TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

3-Year Diploma Engineering Curriculum and Syllabus for Computer Science & Engineering (CSE)

Second Semester

Course Code	Course Title	Contact Hrs. / Week			Credit
		L	T	P	
Theory					
TIUSD-201	Career Advancement- Skill Development-II	2	1	0	3
TIUBSM-202	Mathematics -II	3	1	0	4
TIUBSC-203	Chemistry-II	2	1	0	3
TIUBPM-204	Mechanics-II	2	1	0	3
TIUBEE-205	Introduction to Electrical & Electronics Technology	3	1	0	4
TIUBCS-206	Computer Fundamentals and Programming Techniques	2	1	0	3
Practical					
TIUBEE-295	Introduction to Electrical and Electronics Technology Laboratory & Simulation	0	0	3	2
TIUBCS-296	Computer Application Laboratory	0	0	2	1
TIUBPM-297	Engineering Workshop	0	0	3	2
Sessional					
TIUCSL-281	Entrepreneurship Skill Development-II	0	0	3	2
Total Credits					27

Approved By:

External Expert   VC   Registrar   Dean of Academics   Mentor of the Deptt.   HOD

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SYLLABUS

MATHEMATICS-II
TIUBSM-202

: 3-1-0   **Credit: 4**

DETERMINANTS & MATRICES:

Determinants: Definition & expansion of determinants of order 2 and 3. Properties of determinants (statement only). Minors and cofactors. Evaluation of determinants of order 4 by Chio's method.

Matrix Algebra: Definition of a matrix of order m x n, leading element, principal diagonal. Types of matrices – null matrix, square matrix, diagonal matrix, identity matrix etc. Symmetric and Skew symmetric matrices. Matrix algebra – addition, subtraction, scalar multiplication and multiplication of matrices. Matrix inversion by adjoint method.

INTEGRATION:
Definition of Integration as inverse process of differentiation. Integration of standard functions. Rules for integration (sum, difference, scalar multiple).

Methods for Integration: Integration by substitution. Integration by trigonometric substitution. Integration by parts. Integration by partial fraction.

Definite Integral: Definition of Definite Integral. Properties of definite integrals with simple problems.

Applications of Definite Integral: Area under plain curves. Area bounded by two curves. Volume of revolution. Simple examples.

ORDINARY DIFFERENTIAL EQUATIONS:
Definition of ordinary differential equation, order & degree. Solution of differential equations of 1st order & 1st degree of variable separable type Homogeneous type Reducible to homogeneous type exact type linear type. Reducible to linear type (Bernoulli's Equation).

Solution of 2nd order linear ordinary differential equations with constant coefficients: Evaluation of Complementary functions (**C.F.**). Evaluation of Particular Integral (**P.I.**) for exponential function, polynomial function, sine and cosine function & functions of the form where V is any one of the above.

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PARTIAL DIFFERENTIATION:

Definition & meaning of partial derivative. Evaluation of partial derivatives. Definition & examples of homogeneous functions. Euler's theorem (1st order) on Homogeneous functions for 2 & 3 variables (without proof). Simple problems.

STATISTICS & PROBABILITY:

Statistics: Definition & examples of frequency distribution. Measures of central tendency (mean, median, mode) for ungrouped and grouped frequency distribution. Measures of dispersion – Standard deviation, Simple problems.

Probability: Definition of random experiment, sample space, event, occurrence of events & types of events (e.g. Impossible, mutually exclusive, exhaustive, equally likely). Classical & axiomatic definition of probability. Addition & multiplication theorems of probability (statement only). Simple problems.

Recommended Books:

Main Reading:

1. B.K. Paul Diploma Engineering Mathematics (Vol-2) U.N. Dhar & Sons
2. A. Sarkar Engineering Mathematics Naba Prakashani
3. G.P. Samanta A Text Book of Diploma Engineering, Mathematics, Volume-2, Learning Press
4. Konch & Dey Engineering Mathematics Bhagabati Publication

Supplementary Reading

1. B.S. Grewal Higher Engineering Mathematics Khanna Publishers, New Delhi
2. Fatunla S O Numerical Methods for initial value problems in ordinary differential equations. Academic Press Inc. (London) Ltd
3. Kendall E A An Introduction to numerical analysis (Second edition) John Wiley and Sons, 1989

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CHEMISTRY-II

TIUBSC-203

L-T-P: 2-1-0   **Credit: 3**

Unit 1: Cement

Portland cement**:** Raw materials, Composition and Manufacture, Setting and Hardening of cement.

