.

UNIT IV

Arrays: Definition, types, initialization, processing an array, passing arrays to functions, Strings & arrays.

Pointers, Strings and Structures: Pointers, relationship between arrays and pointers Argument passing using pointers Array of pointers. Passing arrays as arguments. Strings and C string library. Structure and Unions. Defining C structures, passing strings as arguments Programming examples.

Text Books

1. Gottfried, Byron S., Programming with C, Tata McGraw Hill
2. Balagurusamy, E., Programming in ANSI C, Tata McGraw-Hill

Reference Books

1. Jeri R. Hanly & Elliot P. Koffman, Problem Solving and Program Design in C, Addison Wesley.
2. Yashwant Kanetker, Let us C, BPB.
3. Rajaraman, V., Computer Programming in C, PHI.
4. Yashwant Kanetker, Working with C, BPB.

| BSMA219 | PARTIAL DIFFERENTIAL EQUATIONS | (Credits-4) |

Course Objective: The objective of the course module is to

- Provide a brief knowledge of Partial Differential Equations.
- The students will learn about the linear partial differential equations and calculus of variation.

UNIT I

Partial differential equations: Formation, order and degree, Linear and Non-Linear Partial differential equations of the first order: Complete solution, singular solution, General solution, Solution of Lagrange's linear equations, Charpit's general method of solution. Compatible systems of first order equations, Jacobi's method.

UNIT II

Linear partial differential equations of second and higher orders, Linear and non-linear homogenous and non-homogenous equations with constant co-efficient, Partial differential equation with variable co-efficients reducible to equations with constant coefficients, their complimentary functions and particular Integrals, Equations reducible to linear equations with constant co-efficients.

UNIT III

Classification of linear partial differential equations of second order, Hyperbolic, parabolic and elliptic types, Reduction of second order linear partial differential equations to Canonical (Normal) forms and their solutions, Solution of linear hyperbolic equations, Monge's method for partial differential equations of second order.

UNIT IV

Cauchy's problem for second order partial differential equations, Characteristic equations and characteristic curves of second order partial differential equation, Method of separation of variables: Solution of Laplace's equation, Wave equation (one and two dimensions), Diffusion (Heat) equation (one and two dimension) in Cartesian Coordinate system.

TEXT BOOK:

1.   M.D. Raisinghania; *Ordinary And Partial Differential Equations*; S.Chand, New Delhi.

REFERENCE BOOKS:

1.   D.A.Murray; *Introductory Course on Differential Equations;* Orient Longman (India).
2.   Erwin Kreyszing; *Advanced Engineering Mathematics;* John Wiley & Sons, Inc., New York.
3.   A.R. Forsyth; *A Treatise on Differential Equations;* Macmillan and Co. Ltd.
4.   I. N.Sneddon; *Elements of Partial Differential Equations*; McGraw Hill Book Company.

ETCS217   **Data structures**   **(Credits-4)**

Course Objective: The main objective of this course is to provide an introduction to basic data structures, and algorithms.

UNIT I

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: Time Complexity, Big – Oh - notation, Running Times, Best Case, Worst Case, Average Case, Factors depends on running time, Introduction to Recursion, Divide and Conquer Algorithm, Evaluating time Complexity.

UNIT II

The Stacks: Definition, Array based implementation of stacks, Linked List based implementation of stacks, Examples : Infix, postfix, prefix representation, Conversions, Applications.

Queues and Lists: Definition, 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.

UNIT III

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

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

UNIT IV

Sorting Algorithms: Introduction, Sorting by exchange, selection, insertions : 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 Algorithms)

TEXT BOOKS:

1. E. Horowitz and S. Sahani, "Fundamentals of Data Structures", GalgotiaBooksource Pvt. Ltd.
2. R. L. Kruse, B. P. Leung, C. L. Tondo, "Data Structures and program design in C", PHI.

REFERENCES BOOKS:

1. Schaum's outline series, "Data Structure", TMH.
2. Y. Langsamet. al., "Data Structures using C and C++", PHI.
3. Yashwant Kanetkar, "Data Structure through C", BPB.

| ETEL111 | SOFT SKILLS & PERSONALITY DEVELOPMENT | (Credits-3) |

UNIT I

Soft Skills: Inter & intra personal qualities; Leadership; Team spirit; Decision Making; Effective listening for effective communication; Speeches by *Martin Luther King* & *Charlie Chaplin* (Listen to the speech and its pronunciation, tone and intonation; content analysis to know the message and also discuss the personality of the speaker).

UNIT II

Career Management: Resume and C V writing, Job applications, Interviews, Group Discussion Techniques, Negotiation and Meeting Skills, Presentation skills, Speeches by *John F. Kennedy* & *G. Vivekananda* (Listen to the speech and its pronunciation, tone and intonation; content analysis to know the message and also discuss the personality of the speaker).

UNIT III

Written Communication: Employment related correspondence, Report Writing, Editing the given document; Phonetics: Importance, Speech articulation, Transcription, Speeches by *APJ Abdul Kalam* & *Shashi Tharoor* (Listen to the speech and its pronunciation, tone and intonation; content analysis to know the message and also discuss the personality of the speaker).

UNIT IV

Etiquettes & Manners: Effective non-verbal communication; Hospitality Tips; Corporate behaviour; Etiquettes at Business Meetings; Transcultural Etiquettes; Speeches by *Barack Obama* & *Narendra Modi* (Listen to the speech and its pronunciation, tone and intonation; content analysis to know the message and also discuss the personality of the speaker).

TEXT BOOK:

1. Prasad, P. *Functional Aspects of .Communication Skills.*4th Ed. S.K. Kataria & Sons, New Delhi.2008

REFERENCE BOOKS:

1. Sinha, K.K. *Business Communication*. Galgotia Publishers.
2. Mitra, Barun K. *Personality Development and Soft Skills*. Oxford University Press.
3. Bansal, R.K. and Harrison J.B. *Spoken English for India: A Manual of Speech and Phonetics*, Hyderabad: Orient Longman.

4. "Best Poems", http://100.best-poems.net/. 20 July 2016.
5. "Classic English Short Stories", http://www.eastoftheweb.com/short-stories/Collections/ClasEngl.shtml, 20 July 2016

ETCS501   **Languages of Data Modeling**   **(Credits-4)**

Unit 1: Introducing Data Modeling

Introduction to data modeling, data modeling taxonomy: Entity expansion, Input Data Analysis-structuring, Output Data Analysis – structuring, Normalization, overview of model-driven database design, domain models and design patterns, benefits and pitfalls of model-driven design.

Unit 2: Designing Logical Data Models

Entity-Relationship Model – Entity Types, Entity Sets, Attributes Relationship Types, Relationship Instances and ER Diagrams. Extended E-R features: Generalization, Specialization and Aggregations. Concepts of hierarchical, network and relational data models.

Unit 3: Designing Physical Data Models

Concepts of hierarchical, network and relational data models. Function dependency, Dependency preservation, Lossless and lossy decomposition, Multivalued dependency, Normalization 1NF, 2NF, 3NF, BCNF, 4NF, 5NF

Unit 4: Unified Modeling Language

Overview, Building Blocks, Architecture, Modeling Types, Basic Notations, Standard Diagrams, Class Diagram, Object Diagram, Component Diagram.

ETCS508   **INTRODUCTION TO CYBER SECURITY**   **(Credits-3)**

Course Objectives: This course will provide a basic introduction to of all aspects of cyber-security including business, policy and procedures, communications security, network security, security management, legal issues, political issues, and technical issues.

UNIT I

The Security Environment: Threats, vulnerabilities, and consequences, advanced persistent threats, the state of security today, why security matters to DoD.

Principles of Cyber security: The interrelated components of the computing environment, Cyber security models (the CIA triad, the star model, the Parkerian hexad), Variations on a theme based on computer security, information security and information assurance.

UNIT II

Cyber security Management Concepts: Security governance, Management models, roles and functions, Enterprise Roles and Structures, Information security roles and positions, Alternative enterprise structures and interfaces

Strategy and Strategic Planning: Strategy Strategic planning and security strategy, the information security lifecycle, architecting the enterprise, Security Plans and Policies, Levels of planning, planning misalignment

UNIT III

Laws and Regulatory Requirements: Timeline of U.S. laws related to information security, The Federal Information Security Management Act (FISMA), Security Standards and Controls, Security standards and controls, Certification and accreditation (C&A)

Risk Management: Principles of risk, Types of risk, Risk strategies, The Risk Management Framework (RMF), Security Metrics and Key Performance Indicators (KPIs), The challenge of security metrics, Approaches to security metrics , Metrics and FISMA

UNIT IV

Managing information security across the DoD enterprise: The purpose of certification and accreditation, Trends in certification and accreditation, The strategic direction of DoD IT and information security, Responsibilities within the DoD enterprise

The future of cyber security: Key future uncertainties, possible future scenarios

TEXT BOOK:

1. Cyber Security by Godbole, Wiley India

REFERENCE BOOKS:

1. Computer Security by Gollman Wiley India
2. Introduction to Computer Security by Michael T. Goodrich and Roberto Tamassia.

ETCS510   INTRUSION DETECTION & PREVENTION SYSTEM   (Credits-4)

Course Objectives: Understand when, where, how, and why to apply Intrusion Detection tools and techniques in order to improve the security posture of an enterprise. Apply knowledge of the fundamentals and history of Intrusion Detection in order to avoid common pitfalls in the creation and evaluation of new Intrusion Detection Systems. Analyze intrusion detection alerts and logs to distinguish attack types from false alarms

UNIT I

History of Intrusion detection: Audit, Concept and definition, Internal and external threats to data, attacks, Need and types of IDS, Information sources Host based information sources, Network based information sources.

UNIT II

Intrusion Prevention Systems: Network IDs protocol based IDs, Hybrid IDs, Analysis schemes, thinking about intrusion. A model for intrusion analysis, techniques Responses requirement of responses, types of responses mapping responses to policy Vulnerability analysis, credential analysis non credential analysis

UNIT III

Introduction to Snort: Snort Installation Scenarios, Installing Snort, Running Snort on Multiple Network Interfaces, Snort Command Line Options. Step-By-Step Procedure to Compile and Install Snort Location of Snort Files, Snort Modes Snort Alert Modes

Unit-IV

Using ACID and Snort Snarf with Snort, Agent development for intrusion detection, Architecture models of IDs and IPs.

TEXT BOOKS:

1. Rafeeq Rehman : " Intrusion Detection with SNORT, Apache, MySQL, PHP and ACID," 1st Edition, Prentice Hall , 2003.

REFERENCES BOOKS:

1. Christopher Kruegel,Fredrik Valeur, Giovanni Vigna: "Intrusion Detection and Correlation

Challenges and Solutions", 1st Edition, Springer, 2005.

2. Carl Endorf, Eugene Schultz and Jim Mellander " Intrusion Detection & Prevention", 1st Edition, Tata McGraw-Hill, 2004.

3. Stephen Northcutt, Judy Novak : "Network Intrusion Detection", 3rd Edition, New Riders Publishing, 2002.

4. T. Fahringer, R. Prodan, "A Text book on Grid Application Development and Computing Environment". 6th Edition, Khanna Publishers, 2012.

ETCS 153   **PROGRAMMING LAB**   **(Credits-1)**

List of Experiments

1. Write a C program to reverse a given number, find the sum of digits of the number.
2. Write a C program to find the largest of five numbers.
3. Write a program to find the largest number out of five numbers (ternary operator)
4. Write a program to find roots of quadratic equation using functions.
5. Write a C program to check whether a given year is leap year or not.
6. Write a C program to check whether a given number is prime or not, also check whether it is divisible by a number k or not.
7. Write a C program to take marks of a student as input and print the his/her grade bases on following criteria using if – else statements

Marks <40	Fail
40<= Marks <59	Good
59 <= Marks < 80	Excellent
80 <= Marks	Outstanding

8. Perform experiment 7 using switch case statement.
9. Write a C program to concatenate two strings.
10. Write a program using arrays to find the largest and second largest number out of given 10 numbers using bubble sort.
11. Write a program to multiply two matrices
12. Write a program to reverse a string.
13. Write a program to concatenate two strings
14. Write a program to calculate the length of the string.
15. Write a program to find factorial of a number using function.
16. Write a program to check that the input string is a palindrome or not.
17. Write a program using structure to enter a list of books, their prices and number of pages.
18. Write a program to add, subtract, multiply and divide two numbers using menu driven program.
19. Write a C program to compute the length of a string using while loop.
20. Write a C program to convert all the lowercase letter to uppercase letter and all uppercase letters to lower case letter given a string as input.
21. Write a C program to take two matrixes as input and print the sum of two matrixes.
22. Write a C program to display the address of a variable using pointer.
23. Write a C program to compute the length of a string using pointer.
24. Create a structure called STUDENT having name, registration number, class, session as its field. Compute the size of structure STUDENT.

ETME 154   **ENGINEERING MECHANICS 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 Wheel and Axle
7. To determine the MA, VR, η of Worm Wheel (2-start)
8. Verification of force transmitted by members of given truss.
9. To verify the law of moments using Bell crank lever
10. To find CG and moment of Inertia of an irregular body using Computation method.

ETME 155   **ENGINEERING GRAPHICS LAB**   **(Credits-2)**

Course Objective: The Objective of this course is to acquaint engineering students regarding drawings, projections of planes, projection of solid and isometric projection of various objects.

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.

Text Books:

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

Reference Books:

1. Engineering Graphics - K.R. Gopalakrishna, 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 Prentice-Hall of India Pvt. Ltd., New Delhi.

ETCH 159   **ENGINEERING CHEMISTRY LAB**   **(Credits-1)**

List of Experiments

1. Determine the percentage composition of sodium hydroxide in the given mixture of sodium hydroxide and sodium chloride.
2. Determine the amount of Oxalic acid and Sulphuric acid in one liter of solution, given standard sodium hydroxide and Potassium Permanganate.
3. Determine the amount of copper in the copper ore solution, provided hypo solution.
4. Argent metric titration one each by Vohlard's method and by Mohr's method.
5. Complex metric titrations.
6. Determine the heat of neutralization of strong acid with strong base.
7. Determine the surface tension of a liquid using drop weight method.
8. Determine viscosity of a given liquid (density to be determined).
9. Determine the reaction rate constant for the Ist order reaction.
10. Determine the cell constant of a conductivity cell.
11. Find out strength of given solution of HCl conduct metrically.
12. Preparation of urea formaldehyde and phenol formaldehyde resins.
13. Determination of dissolved oxygen in the given sample of water.
14. Determination of alkalinity in the given sample of water.

ETME 160   **WORKSHOP PRACTICE**   **(Credits-2)**

UNIT - I

Materials: Spectrography method for finding composition of materials.

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

UNIT - II

Foundry Shop: Bench moulding 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.

ETCA160	**DATA STRUCTURES LAB**	**(Credits-1)**

List of Experiments

1. Write a program to search an element in a two dimensional array.
2. Write a program to perform following operations on tables using functions only Addition, Subtraction, Multiplication and Transpose.
3. Write a program using iteration concept for quick sort.
4. Write a program to implement various operations on strings.
5. Write a program for swapping two numbers using call by value and call by reference strategies.
6. Write a program to implement Binary search tree.
7. Write a program to create a Linked List and perform operations such as insert, delete, update and reverse.
8. Write a program to simulate various sorting and searching algorithms.
9. Write a program to simulate various Graph traversing techniques.
10. Write a program to simulate various tree traversal techniques.

ETEC 161	**ELECTRICAL SCIENCE LAB**	**(Credits-1)**

List of Experiments

1. To Verify the Thevenin' s theorem
2. To Verify the Superposition theorem
3. To measure voltage, current and power in an A.C. circuit by LCR impedance method
4. To study the frequency response curve in series R-L-C circuit
5. To study the frequency response curve in parallel R-L-C circuit
6. Measurement of power in three phase circuit by two wattmeter method
7. To determine the parameters and losses in single phase transformer by open and short circuit test

8. Speed control of D.C. shunt motor by armature and field control method
9. Speed control of three phase induction motor by applying voltage variation
10. Measurement of power and power factor in single phase circuit
11. Speed control of DC shunt motor by voltage control method
12. Calibration of energy meter/wattmeter/voltmeter/ammeter

ETPH 161   **PHYSICS – I LAB**   **(Credits-1)**

List of Experiments

1. To plot a graph between the distance of the knife edge from the centre of gravity and the time period of the bar pendulum. From the graph, find
i. The acceleration due to gravity.
ii. The radius of gyration and the moment of inertia of the bar about an axis
2. To determine the moment of inertia of a flywheel about its own axis of motion.
3. To determine the value of acceleration due to gravity using Kater`s pendulum.
4. To determine the frequency of A.C. mains with sonometer using non-magnetic wire.
5. To determine the frequency of electrically maintained turning fork by Melde`s method.
6. To determine the wavelength of sodium light using Newton`s ring apparatus.
7. To determine the wavelength of prominent lines of mercury by plane diffraction grating.
8. To determine the refractive index of the material of the prism for the given colors (wavelengths) of mercury light with the help of spectrometer.
9. To determine the specific rotation of cane sugar solution with the help of half shade polarimeter.
10. To determine the wavelength of He -Ne LASER using transmission diffraction grating.

ETCA161   **INTRODUCTION TO COMPUTERS**   **(Credits-1)**
                     & IT, OFFICE AUTOMATION LAB

1. **MS-Windows:** Operating system-Definition & functions, basics of Windows. Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and   folders. Control panel – display properties, adding and removing software and hardware, setting date and time, screensaver and appearance, using windows accessories.
2. **Documentation Using MS-Word** : Introduction to Office Automation, Creating & Editing Document, Formatting Document, Auto-text, Autocorrect, Spelling and Grammar Tool, Document Dictionary, Page Formatting, Bookmark, Advance Features of MS-Word-Mail Merge, Macros, Tables, File Management, Printing, Styles, linking and embedding object, Template.
3. **Electronic Spread Sheet using MS-Excel** : Introduction to MS-Excel, Creating & Editing   Worksheet, Formatting and Essential Operations, Formulas and Functions, Charts, Advance features of MS-Excel-Pivot table & Pivot Chart, Linking and Consolidation, Database Management using Excel-Sorting, Filtering, Table, Validation, Goal Seek, Scenario.
4. **Presentation using MS-PowerPoint:** Presentations, Creating, Manipulating & Enhancing Slides, Organizational Charts, Excel Charts, Word Art, Layering art Objects, Animations and Sounds, Inserting Animated Pictures or Accessing through Object, Inserting Recorded Sound Effect or In-Built Sound Effect.

References for Manual:

1. Microsoft Office – Complete Reference – BPB Publication
2. Learn Microsoft Office – Russell A. Stultz – BPB Publication

ETPH 164 **PHYSICS –II LAB** **(Credits-1)**

List of Experiments

1. To determine the value of e/m of electron by J.J. Thomson method.
2. To determine unknown resistance of a wire by Carey Foster's Bridge.
3. To determine the internal resistance of Leclanche cell using potentiometer.
4. To study the charging and discharging of a capacitor and to find out the time constant.
5. To find the thermal conductivity of a poor conductor by Lee's disk method.
6. To study the thermo EMF using thermocouple and resistance using Pt. Resistance thermometer.
7. To determine the velocity of ultrasound waves using an ultrasonic spectrometer in a given liquid (Kerosene Oil)
8. To measure the frequency of a sine-wave voltage obtains from signal generator and to obtain Lissajous pattern on the CRO screen by feeding two sine wave voltages from two signal generator.
9. To determine the temp. Co-efficient of resistance of platinum by Callender & Griffith's Bridge.
10. To study Hall Effect.
11. To determine plank's constant.

ETCA164 **WEB TECHNOLOGIES LAB** **(Credits-1)**

List of Experiments

1. Write HTML/Java scripts to display your CV in Web Browser.
2. Creation and annotation of static web pages using any HTML editor.
3. Write a program to use XML and JavaScript for creation of your homepage.
4. Write a program in XML for creation of DTD which specifies a particular set of rules.
5. Create a Stylesheet in CSS/XSL and display the document in Web Browser.
6. Create a Registration Form with Table.
7. CSS: Inline Style, Internal Style and External Style Sheets
8. DHTML
    I. Use user defined function to get array of values and sort them in ascending order
    II. Demonstrate String and Math Object's predefined methods
    III. Demonstrate Array Objects and Date Object's predefined methods
    IV. Exception Handling
    V. Calendar Creation : Display all month
    VI. Event Handling
        i. Validation of registration form
        ii. Open a Window from the current window
        iii. Change color of background at each click of button or refresh of a page
        iv. Display calendar for the month and year selected from combo box
        v. On Mouse-over event
9. XML

I.   Create any catalog

II.   Display the catalog created using CSS or XSL

ETCA 165   **INTRODUCTION TO PROGRAMMING LAB**   **(Credits-1)**

List of Experiments

1. Write a C program to reverse a given number, find the sum of digits of the number.
2. Write a C program to find the largest of five numbers.
3. Write a program to find the largest number out of five numbers (ternary operator)
4. Write a program to find roots of quadratic equation using functions.
5. Write a C program to check whether a given year is leap year or not.
6. Write a C program to check whether a given number is prime or not, also check whether it is divisible by a number k or not.
7. Write a C program to take marks of a student as input and print the his/her grade bases on following criteria using if – else statements

   a. Marks <40   Fail

   b. 40<= Marks <59   Good

   c. 59 <= Marks < 80   Excellent

   d. 80 <= Marks   Outstanding

8. Perform experiment 7 using switch case statement.
9. Write a C program to concatenate two strings.
10. Write a program using arrays to find the largest and second largest number out of given 10 numbers using bubble sort.
11. Write a program to multiply two matrices
12. Write a program to reverse a string.
13. Write a program to concatenate two strings
14. Write a program to calculate the length of the string.
15. Write a program to find factorial of a number using function.
16. Write a program to check that the input string is a palindrome or not.
17. Write a program using structure to enter a list of books, their prices and number of pages.
18. Write a program to add, subtract, multiply and divide two numbers using menu driven program.
19. Write a C program to compute the length of a string using while loop.
20. Write a C program to convert all the lowercase letter to uppercase letter and all uppercase letters to lower case letter given a string as input.
21. Write a C program to take two matrixes as input and print the sum of two matrixes.
22. Write a C program to display the address of a variable using pointer.
23. Write a C program to compute the length of a string using pointer.
24. Create a structure called STUDENT having name, registration number, class, session as its field. Compute the size of structure STUDENT.

ETCS 166   **OBJECT ORIENTED PROGRAMMING LAB**   **(Credits-1)**

List of Experiments

1. Write a program which accept principle, rate and time from user and print the simple interest.Solution.
2. Write a program which input principal, rate and time from user and calculate compound interest. You can use library function.

CI = P (1+R/100) T.

3. Write a program to display the following output using a single count statement.

Subject	Marks
Mathematics	90
Computer	77
Chemistry	69 solution

4. Write a program which accepts a character and display its ASCII value. Solution.

5. Write a program to swap the values of two variables. Solution.

6. Write a program to calculate area of circle. Solution

7. Write a program to check whether the given number is positive or negative (using ? : ternary operator) solution

8. Write a program which accepts days as integer and display total number of years, months and days in it.

9. Any year is input by the user. Write a program to determine whether the year is a leap year or not.

10. Write a program to find the roots of and quadratic equation of type ax2+bx+c where a is not equal to zero.

11. The marks obtained by a student in 5 different subjects are input by the user.

    The student gets a division as per the following rules:

    Percentage above or equal to 60 - First division

    Percentage between 50 and 59 - Second division

    Percentage between 40 and 49 - Third division

    Percentage less than 40 - Fail

12. Write a program to calculate the division obtained by the student.

13. Write a program which displays a number 10 to 100 randomly.

14. Write a program using function which accept two integers as an argument and return its sum. Call this function from main ( ) and print the results in main ( ).

15. Write a function that receives two numbers as an argument and display all prime numbers between these two numbers. Call this function from main ( ).

16. Write a C++ program to find the sum and average of one dimensional integer array.

17. Write a C++ program to write number 1 to 100 in a data file NOTES.TXT.

18. Write a user-defined function in C++ to read the content from a text file OUT.TXT, count and   display the number of alphabets present in it.

19. Declare a structure to represent a complex number (a number having a real part and imaginary   part). Write C++ functions to add, subtract, multiply and divide two complex numbers.

20. An array stores details of 25 students (roll no, name, and marks in three subjects).

    Write a program to create such an array and print out a list of students who have failed in more than one subject.

21. Write a program to find the length of string.

22. Write a program to reverse a string.

23. Write a program to check a string is palindrome or not.

24. Write a program which accept a letter and display it in uppercase letter.

25. Write a user-defined function in C++ to display the multiplication of row element of two-dimensional array A [4] [6] containing integer.