Function of: gypsum, Cement Mortar, Cement concrete, Lime mortar, and plaster of paris.

Unit 2: Fuels

Definition and classification, characteristics, combustion and chemical principles involved in it calorific value: gross and net calorific values, calorific value (Dulong formula), Determination of calorific value by Bomb calorimeter.

Solid Fuels: Composition, properties and uses of wood, peat, coal (Types and Selection of coal), and lignite.

Proximate and ultimate analysis of coal Liquid fuels: Petroleum: its chemical composition Fractional distillation of petroleum (product and uses), Cracking, Knocking and chemical structure (antiknock compounds), Octane number, Cetane number.

Gaseous Fuels: Composition and uses of Coal gas, Water gas, Producer gas, Gobar gas, Natural gas, LPG, CNG.

Unit 3: Corrosion

Introduction: Definition, Types of corrosion (dry and wet corrosion), factors affecting the corrosion, methods of preventing corrosion.

Types and mechanism of Atmospheric corrosion, oxide films.

Electrochemical corrosion, its mechanism and types.

Protective measures against corrosion: coatings (galvanic and zinc, organic coating agents, metal cladding, sherardizing).

Refractories properties and use of Boron Carbide and Carborandirm, Asbestos, Glass, Ceramics, Cork (preliminary idea only)

Unit 4: Lubricants

Lubricants and Lubrication: Definition (Lubricant and Lubrication), Function of lubricant, Types of lubricants purpose and types of lubrication, Mechanisms of lubrication, names of common lubricants.

Ideal lubricant and properties: Viscosity, Viscosity index, fire point, flash point, pour point, cloud point, Saponification value, Acid value.

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Unit 5: Protective Coating

Paints**:** Composition, types (Snowchem, distemper) Varnishes: Definition, types, difference from paint, uses, characteristics.
Metallic coating**:** Galvanisation, Electroplating, and Tin plating.

Unit 6: Polymers

Polymers: Polymer (Definition and classification of synthetic polymers), Monomer, Polymerisation, Addition and condensation polymerisation.
Synthetic Plastics: definition, types: thermosetting & thermo softening plastics, their difference with examples, compounding of plastics, properties and applications of plastics.
Natural rubber: Rubber, structure of rubber, preparation & properties, Vulcanization of rubber, properties of vulcanized rubber, synthetic rubber & its comparison with natural rubber, Properties and applications of rubbers.
Preparation and uses of: Polythene, PVC, Polypropylene, Polystyrene, Teflon, and Bakelite,

Unit 7: Nanotechnology

Introduction: Definition, Importance, Size dependent properties of nano-materials.
Preparation methods, Characterisation methods and applications of nano-materials.

Unit 8: Aliphatic compounds

8.1. Chemical tests to identify & uses-Alcohol: Ethanol, propanol, and butanol.
Chemical test to identify & uses- Ketone: Acetone, butanone.
Chemical test to identify & uses-Acid: Acetic acid, propanoic acid, and Butanoic acid.
Chemical test to identify & uses- Ester: Ethyl acetate, amyl acetate.

Unit 9: Aromatic Compounds

Benzene: chlorination, Nitration, Friedel Crafts alkylation.
Aniline: Diazotisation, Coupling reaction with phenol, aniline, & N, N-dimethyl aniline.

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Recommended Books:

Main Reading:

1. Jain & Jain, Engineering Chemistry, 15th Edition(2008),Dhanpat Rai & Co. (Pvt.) Ltd, New Delhi – 110 006.
2. Shashi Chawla, A Text Book of Chemistry, 3rd Edition(2005),Dhanpat Rai & Co. (Pvt.) Ltd, New Delhi – 110 006.