ETEL 171   **COMMUNICATION SKILLS LAB**   **(Credits-1)**

Course Objective: Communication skills lab focuses on communication activities in functional and situational contexts. It encourages students to speak with fluency and accuracy as well as develop the four skills of reading, writing, listening and speaking.

UNIT I

Situational Conversations : Selling a product, Getting a book published, In a government office ,buying a computer, railway enquiry , Introductions, hiring a taxi , Meetings and Greetings, Making an appointment, Making complaints , Agreeing and disagreeing , Congratulations and good wishes, Expressing ability and certainty.

UNIT II

Personality Development: Handling telephonic calls, Career planning, appearing for personal interview, Public speaking, Presentation skills, Group discussion and Dining etiquettes.

UNIT III

Business Writing: Making a CV, Letter writing, Report Writing, Errors in spoken English.

UNIT IV

Business Communication: Job Interviews, Teleconferencing, Meetings, Marketing, Sales, Customer Service Negotiations, Human Resource.

Suggested Readings:

1. O. Scot, Business Communication, Biztantra, New Delhi.

ETCA 165   **INTRODUCTION TO PROGRAMMING LAB**   **(Credits-1)**

List of Experiments

1. Write a C program to reverse a given number, find the sum of digits of the number.
2. Write a C program to find the largest of five numbers.
3. Write a program to find the largest number out of five numbers (ternary operator)
4. Write a program to find roots of quadratic equation using functions.
5. Write a C program to check whether a given year is leap year or not.
6. Write a C program to check whether a given number is prime or not, also check whether it is divisible by a number k or not.
7. Write a C program to take marks of a student as input and print the his/her grade bases on following criteria using if – else statements
    a. Marks <40   FAIL
    b. 40<= Marks <59   GOOD
    c. 59 <= Marks < 80   Excellent
    d. 80 <= Marks   Outstanding
8. Perform experiment 7 using switch case statement.
9. Write a C program to concatenate two strings.
10. Write a program using arrays to find the largest and second largest number out of given 10 numbers using bubble sort.
11. Write a program to multiply two matrices
12. Write a program to reverse a string.
13. Write a program to concatenate two strings

14. Write a program to calculate the length of the string.
15. Write a program to find factorial of a number using function.
16. Write a program to check that the input string is a palindrome or not.
17. Write a program using structure to enter a list of books, their prices and number of pages.
18. Write a program to add, subtract, multiply and divide two numbers using menu driven program.
19. Write a C program to compute the length of a string using while loop.
20. Write a C program to convert all the lowercase letter to uppercase letter and all uppercase letters to lower case letter given a string as input.
21. Write a C program to take two matrixes as input and print the sum of two matrixes.
22. Write a C program to display the address of a variable using pointer.
23. Write a C program to compute the length of a string using pointer.
24. Create a structure called STUDENT having name, registration number, class, session as its field. Compute the size of structure STUDENT.

ETCS565   COMPUTER CENTRE PLANNING & ESTABLISHMENT LAB   (Credits-1)

Course Objective: This practical course will give learning of basic knowledge of hardware and operations of Windows, MS-Word, MS-PowerPoint and MS-Excel.

List of Experiments

1. To check and measure various supply voltages of PC.
2. To make comparative study of motherboards.
3. To observe and study various cables, connections and parts used in computer communication.
4. To study various cards used in a system viz. display card, LAN card etc.
5. To remove, study and replace floppy disk drive.
6. To remove, study and replace CD ROM.
7. To remove, study and replace hard disk.
8. Understanding and Accessing Individual Control Panel Items along with different ways of operating Control panel items.
9. Introduction to Document Editor Application Software: Document creation and formatting of document, inserting and formatting complex table, using inbuilt word template, office online template, creating-edit-modify template, import/export files, convert word document to web document, PDF files, creating hyperlinks, adding security features to word document- imposing password and checking virus in Macros. Finding and Replacing Text, Basic of E-Mail, E-mail Addressing, Using E-mail- opening mail, mailbox, creating and sending mail, replying mail, forwarding, sorting & searching e-mail, Document Collaboration, Instant Messaging and Mail Merging.
10. Introduction to Presentation Application Software: Creating a presentation, different views of the presentation, customizing slides using predefined layouts/ slide transition / paragraph or text animation, importing data from other sources in PowerPoint presentations.
11. Introduction to Spreadsheet Application Software: Features of a spreadsheet, Data entry, Cell referencing, entering series, editing data, ranges, formulae insertion, inserting functions, creating macros and hyperlink, import and export data.
12. Analysis using Spreadsheet Application Software: Consolidation of data and data analysis in spreadsheet: sorting and filtering techniques drop down list from range of cell, applying and removal of data validation to cell, protecting cell data using password.

TCS257   **DATA STRUCTURES LAB**   **(Credits-1)**

List of Experiments

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

BSPH166   **ELECTRICITY MAGNETISM LAB**   **(Credits-1)**

Determination of Fundamental Constants

1. To determine the value of Boltzmann Constant by studying Forward Characteristicsof a Diode.
2. To determine the value of Planck's Constant by using a Photoelectric Cell.
3. To determine the value of Planck's Constant by using LEDs of at least 4 DifferentWavelengths.

Atomic & Molecular Physics

1. To determine the value of e/m by (a) Magnetic Focussing or (b) Bar Magnet.To determine the wavelengths of Hydrogen spectrum and hence to determine thevalue of Rydberg's Constant.
2. To determine the Wavelength of H-alpha Emission Line of Hydrogen Atom.
3. To determine the Absorption Lines in the Rotational Spectrum of Iodine Vapour.

Miscellaneous

1. To determine the Wavelength and the Angular Spread of a He-Ne Laser.
2. To determine the value of Stefan's Constant.
3. To determine the Wavelength and the Velocity of Ultrasonic Waves in a liquid (Kerosene Oil, Xylene, etc.) by studying the Diffraction of light through an UltrasonicGrating.

REFERENCE BOOKS:

1. GeetaSanon, BSc Practical Physics, 1st Edn. (2007), R. Chand & Co.
2. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, NewDelhi.
3. Indu Prakash and Ramakrishna, A Text Book of Practical Physics, KitabMahal, NewDelhi.
4. D. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate Classes, VaniPublication House, New Delhi.
5. Nelson and Jon Ogborn, Practical Physics.

ETCS551   **LANGUAGES OF DATA MODELING LAB**   **(Credits-1)**

List of Experiments

1. Represent the following concepts of OOSE using suitable UML symbols: Association, Composition, Activity, Classes, Interface etc.
2. Create a Usecase diagram of Airline Reservation System.
3. Create a class diagram of Airline Reservation System or any suitable case study.
4. Create an Activity Diagram for the above problem.
5. Design JUnit test cases to test a given Java code. Test cases should cover checking of boundary value analysis, complete path coverage etc.

B.Tech (CSE) | Year 2018-2022 (Scheme of Studies) | Annexure A1 | SOET

ODD SEMESTER

Year	SNo	Course Code	Course Title	L	T	P	C
	1	ETMA 105	Applied Mathematics-I	3	1	-	4
	2	ETPH 109	Applied Physics-I	3	1	-	4
	3	ETEC 119	Electrical Science	3	1	-	4
	4	ETME 106	Engineering Mechanics	3	-	-	3
	5	ETCS103	Introduction to Computer System and Programming	3	1	-	4
	6	ETEL 101	Communication Skills	4	-	-	4
	7	ETPH 151	Applied Physics-I Lab	-	-	2	1
	8	ETELI71	Communication Skills Lab	-	-	2	1
	9	ETEC 161	Electrical Science Lab	-	-	2	1
	10	ETCS153	Programming Lab	-	-	2	1
	11	ETME 154	Engineering Mechanics Lab	-	-	2	1
			TOTAL	19	4	10	28
Second	1	ETMA 201	Applied Mathematics-III	3	1	-	4
	2	ETEC 233	Analog Electronics	3	1	-	4
	3	ETEC 210	Digital Electronics	3	1	-	4
	4	ETCS 219	Foundation of Computer Systems	3	1	-	4
	5	ETCS 211	Operating Systems	3	1	-	4
	6	ETCS 217	Data Structures	3	1	-	4
	7	ETEC 263	Analog Electronics Lab	-	-	2	1
	8	ETEC 256	Digital Electronics Lab	-	-	2	1
	9	ETCS 255	Operating Systems Lab	-	-	2	1
	10	ETCS 257	Data Structures Lab	-	-	2	1
			TOTAL	18	6	8	28
	1	ETCS 323	Java Programming	3	1	-	4
	2	ETCS 304	Computer Networks	3	1	-	4
	3	ETCS 206	Computer Graphics	3	1	-	4
	4	ETCS 214	Theory of Computation	3	1	-	4
	5	ETEC 311	Microprocessor Systems	3	1	-	4

EVEN SEMESTER

SNo	Course Code	Course Title	L	T	P	C
1	ETMA 104	Applied Mathematics-II	3	1	-	4
2	ETPH 108	Applied Physics-II	3	1	-	4
3	ETCH 119	Engineering Chemistry	3	1	-	4
4	ETME 107	Manufacturing Process	3	-	-	3
5	ETCS 112	Object Oriented Programming	3	1	-	4
6	ETCH 125	Enviormental Studies	3	-	-	3
7	ETPH 152	Applied Physics-II Lab	-	-	2	1
8	ETCH159	Engineering Chemistry Lab	-	-	2	1
9	ETCS 166	Object Oriented Programming Lab	-	-	2	1
10	ETME 158	Engineering Graphics Lab	-	-	3	1.5
11	ETME 157	Workshop Practice	-	-	3	1.5
		TOTAL	18	4	12	28
1	ETCS 202	Software Engineering	3	1	-	4
2	ETMA 208	Numerical Analysis	3	1	-	4
3	ETCS 307	Database Management Systems	3	1	-	4
4	ETCS 220	Analysis and Design of Algorithm	3	1	-	4
5	ETEC 235	Communication Engineering	3	1	-	4
6	ETMC 226	Fundamentals of Management	3	-	-	3
7	ETCS 252	Software Engineering Lab	-	-	2	1
8	ETEC 276	Communication Engineering Lab	-	-	2	1
9	ETCS 355	Database Management Systems Lab	-	-	2	1
		TOTAL	18	5	6	26
1	ETCS412	Compiler Design	3	1	-	4
2	ETCS312	Information and Network Security	3	1	-	4
3	ETCS314	Mobile Computing	3	1	-	4
4	ETCS324	Advanced iOS Development	1	-	-	1
5	ETCS222	Computer Systems Organization	3	1	-	4

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

Third Semester

S.No	Code	Course Title	L	T	P	C
6	ETCS315	Fundamentals of iOS Development	1	-	-	1
7	ETCS361	Java Programming Lab	-	-	2	1
8	ETCS365	Computer Networks Lab	-	-	2	1
9	ETCS363	Fundamentals of iOS development Lab	-	-	2	1
10	ETCS258	Computer Graphics Lab	-	-	2	1
11	ETEC353	Microprocessor Systems Lab	-	-	2	1
12	ETCS381	Practical Training I	-	-	-	2
		TOTAL	**16**	**5**	**10**	**28**

S.No	Code	Course Title	L	T	P	C
6	ETCS454	Compiler Design Lab	-	-	2	1
7	ETCS366	Mobile Computing Lab	-	-	2	1
8	ETCS374	Advanced iOS Development Lab	-	-	2	1
9		**Elective**				
(i)	ETCS318	Principles of Programming Languages	3	1	-	4
(ii)	ETCS320	Distributed Computing Systems	3	1	-	4
(iii)	ETCS322	E-Commerce and ERP	3	1	-	4
		TOTAL	**16**	**5**	**6**	**24**

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

Fourth Semester

S.No	Code	Course Title	L	T	P	C
1	ETCS401	Artificial Intelligence	3	-	-	4
2	ETCS316	WebTechnologies	3	1	-	4
3	ETMC421	Entrepreneurship Development	3	-	-	3
4	ETCS368	Web Technologies Lab	-	-	2	1
5	ETCS451	Artificial Intelligence Lab	-	-	2	1
6	ETCS462	Minor Project	-	-	-	2
7	ETCS481	Practical Training II	-	-	-	2
8		**Elective (without Lab)**				
(i)	ETCS403	Distributed Algorithms	3	1	-	4
(ii)	ETCS421	Storage Systems	3	1	-	4
(iii)	ETCS423	Robotics	3	1	-	4
(iv)	ETCS415	Advanced Computer Architecture	3	1	-	4
(v)	ETCS420	Graph Theory	3	1	-	4
(vi)	ETCS422	Cloud Computing	3	1	-	4
9		**Elective (with Lab)**				
(i)	ETCS425	Machine Learning	3	1	-	4
	ETCS471	Machine Learning Lab	-	-	2	1
(ii)	ETCS427	Mobile and Wireless Communication	3	1	-	4
	ETCS473	Mobile and Wireless Communication Lab	-	-	2	1
(iii)	ETCS306	Data Warehousing and Data Mining	3	1	-	4
	ETCS362	Data Warehousing and Data Mining Lab	-	-	2	1
		TOTAL	**15**	**4**	**6**	**26**

S.No	Code	Course Title	L	T	P	C
1	ETCS414	Neural Network	3	1	-	4
2	ETCS464	Major Project	-	-	6	6
3		**Open Elective (without Lab)**				
		(As specified by other schools)	4	-	-	4
4		**Elective (with Lab)**				
(i)	ETCS405	Digital Image Processing	3	1	-	4
	ETCS455	Digital Image Processing Lab	-	-	2	1
(ii)	ETCS413	Advanced Computer Networks	3	1	-	4
	ETCS459	Advanced Computer Networks Lab	-	-	2	1
(iii)	ETCS428	Natural Language Processing	3	1	-	4
	ETCS458	Natural Language Processing Lab	-	-	2	1
(iv)	ETCS430	Advanced Database Management Systems	3	1	-	4
	ETCS460	Advanced Database Management Systems Lab	-	-	2	1
		TOTAL	**9**	**3**	**2**	**19**

Total Hours: Lect [L]+Prac [P]+Tut [T]	**225**
Total Credits [C]	**205**

YEAR 2018-2022 (SCHEME OF STUDIES)

ODD SEMESTER

FIRST YEAR

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETMA105	APPLIED MATHEMATICS-I	3	1	0	4
2	ETPH109	APPLIED PHYSICS-I	3	1	0	4
3	ETEC119	ELECTRICAL SCIENCE	3	1	0	4
4	ETME106	ENGINEERING MECHANICS	3	0	0	3
5	ETCS103	INTRODUCTION TO COMPUTER SYSTEM AND	3	1	0	4
6	ETEL101	COMMUNICATION SKILLS	4	0	0	4
7	ETPH151	APPLIED PHYSICS-I LAB	0	0	2	1
8	ETEL171	COMMUNICATION SKILLS LAB	0	0	2	1
9	ETEC161	ELECTRICAL SCIENCE LAB	0	0	2	1
10	ETCS153	PROGRAMMING LAB	0	0	2	1
11	ETME154	ENGINEERING MECHANICS LAB	0	0	2	1
		TOTAL	**19**	**4**	**10**	**28**

SECOND YEAR

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETMA201	APPLIED MATHEMATICS-III	3	1	0	4
2	ETEC203	BASICS OF ELECTRONICS	3	1	0	4
3	ETME205	THERMODYNAMICS	3	1	0	4
4	ETME207	STRENGTH OF MATERIALS	3	1	0	4
5	ETME209	FLUID MECHANICS	3	1	0	4
6	ETME211	MATERIAL SCIENCE AND METALLURGY	4	0	0	4
7	ETEC259	BASICS OF ELECTRONICS LAB	0	0	2	1
8	ETME253	STRENGTH OF MATERIALS LAB	0	0	2	1
9	ETME255	FLUID MECHANICS LAB	0	0	2	1
10	ETME257	COMPUTER AIDED MACHINE DRAWING LAB	0	0	2	1
		TOTAL	**19**	**5**	**8**	**28**

EVEN SEMESTER

FIRST YEAR

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETMA104	APPLIED MATHEMATICS-II	3	1	0	4
2	ETPH108	APPLIED PHYSICS-II	3	1	0	4
3	ETCH119	ENGINEERING CHEMISTRY	3	1	0	4
4	ETME107	MANUFACTURING PROCESSES	3	0	0	3
5	ETCS112	OBJECT ORIENTED PROGRAMMING	3	1	0	4
6	ETCH125	ENVIRONMENTAL STUDIES	3	0	0	3
7	ETPH152	APPLIED PHYSICS-II LAB	0	0	2	1
8	ETCH159	ENGINEERING CHEMISTRY LAB	0	0	2	1
9	ETCS166	OBJECT ORIENTED PROGRAMMING LAB	0	0	2	1
10	ETME155	ENGINEERING GRAPHICS LAB	0	0	3	1.5
11	ETME157	WORKSHOP PRACTICE	0	0	3	1.5
		TOTAL	**18**	**4**	**12**	**28**

SECOND YEAR

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETME210	FLUID MACHINES	3	1	0	4
2	ETME204	KINEMATICS OF MACHINES	3	1	0	4
3	ETME214	TURBOMACHINES	3	1	0	4
4	ETMA210	APPLIED NUMERICAL TECHNIQUES &	3	1	0	4
5	ETMC226	FUNDAMENTALS OF MANAGEMENT	3	0	0	3
6		ELECTIVE	4	0	0	4
7	ETME252	FLUID MACHINES LAB	0	0	2	1
8	ETME254	KINEMATICS OF MACHINE LAB	0	0	2	1
9	ETMA256	APPLIED NUMERICAL TECHNIQUES &	0	0	2	1
		TOTAL	**19**	**4**	**6**	**26**

THIRD

S.No	Code	Subject	L	T	P	C
1	ETME301	DYNAMICS OF MACHINES	3	1	0	4
2	ETME303	MACHINE DESIGN-I	3	1	0	4
3	ETEE317	MEASUREMENTS & INSTRUMENTATION	4	0	0	4
4	ETME307	COMPUTER AIDED DESIGN	4	0	0	4
5	ETME309	MANUFACTURING TECHNOLOGY	4	0	0	4
6	ETME311	INTERNAL COMBUSTION ENGINE & GAS	4	0	0	4
7	ETME351	DYNAMICS OF MACHINE LAB	0	0	2	1
8	ETME353	COMPUTER AIDED DESIGN LAB	0	0	2	1
9	ETME355	INTERNAL COMBUSTION ENGINE & GAS	0	0	2	1
10	ETME357	MANUFACTURING TECHNOLOGY LAB	0	0	2	1
11	ETME381	PRACTICAL TRAINING-I	0	0	0	2
		TOTAL	**22**	**2**	**8**	**30**

S.No	Code	Subject	L	T	P	C
1	ETME302	HEAT TRANSFER	3	1	0	4
2	ETME304	MACHINE DESIGN-II	3	1	0	4
3	ETME306	ROBOTICS & AUTOMATION	4	0	0	4
4	ETME320	AUTOMOBILE ENGINEERING	4	0	0	4
5	ETME314	PRODUCTION AND OPERATIONS MANAGEMENT	4	0	0	4
6	ETME312	NON-CONVENTIONAL ENERGY RESOURCES	4	0	0	4
7	ETME352	HEAT TRANSFER LAB	0	0	2	1
8	ETME354	ROBOTICS & AUTOMATION LAB	0	0	2	1
9	ETME356	AUTOMOBILE ENGINEERING LAB	0	0	2	1
		TOTAL	**22**	**2**	**6**	**27**

NOTE: PRACTICAL TRAINING FOR MINIMUM OF FOUR WEEKS DURATION AT THE END OF SIXTH SEMESTER, DURING SUMMER BREAK, AND ITS EVALUATION WILL BE DONE

FOURTH

S.No	Code	Subject	L	T	P	C
1	ETME401	REFRIGERATION AND AIR-CONDITIONING	3	1	0	4
2	ETMA403	OPERATIONS RESEARCH	3	1	0	4
3	ETME405	POWER PLANT ENGINEERING	4	0	0	4
4		ELECTIVE	4	0	0	4
5	ETME409	MEASUREMENT & METROLOGY	3	0	0	3
6	ETME451	REFRIGERATION AND AIR-CONDITIONING LAB	0	0	2	1
7	ETME453	MEASUREMENT & METROLOGY LAB	0	0	2	1
8	ETME481	PRACTICAL TRAINING-II	0	0	0	2
9	ETME457	MINOR PROJECT	0	0	0	2
		TOTAL	**17**	**2**	**4**	**25**

S.No	Code	Subject	L	T	P	C
1	ETME402	MECHANICAL VIBRATIONS	3	1	0	4
2	ETME406	MECHATRONICS	4	0	0	4
3		ELECTIVE	4	0	0	4
4		OPEN ELECTIVE	3	1	0	4
5	ETME454	MAJOR PROJECT	0	0	0	6
		TOTAL	**14**	**2**	**0**	**22**

ELECTIVES

S.No	Code	Subject	L	T	P	C
1	ETME410	INSPECTIONS AND QUALITY CONTROL	4	0	0	4
2	ETME413	WASTE HEAT RECOVERY SYSTEMS	4	0	0	4
3	ETME415	INDUSTRIAL DESIGNS AND PRODUCT	4	0	0	4
4	ETME412	INDUSTRIAL ENGINEERING	4	0	0	4
5	ETME408	COMPUTER AIDED MANUFACTURING	4	0	0	4
6	ETME417	SOLAR ENERGY	4	0	0	4
7	ETME216	COMPUTATIONAL FLUID DYNAMICS	3	1	0	4
8	ETME212	FLEXIBLE MANUFACTURING SYSTEM	4	0	0	4

	L	T	P	C
TOTAL HOURS: LECT [L]+PRAC [P]+TUT [T]				**229**
TOTAL CREDITS [C]				**214**

SOET — YEAR 2018-2022 (SCHEME OF STUDIES) — Annexure A3 — B.TECH. (EEE)

FIRST YEAR

ODD SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETMA105	APPLIED MATHEMATICS-I	3	1	0	4
2	ETPH109	APPLIED PHYSICS-I	3	1	0	4
3	ETEC119	ELECTRICAL SCIENCE	3	1	0	4
4	ETME106	ENGINEERING MECHANICS	3	0	0	3
5	ETCS103	INTRODUCTION TO COMPUTER SYSTEM AND PROGRAMMING	3	1	0	4
6	ETEL101	COMMUNICATION SKILLS	4	0	0	4
7	ETPH151	APPLIED PHYSICS-I LAB	0	0	2	1
8	ETEL171	COMMUNICATION SKILLS LAB	0	0	2	1
9	ETEC161	ELECTRICAL SCIENCE LAB	0	0	2	1
10	ETCS153	PROGRAMMING LAB	0	0	2	1
11	ETME154	ENGINEERING MECHANICS LAB	0	0	2	1
		TOTAL	**19**	**4**	**10**	**28**

EVEN SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETMA104	APPLIED MATHEMATICS-II	3	1	0	4
2	ETPH108	APPLIED PHYSICS-II	3	1	0	4
3	ETCH119	ENGINEERING CHEMISTRY	3	1	0	4
4	ETME107	MANUFACTURING PROCESSES	3	0	0	3
5	ETCS112	OBJECT ORIENTED PROGRAMMING	3	1	0	4
6	ETCH125	ENVIRONMENTAL STUDIES	3	0	0	3
7	ETPH152	APPLIED PHYSICS-II LAB	0	0	2	1
8	ETCH159	ENGINEERING CHEMISTRY LAB	0	0	2	1
9	ETCS166	OBJECT ORIENTED PROGRAMMING LAB	0	0	2	1
10	ETME155	ENGINEERING GRAPHICS LAB	0	0	3	1.5
11	ETME157	WORKSHOP PRACTICE	0	0	3	1.5
		TOTAL	**18**	**4**	**12**	**28**

SECOND YEAR

ODD SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETMA201	APPLIED MATHEMATICS-III	3	1	0	4
2	ETCS217	DATA STRUCTURES	3	1	0	4
3	ETEC233	ANALOG ELECTRONICS	3	1	0	4
4	ETEC207	CIRCUITS & SYSTEMS	3	1	0	4
5	ETEC209	COMMUNICATION SYSTEMS-I	3	1	0	4
6	ETEE215	ELECTRO-MECHANICAL ENERGY CONVERSION-I	3	1	0	4
7	ETEC263	ANALOG ELECTRONICS LAB	0	0	2	1
8	ETEC253	CIRCUITS & SYSTEMS LAB	0	0	2	1
9	ETEC255	COMMUNICATION SYSTEMS-I LAB	0	0	2	1
10	ETEE257	ELECTRO-MECHANICAL ENERGY CONVERSION-I LAB	0	0	2	1
		TOTAL	**18**	**6**	**8**	**28**