Supplementary Reading

1. Shubha K. Kulkarni, Nanotechnology: Principles & Practices (2006), Capital Publishing House, New Delhi - 110002 , India

MECHANICS-II
TIUBPM-204

: 2-1-0   **Credit: 3**

Unit I - Stress and strain: Concept of stress and strain. Various types of stress and Strains, Definition of tension, compression, shear, bending, torsion, concept of volumetric and lateral strain, Poisson's ratio, changes in dimensions and volume of a bar under direct load (Axial and along all the three Axes), ultimate stress, Working stress, elasticity, Hook's Law, Load deformation diagram for mild steel and cast iron. Definition of modulus of elasticity, Yield point, modulus of rigidity and bulk modulus, stress & strain for homogeneous material and composite section.

Unit II - Kinematics of Particles: Differential equations of kinematics – plane, rectilinear and curvilinear motions; Cartesian co-ordinate system; Normal and tangent co-ordinate system, projectile motion**.**

Kinetics of Particles: Newton's second law of motion; Work and energy principle – gravitational potential energy, elastic potential energy, kinetic energy, power, efficiency; Principle of impulse and momentum; Impact motion- direct central impact.

Rotation of Rigid Bodies: Kinematics of rotation; Kinetics of rotation- equation of motion, principle of work and energy; Principle of impulse and momentum'
Plane Motion of Rigid Bodies Translation of a rigid body in a plane; Kinematics of plane motion; Instantaneous centre of rotation; Kinetics of plane motion – equation of motion, principle of work and energy; Principle of impulse and momentum.

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Unit III - Project work

A project work will be assigned to the students by the concerned subject faculty. It will carry 10 marks and will be evaluated by the faculty itself. The topic of the project will be decided by the faculty. The students will work in a group of 3 – 5 on each topic. The topic should be related to the subject taught by the faculty and should have proper utility and importance to enhance his practical skill & knowledge.

Recommended Books:

Main Reading:

1. S. S. Bhavikatti, K. G. Rajashekarappa, Engineering Mechanics 4th Edition, New Age International publishers
2. R. S. Khurmi, A Textbook of Engineering Mechanics, S. Chand & Company Ltd.

Supplementary Reading

1. A.R. Basu, Engineering Mechanics

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INTRODUCTION TO ELECTRICAL & ELECTRONICS TECHNOLOGY
TIUBEE-205

: 3-1-0   Credit: 4

DC Network Theorem: Definition of electric circuit, network, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, Kirchhoff's law, Principle of superposition. Source equivalence and conversion, Thevenin's theorem, Norton Theorem, nodal analysis, mesh analysis, stardelta conversion. Maximum power transfer theorem with proof.

Electromagnetism: Biot-savart law, Ampere's circuital law, field calculation using Biot-savart & ampere's circuital law. Magnetic circuits, Analogous quantities in magnetic and electric circuits, Faraday's law, Self and mutual inductance. Energy stored in a magnetic field, B-H curve, Hysteretic and Eddy current losses, Lifting power of Electromagnet.

AC fundamental: Production of alternating voltage, waveforms, average and RMS values, peak factor, form factor, phase and phase difference, phasor representation of alternating quantities, phasor diagram, behavior of AC series , parallel and series parallel circuits, Power factor, Power in AC circuit, Effect of frequency variation in RLC series and parallel circuits, Resonance in RLC series and parallel circuit, Q factor, band width of resonant circuit.

Semiconductors: Crystalline material: Mechanical properties, Energy band theory, Fermi levels; Conductors, Semiconductors and Insulators: electrical properties, band diagrams. Semiconductors: intrinsic and extrinsic, energy band diagram, electrical conduction phenomenon, P-type and N-type semiconductors, drift and diffusion carriers.

Diodes and Diode Circuits: Formation of P-N junction, energy band diagram, and built-in-potential forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics; Junction capacitance and Varactor diode. Simple diode circuits, load line, linear piecewise model.

Rectifier circuits: half wave, full wave, PIV, DC voltage and current, ripple factor, efficiency, idea of regulation.

Bipolar Junction Transistors:
Formation of PNP / NPN junctions, energy band diagram; transistor mechanism and principle of transistors, CE, CB, CC configuration, transistor characteristics: cut-off active and saturation mode, transistor action, injection efficiency, base transport factor and current amplification factors for CB and CE modes. Biasing and Bias stability: calculation of stability factor.

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Recommended Books:

Main Reading:

1. Kothari, D P; Nagrath, I J, Basic Electrical Engineering**,** Tata McGraw-Hill
2. Kulshreshtha, Basic Electrical Engineering: Principles and Application, Tata McGraw-Hill.
3. D.Chattopadhyay, Electronics , New Age Publication

Supplementary Reading

1. Millman Halkias, Integrated Electronics,
2. Robert.L.Boylestad, Electronic Devices and Circuit Theory,

COMPUTER FUNDAMENTALS AND PROGRAMMING TECHNIQUES
TIUBCS-206

: 2-1-0   Credit: 3

Basic Computer Concepts: Different generations of computer hardware; Number System, Logic Gates, Modern taxonomy of computers; Hardware and software; Basic computer applications; General idea of information technologies; Information system development process.

Number System: Different Number Systems: Decimal, Binary, Octal, Hexadecimal. Conversions from one number system to other. Logic Gates- Overview of logic gate; Basic Gates (AND, OR, NOT) with truth table and diagram; Universal Gate (NAND, NOR, XOR) with truth table and diagram; Designing Boolean algebraic expression with logic gates.

Computer Hardware: Input and Output devices; Memory (or storage) devices; Central Processing Unit. Input / Output devices: keyboard, mouse, light pen, barcode readers, scanners, MICR, OCR, voice recognition and handwriting recognition systems; visual display terminals, printers, plotters etc. Storage devices: Primary storage – RAM, ROM, EEROM, PROM, EPROM; Secondary storage – direct access devices, serial access devices: hard disks, floppy disks, magnetic tape, CD-ROM, DVD; Cache memory and Virtual memory. Central Processing Unit – Control Unit; Arithmetic and Logic Unit; and shift registers.

Computer Software: Meaning of software; broad classification of software; system software and application software; utilities. Systems software – Operating systems: Basic idea of an OS; OS as a resource manager – memory management, input/output management, secondary storage management, processor management, program management, network management; Brief introduction to different types of operating systems like DOS, Windows, Unix, Linux etc. Application software – System development tools, Utilities, Application packages.

Programming languages and Algorithms: The concept of programming; pseudo code and

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flowcharts; structure of programs; program development guidelines; programming languages – machine language, assembly languages, high-level languages (procedural and object-oriented languages), fourth generation languages; object code and executable codes; compilers, translators, assemblers; editing tools such as vi. Algorithms – Basic concept; some typical algorithms – Finding the sum of a series, solving a quadratic equation, generating Fibonacci sequence, checking whether a number is prime or not, creating an array of numbers and displaying the largest element in the list, sorting a given set of numbers, multiplying together two matrices etc. (The algorithms may be implemented using pseudo code).

Computer networks and Internet: Basic concepts of computer networks; local area networks and wide area networks; switches, hubs, routers, idea of distributed systems; the Internet and the World Wide Web.

Computer Applications: Essential features of computer systems and structures required for office automation, networking, and parallel processing.

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Recommended Books:

Main Reading:
1. Martin & Powell – Information Systems: A Management Perspective, McGraw-Hill
2. Laudon & Laudon – Management Information Systems, Pearson Education

Supplementary Reading

1. Pradeep K Sinha, Priti Sinha, Computer Fundamentals, BPB Publications

INTRODUCTION TO ELECTRICAL & ELECTRONICS TECHNOLOGY
LABORATORY & SIMULATION
TIUBEE-295

L-T-P: 0-0-3   **Credit: 2**

List of Experiments:

1. Characteristics of Fluorescent lamps

2. Characteristics of Tungsten and Carbon filament lamps

3. A. Verification of Thevenin's theorem.

    B. Verification of Norton's theorems.

4. Verification of Maximum power theorem.

5. Verification of Superposition theorem

6. Study of R-L-C Series circuit

7. Study of R-L-C parallel circuit

8. Familiarisation with passive and active electronic components such as Resistors, Inductors,

Capacitors, Diodes, Transistors (BJT) and electronic equipment like DC power supplies,

multimeters etc.