EVEN SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETEE204	COMPUTATIONAL TECHNIQUES	3	1	0	4
2	ETEC216	ADVANCE ANALOG ELECTRONICS	3	1	0	4
3	ETEC210	DIGITAL ELECTRONICS	3	1	0	4
4	ETEE212	ELECTRO-MECHANICAL ENERGY CONVERSION-II	3	1	0	4
5	ETEE214	ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS	3	1	0	4
6	ETMC226	FUNDAMENTALS OF MANAGEMENT	3	0	0	3
7	ETEC264	ADVANCE ANALOG ELECTRONICS LAB	0	0	2	1
8	ETEC256	DIGITAL ELECTRONICS LAB	0	0	2	1
9	ETEE262	ELECTRO-MECHANICAL ENERGY CONVERSION-II LAB	0	0	2	1
10	ETEE264	ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS LAB	0	0	2	1
		TOTAL	**18**	**5**	**8**	**27**

NOTE: PRACTICAL TRAINING WILL BE OF FOUR WEEKS DURATION AT THE END OF FOURTH SEMESTER DURING SUMMER BREAK AND THE EVALUATION WILL BE DONE IN THE FIVFTH SEMESTER

ODD SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETEC311	MICROPROCESSOR SYSTEMS	3	1	0	4
2	ETEC305	ELECTROMAGNETIC FIELDS THEORY	3	1	0	4
3	ETEE327	ELECTRICAL ENGINEERING MATERIALS	3	0	0	3

EVEN SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETMC421	ENTREPRENEURSHIP DEVELOPMENT	3	0	0	3
2	ETEC308	CONTROL SYSTEM	3	1	0	4
3	ETEC314	DIGITAL SIGNAL PROCESSING	3	1	0	4

THIRD

S.No	Code	Subject	L	T	P	C
4	ETEC307	ELECTRONIC MEASURING INSTRUMENTS	3	1	0	4
5	ETEC212	COMMUNICATION SYSTEMS-II	3	1	0	4
6	ETEE315	POWER SYSTEM-I	3	1	0	4
7	ETEC258	COMMUNICATION SYSTEMS-II LAB	0	0	2	1
8	ETEC353	MICROPROCESSOR SYSTEMS LAB	0	0	2	1
9	ETEC355	ELECTRONIC MEASURING INSTRUMENTS LAB	0	0	2	1
10	ETEC254	CIRCUIT DESIGNING LAB ON PCB	0	0	2	1
11	ETEE381	PRACTICAL TRAINING-I	0	0	0	2
		TOTAL	18	5	8	29

S.No	Code	Subject	L	T	P	C
4	ETEE312	POWER SYSTEM-II	3	1	0	4
5	ETEE316	POWER ELECTRONICS	3	1	0	4
6	ETEC401	EMBEDDED SYSTEMS	3	1	0	4
7	ETEC360	DIGITAL SIGNAL PROCESSING LAB	0	0	2	1
8	ETEC451	EMBEDDED SYSTEMS LAB	0	0	2	1
9	ETEC358	CONTROL SYSTEM LAB	0	0	2	1
10	ETEE364	POWER ELECTRONICS LAB	0	0	2	1
		TOTAL	18	5	8	27

NOTE: PRACTICAL TRAINING WILL BE FOUR WEEKS DURATION AT THE END OF SIXTH SEMESTER DURING SUMMER BREAK AND THE EVALUATION WILL BE DONE AT THE END OF SEVENTH SEMESTER.

FOURTH

S.No	Code	Subject	L	T	P	C
1	ETEE407	HVDC AND FLEXIBLE AC TRANSMISSION SYSTEMS	3	1	0	4
2	ETEC306	VLSI DESIGN	3	1	0	4
3	ETEE403	SWITCHGEAR AND PROTECTION	3	1	0	4
4		ELECTIVE	3	0	0	3
5		ELECTIVE	3	0	0	3
6	ETEE362	POWER SYSTEM LAB	0	0	2	1
7	ETEC356	VLSI DESIGN LAB	0	0	2	1
8	ETEE457	MINOR PROJECT	0	0	0	2
9	ETEE481	PRACTICAL TRAINING-II	0	0	0	2
		TOTAL	15	3	4	24

S.No	Code	Subject	L	T	P	C
1	ETEE402	POWER SYSTEM OPERATION AND CONTROL	3	1	0	4
2	ETEE404	ELECTRIC DRIVES	3	1	0	4
3		OPEN ELECTIVE	3	1	0	4
4		ELECTIVE	3	0	0	3
5	ETEE452	POWER SYSTEMS SIMULATION LAB	0	0	2	1
6	ETEE460	MAJOR PROJECT	0	0	0	6
		TOTAL	12	3	2	22
		TOTAL HOURS: LECT [L]+PRAC [P]+TUT [T] (EXCLUDING NO L, T, S, P COURSES)				231
		TOTAL CREDITS [C]				213

ELECTIVES

S.No	Code	Subject	L	T	P	C
1	ETEC412	BIO MEDICAL ELECTRONICS	3	0	0	3
2	ETEE413	DESIGN OF ELECTRICAL SYSTEMS	3	0	0	3
3	ETEE415	COMPUTER METHODS IN POWER SYSTEM	3	0	0	3
4	ETEC423	PLC AND SCADA	3	0	0	3
5	ETEC418	NEURAL NETWORKS AND FUZZY LOGIC	3	0	0	3
6	ETEE410	SWITCHED MODE POWER CONVERTERS	3	0	0	3
7	ETEE412	DISTRIBUTION SYSTEM PLANNING AND AUTOMATION	3	0	0	3
8	ETEE414	ELECTRICAL MACHINE MODELING AND ANALYSIS	3	0	0	3
9	ETEC414	INTRODUCTION TO NANO TECHNOLOGY	3	0	0	3
10	ETEE408	ELECTRIC TRACTION	3	0	0	3
11	ETEE418	POWER QUALITY	3	0	0	3
12	ETEE422	SMART ELECTRIC GRID	3	0	0	3
13	ETEC402	ROBOTICS	3	0	0	3
14	ETEC425	DATA COMMUNICATION NETWORKS	3	0	0	3
15	ETEC430	FUZZY LOGIC AND SYSTEMS	3	0	0	3
16	ETEC413	RADAR & SONAR ENGINEERING	3	0	0	3
17	ETEC410	SATELLITE COMMUNICATION	3	0	0	3

FIRST YEAR

ODD SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETMA105	APPLIED MATHEMATICS-I	3	1	0	4
2	ETPH109	APPLIED PHYSICS-I	3	1	0	4
3	ETEC119	ELECTRICAL SCIENCE	3	1	0	4
4	ETME106	ENGINEERING MECHANICS	3	0	0	3
5	ETCS103	INTRODUCTION TO COMPUTER SYSTEM AND PROGRAMMING	3	1	0	4
6	ETEL101	COMMUNICATION SKILLS	4	0	0	4
7	ETPH151	APPLIED PHYSICS-I LAB	0	0	2	1
8	ETEL171	COMMUNICATION SKILLS LAB	0	0	2	1
9	ETEC161	ELECTRICAL SCIENCE LAB	0	0	2	1
10	ETCS153	PROGRAMMING LAB	0	0	2	1
11	ETME154	ENGINEERING MECHANICS LAB	0	0	2	1
		TOTAL	19	4	10	28

EVEN SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETMA104	APPLIED MATHEMATICS-II	3	1	0	4
2	ETPH108	APPLIED PHYSICS-II	3	1	0	4
3	ETCH119	ENGINEERING CHEMISTRY	3	1	0	4
4	ETME107	MANUFACTURING PROCESSES	3	0	0	3
5	ETCS112	OBJECT ORIENTED PROGRAMMING	3	1	0	4
6	ETCH125	ENVIRONMENTAL STUDIES	3	0	0	3
7	ETPH152	APPLIED PHYSICS-II LAB	0	0	2	1
8	ETCH159	ENGINEERING CHEMISTRY LAB	0	0	2	1
9	ETCS166	OBJECT ORIENTED PROGRAMMING LAB	0	0	2	1
10	ETME155	ENGINEERING GRAPHICS LAB	0	0	3	1.5
11	ETME157	WORKSHOP PRACTICE	0	0	3	1.5
		TOTAL	18	4	12	28

SECOND YEAR

ODD SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETMA201	APPLIED MATHEMATICS-III	3	1	0	4
2	ETEC233	ANALOG ELECTRONICS	3	1	0	4
3	ETEC207	CIRCUITS & SYSTEMS	3	1	0	4
4	ETEC209	COMMUNICATION SYSTEMS-I	3	1	0	4
5	ETCS217	DATA STRUCTURES	3	1	0	4
6	ETEE215	ELECTRO-MECHANICAL ENERGY CONVERSION-I	3	1	0	4
7	ETEC263	ANALOG ELECTRONICS LAB	0	0	2	1
8	ETEC255	COMMUNICATION SYSTEMS-I LAB	0	0	2	1
9	ETEC253	CIRCUITS & SYSTEMS LAB	0	0	2	1
10	ETEE257	ELECTRO-MECHANICAL ENERGY CONVERSION-I LAB	0	0	2	1
		TOTAL	18	6	8	28

EVEN SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETEC202	SIGNALS & SYSTEMS	3	1	0	4
2	ETEC216	ADVANCE ANALOG ELECTRONICS	3	1	0	4
3	ETEC210	DIGITAL ELECTRONICS	3	1	0	4
4	ETEE204	COMPUTATIONAL TECHNIQUES	3	1	0	4
5	ETEC212	COMMUNICATION SYSTEMS-II	3	1	0	4
6	ETMC226	FUNDAMENTALS OF MANAGEMENT	3	0	0	3
7	ETEC264	ADVANCE ANALOG ELECTRONICS LAB	0	0	2	1
8	ETEC256	DIGITAL ELECTRONICS LAB	0	0	2	1
9	ETEC258	COMMUNICATION SYSTEMS-II LAB	0	0	2	1
		TOTAL	18	5	6	26

NOTE: PRACTICAL TRAINING WILL BE OF FOUR WEEKS DURATION AT THE END OF FOURTH SEMESTER DURING SUMMER BREAK AND THE EVALUATION WILL BE DONE IN THE FIVFTH SEMESTER

ODD SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETEC301	DIGITAL CIRCUIT DESIGNING	3	1	0	4
2	ETEC311	MICROPROCESSOR SYSTEMS	3	1	0	4
3	ETCS222	COMPUTER SYSTEMS ORGANIZATION	3	1	0	4
4	ETEC305	ELECTROMAGNETIC FIELDS THEORY	3	1	0	4

EVEN SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETEC401	EMBEDDED SYSTEMS	3	1	0	4
2	ETEC304	ANTENNA & WAVE PROPAGATION	3	1	0	4
3	ETMC421	ENTREPRENEURSHIP DEVELOPMENT	3	0	0	3
4	ETEC308	CONTROL SYSTEM	3	1	0	4

THIRD

S.No	Code	Subject	L	T	P	C
5	ETEC309	INFORMATION THEORY & CODING	3	0	0	3
6	ETEC307	ELECTRONIC MEASURING INSTRUMENTS	3	1	0	4
7	ETEC351	DIGITAL CIRCUITS DESIGNING LAB	0	0	2	1
8	ETEC353	MICROPROCESSOR SYSTEMS LAB	0	0	2	1
9	ETEC254	CIRCUIT DESIGNING LAB ON PCB	0	0	2	1
10	ETEC355	ELECTRONIC MEASURING INSTRUMENTS LAB	0	0	2	1
11	ETEC381	PRACTICAL TRAINING-I	0	0	0	2
		TOTAL	18	5	8	29

5	ETEC310	LINEAR INTEGRATED CIRCUITS	3	1	0	4
6	ETEC314	DIGITAL SIGNAL PROCESSING	3	1	0	4
7	ETEC451	EMBEDDED SYSTEMS LAB	0	0	2	1
8	ETEC360	DIGITAL SIGNAL PROCESSING LAB	0	0	2	1
9	ETEC358	CONTROL SYSTEM LAB	0	0	2	1
		TOTAL	18	5	6	26

NOTE: PRACTICAL TRAINING WILL BE OF FOUR WEEKS DURATION AT THE END OF SIXTH SEMESTER DURING SUMMER BREAK AND THE EVALUATION WILL BE DONE AT THE END OF SEVENTH SEMESTER.