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9. Familiarisation with measuring and testing equipment like CRO, Signal generators etc.

10. Study of I-V characteristics of Junction diodes.

11. Study of I-V characteristics of Zener diodes.

12. Study of Half and Full wave rectifiers with Regulation and Ripple factors.

13. Study of I-V characteristics of BJTs.

COMPUTER APPLICATION LABORATORY
TIUBCS-296

    : 0-0-2   **Credit: 1**

Unit I: MS Windows
Introduction to M.S. Windows; Features of Windows; Various versions of Windows & its use; Working with Windows; My Computer & Recycle bin ; Desktop, Icons and Windows Explorer; Screen description & working styles of Windows; Dialog Boxes & Toolbars; Working with Files & Folders; simple operations like copy, delete ,moving of files and folders from one drive to another, Shortcuts & Auto starts; Accessories and Windows Settings using Control Panel- setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & Program lists; Installing and Uninstalling new Hardware & Software program on your computer. Introduction to Internet and E-mail; searching information through a search engines (google).

Unit II: MS Word Basics
Introduction to MS Office; Introduction to MSWord; Features & area of use. Working with MS Word.; Menus & Commands; Toolbars & Buttons; Shortcut Menus, Wizards & Templates; Creating a New Document; Different Page Views and layouts; Applying various Text Enhancements; Working with – Styles, Text Attributes; Paragraph and Page Formatting; Text Editing using various features ; Bullets, Numbering, Auto formatting, Printing & various print options.

Advanced Features of MS-Word: Spell Check, Thesaurus, Find & Replace; Headers & Footers ; Inserting – Page Numbers, Pictures, Files, Auto texts, Symbols etc.; Working with Columns, Tabs & Indents; Creation & Working with Tables including conversion to and from text; Margins & Space management in Document; Adding References and Graphics; Mail Merge, Envelops & Mailing Labels. Importing and exporting to and from various formats.

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Unit III: MS Excel: Introduction and area of use; Working with MS Excel.; concepts of Workbook & Worksheets; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.; Using different features with Data and Text; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with various options.

Unit IV: MS PowerPoint: Introduction & area of use; Working with MS PowerPoint; Creating a New Presentation; Working with Presentation; Using Wizards; Slides & its different views; Inserting, Deleting and Copying of Slides; Working with Notes, Handouts, Columns & Lists; Adding Graphics, Sounds and Movies to a Slide; Working with PowerPoint Objects; Designing & Presentation of a Slide Show; Printing Presentations, Notes, Handouts with print options.

Recommended Books:

Main Reading

1. Windows XP Complete Reference. BPB Publications
2. Joe Habraken, Microsoft Office 2000, 8 in 1 by, Prentice Hall of India

Supplementary Reading

1. A. Mansoor, I.T. Tools and Applications, Pragya Publications, Matura

ENGINEERING WORKSHOP
TIUBPM-297

L-T-P: 0-0-3   **Credit: 2**

1. General safety precautions in workshop and introduction.

2. **Carpentry Shop** :- Safety precaution, Kinds of wood and timber, Application of timber as per their classification, Carpentry hand tools and machines, Demonstration of wood working machine like, band saw, circular saw, thickness planner, wood working lathe, surface planners etc.
Exercise: Different types of carpentry joint.

3. **Welding Shop:** - Safety precaution in welding shop, Introduction to gas and arc welding, Soldering and brazing etc, welding equipment and welding material
Exercise: A simple job on gas/arc welding.

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4. **Turning and Machine Shop:** - Safety precautions, Demonstration and working principles of some of the general machines, like lathe, shaper, milling, drilling, grinding, slotting etc. General idea of cutting tools of the machines.

Exercise: A simple job on lathe/ shaper.

Recommended Books:

1. Elements of Workshop Technology (Volume - 1) by S.K. Hajra Choudhury, A.K. Hajra Choudhury, Nirjhar Roy.

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