FOURTH

S.No	Code	Subject	L	T	P	C
1	ETEC302	MICROWAVE ENGINEERING	3	1	0	4
2	ETEC306	VLSI DESIGN	3	1	0	4
3	ETEC406	WIRELESS COMMUNICATION	3	1	0	4
4		ELECTIVE	3	0	0	3
5		ELECTIVE	3	0	0	3
6	ETEC352	MICROWAVE ENGINEERING LAB	0	0	2	1
7	ETEC356	VLSI DESIGN LAB	0	0	2	1
8	ETEC465	MINOR PROJECT	0	0	0	2
9	ETEC481	PRACTICAL TRAINING-II	0	0	0	2
		TOTAL	15	3	4	24

1	ETEC403	DIGITAL IMAGE PROCESSING	3	1	0	4
2	ETEC404	OPTICAL COMMUNICATION	3	1	0	4
3		OPEN ELECTIVE	3	1	0	4
4		ELECTIVE	3	0	0	3
5	ETEC453	DIGITAL IMAGE PROCESSING LAB	0	0	2	1
6	ETEC452	OPTICAL COMMUNICATION LAB	0	0	2	1
7	ETEC460	MAJOR PROJECT	0	0	0	6
		TOTAL	12	3	4	23

TOTAL HOURS: LECT [L]+PRAC [P]+TUT [T] (EXCLUDING NO L, T, S, P COURSES)	229
TOTAL CREDITS [C]	212

ELECTIVES

S.No	Code	Subject	L	T	P	C
1	ETEC413	RADAR & SONAR ENGINEERING	3	0	0	3
2	ETEC423	INTELLIGENT INSTRUMENTATION	3	0	0	3
3	ETEC419	MOBILE COMMUNICATION	3	0	0	3
4	ETEC409	CONSUMER ELECTRONICS	3	0	0	3
5	ETEC418	NEURAL NETWORKS & FUZZY LOGIC	3	0	0	3
6	ETEC412	BIO MEDICAL ELECTRONICS	3	0	0	3
7	ETEC414	INTRODUCTION TO NANO TECHNOLOGY	3	0	0	3
8	ETEC420	INTEGRATED CIRCUIT TECHNOLOGY	3	0	0	3
9	ETEC410	SATELLITE COMMUNICATION	3	0	0	3
10	ETEC402	ROBOTICS	3	0	0	3
11	ETEC425	DATA COMMUNICATION NETWORKS	3	0	0	3
12	ETEC430	FUZZY LOGIC AND SYSTEMS	3	0	0	3

SOET | YEAR 2018-2022 (SCHEME OF STUDIES) | Annexure A5 | B.TECH. (CE)

ODD SEMESTER

YEAR	SN	COURSE CODE	COURSE TITLE	L	T	P	C
FIRST	1	ETMA105	APPLIED MATHEMATICS-I	3	1	0	4
	2	ETPH109	APPLIED PHYSICS-I	3	1	0	4
	3	ETEC119	ELECTRICAL SCIENCE	3	1	0	4
	4	ETME106	ENGINEERING MECHANICS	3	0	0	3
	5	ETCS103	INTRODUCTION TO COMPUTER SYSTEM AND PROGRAMMING	3	1	0	4
	6	ETEL101	COMMUNICATION SKILLS	4	0	0	4
	7	ETPH151	APPLIED PHYSICS-I LAB	0	0	2	1
	8	ETEL171	COMMUNICATION SKILLS LAB	0	0	2	1
	9	ETEC161	ELECTRICAL SCIENCE LAB	0	0	2	1
	10	ETCS153	PROGRAMMING LAB	0	0	2	1
	11	ETME154	ENGINEERING MECHANICS LAB	0	0	2	1
			TOTAL	20	4	10	28

YEAR	SN	COURSE CODE	COURSE TITLE	L	T	P	C
SECOND	1	ETMA201	APPLIED MATHEMATICS-III	3	1	0	4
	2	ETEC203	BASICS OF ELECTRONICS	3	1	0	4
	3	ETCE213	SURVEYING-I	3	1	0	4
	4	ETCE207	BUILDING MATERIALS & TECHNOLOGY	3	1	0	4
	5	ETCE217	FLUID MECHANICS	3	1	0	4
	6	ETCE261	SURVEYING-I LAB	0	0	2	1
	7	ETME255	FLUID MECHANICS LAB	0	0	2	1
	8	ETEC259	BASICS OF ELECTRONICS LAB	0	0	2	1
	9	ETCE260	BUILDING DRAWING LAB	0	0	2	1
			TOTAL	15	5	8	24

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETCE216	FLUID MACHINES	3	1	0	4
2	ETCE208	STRUCTURAL ANALYSIS-II	3	1	0	4
3	ETCE307	DESIGN OF CONCRETE STRUCTURES-I	3	1	0	4
4	ETCE321	ENVIRONMENTAL ENGINEERING -I	3	1	0	4

EVEN SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETMA104	APPLIED MATHEMATICS-II	3	1	0	4
2	ETPH108	APPLIED PHYSICS-II	3	1	0	4
3	ETCH119	ENGINEERING CHEMISTRY	3	1	0	4
4	ETME107	MANUFACTURING PROCESSES	3	0	0	3
5	ETCS112	OBJECT ORIENTED PROGRAMMING	3	1	0	4
6	ETCH125	ENVIRONMENTAL STUDIES	3	0	0	3
7	ETPH152	APPLIED PHYSICS-II LAB	0	0	2	1
8	ETCH159	ENGINEERING CHEMISTRY LAB	0	0	2	1
9	ETCS166	OBJECT ORIENTED PROGRAMMING LAB	0	0	3	1.5
10	ETME155	ENGINEERING GRAPHICS LAB	0	0	3	1.5
11	ETME157	WORKSHOP PRACTICE	0	0	3	1.5
		TOTAL	18	4	12	28

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETCE214	SURVEYING-II	3	1	0	4
2	ETCE206	CONSTRUCTION & CONCRETE TECHNOLOGY	3	1	0	4
3	ETCE204	SOIL MECHANICS	3	1	0	4
4	ETMC226	FUNDAMENTALS OF MANAGEMENT	3	0	0	3
5	ETCE211	STRUCTURAL ANALYSIS-I	3	1	0	4
6	ETCE256	CONSTRUCTION & CONCRETE TECHNOLOGY LAB	0	0	2	1
7	ETCE257	STRUCTURAL ANALYSIS-I LAB	0	0	2	1
8	ETCE262	SURVEYING-II LAB	0	0	2	1
9	ETCE254	SOIL MECHANICS LAB	0	0	2	1
		TOTAL	15	4	8	23

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETCE302	DESIGN OF CONCRETE STRUCTURES-II	3	1	0	4
2	ETMC431	ENGINEERING ECONOMICS	3	0	0	3
3	ETCE303	GEOTECHNICAL ENGINEERING	3	1	0	4
4	ETCE322	ENVIRONMENTAL ENGINEERING -II	3	1	0	4

*NOTE: PRACTICAL TRAINING WILL BE OF FOUR WEEKS DURATION AT THE END OF FOURTH SEMESTER DURING SUMMER BREAK AND THE EVALUATION WILL BE DONE IN THE FIVFTH SEMESTER

THIRD

#	Code	Subject	L	T	P	C
5	ETCE301	ESTIMATION & COSTING	3	1	0	4
6	ETCE313	ENGINEERING GEOLOGY & ROCK MECHANICS	3	1	0	4
7	ETCE252	FLUID MACHINES LAB	0	0	2	1
8	ETCE354	ENVIRONMENTAL ENGINEERING LAB	0	0	2	1
9	ETCE357	ENGINEERING GEOLOGY LAB	0	0	2	1
10	ETCE258	STRUCTURAL ANALYSIS-II LAB	0	0	2	1
11	ETCE381	PRACTICAL TRAINING-I	0	0	0	2
		TOTAL	**18**	**6**	**8**	**30**

#	Code	Subject	L	T	P	C
5	ETCE315	TRANSPORTATION ENGINEERING-I	3	1	0	4
6	ETCE320	WATER RESOURCE ENGINEERING	3	1	0	4
7	ETCE351	GEOTECHNICAL ENGINEERING LAB	0	0	2	1
8	ETCE453	CAD LAB	0	0	2	1
9	ETCE353	TRANSPORTATION ENGINEERING-I LAB	0	0	2	1
		TOTAL	**18**	**5**	**6**	**26**

FOURTH

#	Code	Subject	L	T	P	C
1	ETCE424	REMOTE SENSING & GIS	3	1	0	4
2	ETCE403	DESIGN OF STEEL STRUCTURE-I	3	1	0	4
3		ELECTIVE	3	1	0	4
4	ETCE308	TRANSPORTATION ENGINEERING-II	3	1	0	4
5	ETCE310	FOUNDATION ENGINEERING	3	1	0	4
6	ETCE411	BRIDGE ENGINEERING	3	1	0	4
7	ETCE352	TRANSPORTATION ENGINEERING-II LAB	0	0	2	1
8	ETCE356	FOUNDATION ENGINEERING LAB	0	0	2	1
9	ETCE455	MINOR PROJECT	0	0	0	2
10	ETCE481	PRACTICAL TRAINING-II	0	0	0	2
		TOTAL	**18**	**6**	**4**	**30**

#	Code	Subject	L	T	P	C
1	ETCE404	EARTHQUAKE RESISTANT DESIGN	3	0	0	3
2		ELECTIVE	3	1	0	4
3	ETCE408	DESIGN OF STEEL STRUCTURE-II	3	1	0	4
4	ETCE321	CONSTRUCTION PLANNING & MANAGEMENT	3	1	0	4
5		OPEN ELECTIVE	3	1	0	4
6	ETCE452	MAJOR PROJECT	0	0	0	6
		TOTAL	**15**	**4**	**0**	**25**

*NOTE: PRACTICAL TRAINING WILL BE OF SIX WEEKS DURATION AT THE END OF SIXTH SEMESTER DURING SUMMER BREAK AND THE EVALUATION WILL BE DONE IN THE SEVENTH SEMESTER

ELECTIVES

#	Code	Subject	L	T	P	C
1	ETCE402	ENVIRONMENTAL IMPACT ASSESSMENT	3	1	0	4
2	ETCE412	ENVIRONMENTAL POLLUTION & CONTROL	3	1	0	4
3	ETCE418	SOLID WASTE MANAGEMENT	3	1	0	4
4	ETCE413	AIRPORT ENGINEERING	3	1	0	4
5	ETCE414	PAVEMENT CONSTRUCTION & MAINTENANCE	3	1	0	4
6	ETCE415	GROUND WATER DEVELOPMENT	3	1	0	4
7	ETCE410	DISASTER MITIGATION AND MANAGEMENT	3	1	0	4
8	ETCE416	HYDRO POWER ENGINEERING	3	1	0	4
9	ETCE417	GROUND IMPROVEMENT TECHNIQUES	3	1	0	4
10	ETCE420	RAILWAY ENGINEERING	3	1	0	4

TOTAL HOURS: LECT [L]+PRAC [P]+TUT [T] (EXCLUDING NO L, T, S, P COURSES)	230
TOTAL CREDITS [C]	214

BCA — **Year 2018-2021 (Scheme of Studies)** — **Annexure A6** — **SOET**

ODD SEMESTER

Year	SNo	CourseCode	Course Title	L	T	P	C
First	1	ETMC121	Principles of Management	3	-	-	3
	2	ETCA131	Introduction to Computers & IT, Office Automation	3	1	-	4
	3	ETCH125	Environmental Studies	3	-	-	3
	4	ETCA 133	Digital Logic	3	1	-	4
	5	ETCA135	Introduction to Programming	3	1	-	4
	6	ETMA163	Basic of Mathematics	3	1	-	4
	7	ETCA161	Introduction to Computers & IT, Office Automation Lab	-	-	2	1
	8	ETCA165	Introduction to Programming Lab	-	-	2	1
	9	ETCA 167	Digital Logic Lab	-	-	2	1
			TOTAL	**18**	**4**	**6**	**25**
Second	1	ETCS 217	Data Structures	3	1	-	4
	2	ETCS 206	Computer Graphics	3	1	-	4
	3	ETCS202	Software Engineering	3	1	-	4
	4	ETCS323	Java Programming	3	1	-	4
	5	ETCS322	E- Commerce and ERP	3	1	-	4
	6	ETMA233	Numerical Methods	3	1	-	4
	7	ETCS 257	Data Structures Lab	-	-	2	1
	8	ETCS258	Computer Graphics Lab	-	-	2	1

EVEN SEMESTER

SNo	Course Code	Course Title	L	T	P	C
1	ETEL101	Communication Skills	4	-	-	4
2	ETCA231	Database System Concepts	3	1	-	4
3	ETCA126	Computer Organization &Architecture	3	1	-	4
4	ETCS112	Object Oriented Programming	3	1	-	4
5	ETCA136	Web Technologies	3	1	-	4
6	ETMA144	Differential Equations & Optimization Techniques	3	1	-	4
7	ETCA269	Database System Concepts Lab	-	-	2	1
8	ETCA164	Web Technologies Lab	-	-	2	1
9	ETCS166	Object Oriented Programming Lab	-	-	2	1
10	ETEL171	Communication Skills Lab	-	-	2	1
		TOTAL	**19**	**5**	**8**	**28**
1	ETCA232	Foundation of Computer Science	3	1	-	4
2	ETCS211	Operating Systems	3	1	-	4
3	ETCS304	Computer Networks	3	1	-	4
4	ETMC123	Micro Economics	3	-	-	3
5	ETCA228	Mobile Application Development	3	1	-	4
6	ETCA230	System Analysis and Design	3	1	-	4
7	ETCS255	Operating Systems Lab	-	-	2	1
8	ETCA264	Mobile Application Development Lab	-	-	2	1

		Third Semester (continued)	L	P	T	C
9	ETCS252	Software Engineering Lab	-	-	2	1
10	ETCS361	Java Programming Lab	-	-	2	1
		TOTAL	18	6	8	28

Third

			L	P	T	C
1	ETCS306	Data Warehousing and Data Mining	3	1	-	4
2	ETCA227	Web Based Programming using PHP	3	1	-	4
3	ETCA325	Linux Environment	3	1	-	4
4	ETCS314	Mobile Computing	3	1	-	4
5	ETCS214	Theory of Computation	3	1	-	4
6	ETCA267	Web Based Programming Using PHP Lab	-	-	2	1
7	ETCS362	Data Warehousing and Data Mining Lab	-	-	2	1
8	ETCA365	Linux Environment Lab	-	-	2	1
9	ETCA367	Practical Training	-	-	2	1
		TOTAL	15	5	8	24

			L	P	T	C
9	ETCS365	Computer Networks Lab	-	-	2	1
10	ETCA380	Seminar	-	-	2	1
		TOTAL	18	6	8	28

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

			L	P	T	C
1	ETCS422	Cloud Computing	3	1	-	4
2	ETCA324	Net Framework	3	1	-	4
3	ETCA326	Enterprise Computing in JAVA	3	1	-	4
4	ETCA362	Cloud Computing Lab	-	-	2	1
5	ETCA364	Net Framework Lab	-	-	2	1
6	ETCA366	Enterprise Computing in JAVA Lab	-	-	2	1
7	ETCA368	Major Project	-	-	6	3
8		**Elective (with Lab)**				
(i)	ETCA328	Multimedia Technologies	3	1	-	4
	ETCA370	Multimedia Technologies Lab	-	-	2	1
(ii)	ETCA 330	Network Security & Cryptography	3	1	-	4
	ETCA372	Network Security & Cryptography Lab	-	-	2	1
(iii)	ETCA 332	Software Testing	3	1	-	4
	ETCA374	Software Testing Lab	-	-	2	1
		TOTAL	12	4	14	23

Total Hours: Lect [L]+Prac [P]+Tut [T]	181
Total Credits [C]	155

SOET — **B.SC.(H) (COMPUTER SCIENCE)** — Annexure A7

YEAR — YEAR2018 (SCHEME OF STUDIES)

FIRST — ODD SEMESTER

SNO	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETME106	ENGINEERING MECHANICS	3	0	0	3
2	BSMA133	CALCULUS	4	0	0	4
3	ETEL101	COMMUNICATION SKILLS	4	0	0	4
4	ETCA135	INTRODUCTION TO PROGRAMMING	3	1	0	4
5	ETCS521	COMPUTER CENTRE PLANNING & ESTABLIS	3	1	0	4
6	ETME154	ENGINEERING MECHANICS LAB	0	0	2	1
7	ETEL171	COMMUNICATION SKILLS LAB	0	0	2	1
8	ETCA165	INTRODUCTION TO PROGRAMMING LAB	0	0	2	1
9	ETCS565	COMPUTER CENTRE PLANNING & ESTABLIS	0	0	2	1
		TOTAL	17	2	8	23

FIRST — EVEN SEMESTER

SNO	COURSE CODE	COURSE TITLE	L	T	P	C
1	BSPH112	ELECTRICITY AND MAGNETISM	3	1	0	4
2	BSMA219	PARTIAL DIFFERENTIAL EQUATIONS	4	0	0	4
3	ETELI11	SOFT SKILLS AND PERSONALITY DEV	3	0	0	3
4	BSCH125	ENVIRONMENTAL STUDIES	3	0	0	3
5	ETCS217	DATA STRUCTURES	3	1	0	4
6	ETCS112	OBJECT ORIENTED PROGRAMMING	3	1	0	4
7	BSPH166	ELECTRICITY MAGNETISM LAB	0	0	2	1
8	ETCS257	DATA STRUCTURES LAB	0	0	2	1
9	ETCS166	OBJECT ORIENTED PROGRAMMING L	0	0	2	1
		TOTAL	19	4	6	25

SECOND — ODD SEMESTER

SNO	COURSE CODE	COURSE TITLE	L	T	P	C
1	BSPH210	STATISTICAL MECHANICS	4	1	0	5
2	BSMA217	REAL ANALYSIS	4	0	0	4
3	BSMA331	NUMERICAL ANALYSIS	4	0	0	4
4	ETCS211	OPERATING SYSTEMS	3	1	0	4
5	ETCA231	DATABASE SYSTEM CONCEPTS	3	1	0	4
6	ETCA269	DATABASE SYSTEM CONCEPTS LAB	0	0	2	1
7	BSPH272	STATISTICAL MECHANICS LAB	0	0	2	1
8	BSMA351	NUMERICAL ANALYSIS LAB	0	0	2	1
9	ETCS255	OPERATING SYSTEMS LAB	0	0	2	1
		TOTAL	18	3	8	25

SECOND — EVEN SEMESTER

SNO	COURSE CODE	COURSE TITLE	L	T	P	C
1	BSPH105	OPTICS	4	1	0	5
2	BSMA137	ALGEBRA	4	0	0	4
3	ETEC210	DIGITAL ELECTRONICS	3	1	0	4
4	ETCS304	COMPUTER NETWORKS	3	1	0	4
5	ETCA136	WEB TECHNOLOGIES	3	1	0	4
6	BSPH165	OPTICS LAB	0	0	2	1
7	ETEC256	DIGITAL ELECTRONICS LAB	0	0	2	1
8	ETCS365	COMPUTER NETWORKS LAB	0	0	2	1
9	ETCA164	WEB TECHNOLOGIES LAB	0	0	2	1
		TOTAL	17	4	8	25

THIRD

S.No	Code	Subject	L	T	P	Credits
1	ETCS323	JAVA PROGRAMMING	3	1	0	4
2	BSMA329	DISCRETE MATHEMATICS	4	0	0	4
3	ETCS 515	COMPUTER GRAPHICS & MULTIMEDIA	3	1	0	4
4	ETCS 517	AI & PATTERN RECOGNITION	3	1	0	4
5	ETCS202	SOFTWARE ENGINEERING	3	1	0	4
6	ETCS361	JAVA PROGRAMMING LAB	0	0	2	1
7	ETCS559	COMPUTER GRAPHICS & MULTIMEDIA LAB	0	0	2	1
8	ETCS561	AI & PATTERN RECOGNITION LAB	0	0	2	1
9	ETCS252	SOFTWARE ENGINEERING LAB	0	0	2	1
10	ETCS507	SEMINAR	0	0	2	1
		TOTAL	16	4	10	25

S.No	Code	Subject	L	T	P	Credits
1	ETCS506	PYTHON PROGRAMMING	3	1	0	4
2	ETCS220	ANALYSIS AND DESIGN OF ALGORITHM	3	1	0	4
3	BSMA326	OPERATIONAL RESEARCH	4	0	0	4
4	ETCS505	TECHNICAL WRITING	3	0	0	3
5	ETMC226	FUNDAMENTALS OF MANAGEMENT	3	0	0	3
6	ETCS555	PYTHON PROGRAMMING LAB	0	0	2	1
7	ETCA365	LINUX ENVIRONMENT LAB	0	0	2	1
8	ETCA368	MAJOR PROJECT	0	0	6	3
		TOTAL	16	2	10	23

TOTAL CREDITS	146

ODD SEMESTER

YEAR — FIRST

SNO	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETME106	ENGINEERING MECHANICS	3	0	0	3
2	BSMA133	CALCULUS	4	0	0	4
3	ETEL101	COMMUNICATION SKILLS	4	0	0	4
4	ETCA135	INTRODUCTION TO PROGRAMMING	3	1	0	4
5	ETCS521	COMPUTER CENTRE PLANNING & ESTABLISHMENT	3	1	0	4
6	ETME154	ENGINEERING MECHANICS LAB	0	0	2	1
7	ETEL171	COMMUNICATION SKILLS LAB	0	0	2	1
8	ETCA165	INTRODUCTION TO PROGRAMMING LAB	0	0	2	1
9	ETCS565	COMPUTER CENTRE PLANNING & ESTABLISHMENT LAB	0	0	2	1
		TOTAL	17	2	8	23

YEAR — SECOND

SNO	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETCS502	STATISTICAL DATA ANALYSIS	3	1	0	4
2	BSMA217	REAL ANALYSIS	4	0	0	4
3	BSMA331	NUMERICAL ANALYSIS	4	0	0	4
4	ETCS211	OPERATING SYSTEMS	3	1	0	4
5	ETCA231	DATABASE SYSTEM CONCEPTS	3	1	0	4
6	ETCS552	STATISTICAL DATA ANALYSIS LAB	0	0	2	1

EVEN SEMESTER

YEAR — FIRST

SNO	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETCS501	LANGUAGES OF DATA MODELING	3	1	0	4
2	BSMA219	PARTIAL DIFFERENTIAL EQUATIONS	4	0	0	4
3	ETEL111	SOFT SKILLS AND PERSONALITY DEVELOPMENT	3	0	0	3
4	BSCH125	ENVIRONMENTAL STUDIES	3	0	0	3
5	ETCS217	DATA STRUCTURES	3	1	0	4
6	ETCS112	OBJECT ORIENTED PROGRAMMING	3	1	0	4
7	ETCS551	LANGUAGES OF DATA MODELING LAB	0	0	2	1
8	ETCS257	DATA STRUCTURES LAB	0	0	2	1
9	ETCS166	OBJECT ORIENTED PROGRAMMING LAB	0	0	2	1
		TOTAL	19	4	6	25

YEAR — SECOND

SNO	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETCS503	DATA MINING AND PREDICTIVE MODELING	3	1	0	4
2	BSMA137	ALGEBRA	4	0	0	4
3	ETEC210	DIGITAL ELECTRONICS	3	1	0	4
4	ETCS304	COMPUTER NETWORKS	3	1	0	4
5	ETCA136	WEB TECHNOLOGIES	3	1	0	4
6	ETCS553	DATA MINING AND PREDICTIVE MODELING LAB	0	0	2	1

S.No	Code	Subject	L	T	P	Credits
7	BSMA351	NUMERICAL ANALYSIS LAB	0	0	2	1
8	ETCS255	OPERATING SYSTEMS LAB	0	0	2	1
9	ETCA269	DATABASE SYSTEM CONCEPTS LAB	0	0	2	1
		TOTAL	17	3	8	24

S.No	Code	Subject	L	T	P	Credits
7	ETEC256	DIGITAL ELECTRONICS LAB	0	0	2	1
8	ETCS365	COMPUTER NETWORKS LAB	0	0	2	1
9	ETCA164	WEB TECHNOLOGIES LAB	0	0	2	1
		TOTAL	16	4	8	24

THIRD

S.No	Code	Subject	L	T	P	Credits
1	ETCS504	BIG DATA ANALYTICS	3	1	0	4
2	BSMA329	DISCRETE MATHEMATICS	4	0	0	4
3	ETCS 515	COMPUTER GRAPHICS & MULTIMEDIA	3	1	0	4
4	ETCS 517	AI & PATTERN RECOGNITION	3	1	0	4
5	ETCS202	SOFTWARE ENGINEERING	3	1	0	4
6	ETCS554	BIG DATA ANALYTICS LAB	0	0	2	1
7	ETCS559	COMPUTER GRAPHICS & MULTIMEDIA LAB	0	0	2	1
8	ETCS561	AI & PATTERN RECOGNITION LAB	0	0	2	1
9	ETCS252	SOFTWARE ENGINEERING LAB	0	0	2	1
10	ETCS507	SEMINAR	0	0	2	1
		TOTAL	16	4	10	25

S.No	Code	Subject	L	T	P	Credits
1	ETCS314	MOBILE COMPUTING	3	1	0	4
2	BSMA326	OPERATIONAL RESEARCH	4	0	0	4
3	ETCS505	TECHNICAL WRITING	3	0	0	3
4	ETMC226	FUNDAMENTALS OF MANAGEMENT	3	0	0	3
5	ETCS506	PYTHON PROGRAMMING	3	1	0	4
6	ETCS555	PYTHON PROGRAMMING LAB	0	0	2	1
7	ETCA365	LINUX ENVIRONMENT LAB	0	0	2	1
8	ETCA368	MAJOR PROJECT	0	0	6	3
		TOTAL	16	2	10	23

TOTAL CREDITS	144

FIRST YEAR

ODD SEMESTER

SNO	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETCS508	INTRODUCTION TO CYBER SECURITY	3	1	0	4
2	BSMA133	CALCULUS	4	0	0	4
3	ETCS521	COMPUTER CENTRE PLANNING & ESTABLISHMENT	3	1	0	4
4	ETEL101	COMMUNICATION SKILLS	4	0	0	4
5	ETCA135	INTRODUCTION TO PROGRAMMING	3	1	0	4
6	ETCS509	INTRODUCTION TO CYBER SECURITY LAB	0	0	2	1
7	ETCS565	COMPUTER CENTRE PLANNING & ESTABLISHMENT LAB	0	0	2	1
8	ETEL171	COMMUNICATION SKILLS LAB	0	0	2	1
9	ETCA165	INTRODUCTION TO PROGRAMMING LAB	0	0	2	1
10	ETCA365	LINUX ENVIRONMENT LAB	0	0	2	1
		TOTAL	17	3	10	25

EVEN SEMESTER

SNO	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETCS510	INTRUSION DETECTION & PREVENTION SYSTEM	3	1	0	4
2	BSMA219	PARTIAL DIFFERENTIAL EQUATIONS	4	0	0	4
3	ETCS112	OBJECT ORIENTED PROGRAMMING	3	1	0	4
4	ETEL111	SOFT SKILLS AND PERSONALITY DEVELOPMENT	3	0	0	3
5	BSCH125	ENVIRONMENTAL STUDIES	3	0	0	3
6	ETCS217	DATA STRUCTURES	3	1	0	4
7	ETCS166	OBJECT ORIENTED PROGRAMMING LAB	0	0	2	1
8	ETCS257	DATA STRUCTURES LAB	0	0	2	1
		TOTAL	19	4	4	24

SECOND YEAR

ODD SEMESTER

SNO	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETCS211	OPERATING SYSTEMS	3	1	0	4
2	BSMA217	REAL ANALYSIS	4	0	0	4
3	BSMA331	NUMERICAL ANALYSIS	4	0	0	4
4	ETCS202	SOFTWARE ENGINEERING	3	1	0	4
5	ETCS519	NETWORK SECURITY & STEGANOGRAPHY	3	1	0	4
6	ETEL217	PERSONALITY DEVELOPMENT AND COMMUNICATION SKILLS	3	0	0	3
7	ETCS255	OPERATING SYSTEMS LAB	0	0	2	1

EVEN SEMESTER

SNO	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETEC210	DIGITAL ELECTRONICS	3	1	0	4
2	BSMA137	ALGEBRA	4	0	0	4
3	ETCS304	COMPUTER NETWORKS	3	1	0	4
4	ETCS511	CYBER FORENSICS	3	1	0	4
5	ETCA231	DATABASE SYSTEM CONCEPTS	3	1	0	4
6	ETEC256	DIGITAL ELECTRONICS LAB	0	0	2	1
7	ETCS556	CYBER FORENSICS LAB	0	0	2	1

S.No	Code	Subject	L	T	P	Credits
8	BSMA351	NUMERICAL ANALYSIS LAB	0	0	2	1
9	ETCS252	SOFTWARE ENGINEERING LAB	0	0	2	1
10	ETCS563	NETWORK SECURITY & STEGANOGRAPHY LAB	0	0	2	1
		TOTAL	20	3	8	27

S.No	Code	Subject	L	T	P	Credits
8	ETCS365	COMPUTER NETWORKS LAB	0	0	2	1
9	ETCA269	DATABASE SYSTEM CONCEPTS LAB	0	0	2	1
		TOTAL	16	4	8	24

THIRD

S.No	Code	Subject	L	T	P	Credits
1	ETCS 515	COMPUTER GRAPHICS & MULTIMEDIA	3	1	0	4
2	BSMA329	DISCRETE MATHEMATICS	4	0	0	4
3	ETCA136	WEB TECHNOLOGIES	3	1	0	4
4	ETCS512	CYBERSPACE & THE LAW	3	1	0	4
5	ETCS323	JAVA PROGRAMMING	3	1	0	4
6	ETCA164	WEB TECHNOLOGIES LAB	0	0	2	1
7	ETCS557	CYBERSPACE & THE LAW LAB	0	0	2	1
8	ETCS559	COMPUTER GRAPHICS & MULTIMEDIA LAB	0	0	2	1
9	ETCS361	JAVA PROGRAMMING LAB	0	0	2	1
10	ETCS507	SEMINAR	0	0	2	1
		TOTAL	16	4	10	25

S.No	Code	Subject	L	T	P	Credits
1	ETCS513	ETHICAL HACKING	3	1	0	4
2	ETCS514	IT ENABLED SERVICES	3	1	0	4
3	ETCS505	TECHNICAL WRITING	3	0	0	3
4	ETCS506	PYTHON PROGRAMMING	3	1	0	4
5	ETMC226	FUNDAMENTALS OF MANAGEMENT	3	0	0	3
6	ETCS555	PYTHON PROGRAMMING LAB	0	0	2	1
7	ETCS558	ETHICAL HACKING LAB	0	0	2	1
8	ETCA368	MAJOR PROJECT	0	0	6	3
		TOTAL	15	3	10	23

TOTAL CREDITS	148

SOET — **YEAR 2018-2021 (SCHEME OF STUDIES)** — **Annexure A10** — **B.Sc.(H)(Electronics Science)**

YEAR: FIRST

ODD SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETMA105	APPLIED MATHEMATICS-I	3	1	0	4
2	ETPH501	APPLIED PHYSICS	3	1	0	4
3	ETEC203	BASICS OF ELECTRONICS	3	1	0	4
4	ETCS103	INTRODUCTION TO COMPUTER SYSTEM AND PROGRAMMING	3	1	0	4
5	ETEL101	COMMUNICATION SKILLS	4	0	0	4
6	ETPH551	APPLIED PHYSICS LAB	0	0	2	1
7	ETEL171	COMMUNICATION SKILLS LAB	0	0	2	1
8	ETCS153	PROGRAMMING LAB	0	0	2	1
9	ETEC259	BASICS OF ELECTRONICS LAB	0	0	2	1
		TOTAL	**16**	**4**	**8**	**24**

EVEN SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETMA104	APPLIED MATHEMATICS-II	3	1	0	4
2	ETCH125	ENVIRONMENTAL STUDIES	3	0	0	3
3	ETCH119	ENGINEERING CHEMISTRY	3	1	0	4
4	ETME106	ENGINEERING MECHANICS	3	0	0	3
5	ETEC119	ELECTRICAL SCIENCE	3	1	0	4
6	ETEC161	ELECTRICAL SCIENCE LAB	0	0	2	1
7	ETCH159	ENGINEERING CHEMISTRY LAB	0	0	2	1
8	ETMEI57	WORKSHOP PRACTICE	0	0	3	1.5
9	ETMEI54	ENGINEERING MECHANICS LAB	0	0	2	1
		TOTAL	**15**	**3**	**9**	**22.5**

YEAR: SECOND

ODD SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETEE204	COMPUTATIONAL TECHNIQUES	3	1	0	4
2	ETEC511	ELECTRONICS DEVICES & CIRCUITS	3	1	0	4
3	ETEC513	NETWORK THEORY	3	1	0	4
4	ETEC210	DIGITAL ELECTRONICS	3	1	0	4
5	ETCS217	DATA STRUCTURES	3	1	0	4
6	ETEC551	ELECTRONICS DEVICES & CIRCUITS LAB	0	0	2	1
7	ETEC553	NETWORK THEORY LAB	0	0	2	1
8	ETCS257	DATA STRUCTURES LAB	0	0	2	1
9	ETEC256	DIGITAL ELECTRONICS LAB	0	0	2	1
		TOTAL	**15**	**5**	**8**	**24**

EVEN SEMESTER

SN	COURSE CODE	COURSE TITLE	L	T	P	C
1	ETEC308	CONTROL SYSTEM	3	1	0	4
2	ETEC307	ELECTRONIC MEASURING INSTRUMENTS	3	1	0	4
3	ETEC235	COMMUNICATION ENGINEERING	3	1	0	4
4	ETEB327	ELECTRICAL ENGINEERING MATERIALS	3	0	0	3
5	ETEC305	ELECTROMAGNETIC FIELD THEORY	3	1	0	4
6	ETEC358	CONTROL SYSTEM LAB	0	0	2	1
7	ETEC276	COMMUNICATION ENGINEERING LAB	0	0	2	1
8	ETEC552	INTRODUCTION TO MATLAB LAB	0	0	2	1
9	ETEC254	CIRCUIT DESIGNING LAB ON PCB	0	0	2	1
		TOTAL	**15**	**4**	**8**	**23**

THIRD

	Code	Subject	L	T	P	C
1	ETCS 427	MOBILE AND WIRLESS COMMUNICATION	3	1	0	4
2	ETEC522	MICROPROCESSOR & MICROCONTROLLER	3	1	0	4
3	ETEC309	INFORMATION THEORY & CODING	3	0	0	3
4		ELECTIVE	3	0	0	3
5		ELECTIVE	3	0	0	4
6	ETEC310	LINEAR INTEGRATED CIRCUITS	3	1	0	4
7	ETEC554	MICROPROCESSOR & MICROCONTROLLER LAB	0	0	2	1
8	ETEC556	MINOR PROJECT	0	0	0	2
		TOTAL	18	3	2	25

	Code	Subject	L	T	P	C
1	ETEC413	RADAR AND SONAR ENGINEERING	3	0	0	3
2	ETEC314	DIGITAL SIGNAL PROCESSING	3	1	0	4
3	ETEC523	TECHNICAL WRITING	3	0	0	3
4		OPEN ELECTIVE	3	1	0	4
5		ELECTIVE	3	0	0	3
6	ETEC360	DIGITAL SIGNAL PROCESSING LAB	0	0	2	1
7	ETEC557	MAJOR PROJECT	0	0	0	4
		TOTAL	15	2	2	22

ELECTIVES

	Code	Subject	L	T	P	C
1	ETEC425	DATA COMMUNICATION NETWORKS	3	0	0	3
2	ETEC423	INTELLIGENT INSTRUMENTATION	3	0	0	3
3	ETEC419	MOBILE COMMUNICATION	3	0	0	3
4	ETEC409	CONSUMER ELECTRONICS	3	0	0	3
5	ETEC418	NEURAL NETWORKS & FUZZY LOGIC	3	0	0	3
6	ETEC412	BIO MEDICAL ELECTRONICS	3	0	0	3
7	ETEC414	INTRODUCTION TO NANO TECHNOLOGY	3	0	0	3
8	ETEC420	INTEGRATED CIRCUIT TECHNOLOGY	3	0	0	3
9	ETEC410	SATELLITE COMMUNICATION	3	0	0	3
10	ETEC402	ROBOTICS	3	0	0	3

TOTAL HOURS: LECT [L]+PRAC [P]+TUT [T] (EXCLUDING NO L, T, S, P COURSES)	93[L]+21[T]+39[P]
TOTAL CREDITS [C]	140.5