SANT GADGE BABA AMRAVATI UNIVERSITY GAZETTE

Official Publication of Sant Gadge Baba Amravati University

PART- TWO

(Extra-ordinary)

Wednesday, the 30th October, 2024

NOTIFICATION

No. 146 /2024 Dated : 30/10/2024

Subject : Implementation of the new syllabus of Semester I & II of the subjects of B.E./ B.Tech. (Chem. Engg.)/B.Tech.(Chem.Tech.(Food, Pulp & Paper, Oil & Paint and Petrochemical Tech.)/B.Text. Engg. as per NEP- 2020 Pattern.

It is notified for general information of all concerned that the authorities of the University have accepted to implement the new syllabus of Semester I & II of the subjects of B.E./ B.Tech. (Chem. Engg.) / B.Tech.(Chem.Tech. (Food, Pulp & Paper, Oil & Paint and Petrochemical Tech.)/B.Text. Engg. as per NEP- 2020 Pattern to be implemented from the academic session 2024-2025 onwards in phase wise manner as mentioned below:

Sd/-
(Dr.A.M.Asanare)
Registrar
Sant Gadge Baba Amravati University

DRAFT SYLLABUS FOR ME IN COMPUTER AIDED STRUCTURAL ENGINEERING [C.B.C.S.]

SEMESTER-I

Syllabus for First year four years Undergraduate Engineering Degree Programme
Semester I & II Common for All the branches of Engineering & Technology [as per NEP-2020]

1AS100BS: APPLIED MATHEMATICS - I

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
	I	1AS100BS	Applied Mathematics I	3	45	3 Hrs.	60

Course Description:
Subject Code 1AS100BS Applied Mathematics-I is a compulsory course for First Year B.E., B.Tech., B.E.Text. and common to all branches.

Aim: To impart the sound knowledge on the principles of Mathematics involving the different application-oriented topics required for all engineering students.

Course Objectives:

- To identify algebraic problems from practical areas and obtain the solutions in certain cases.
- To identify the differentials equations of different types.
- To identify the Application of differentials equations.

Course Outcomes:

After completing the course, the students will be able to-

CO1: Understand the infinite series and solution by different tests.
CO2: Form n^{th} order derivatives of the functions, they might encounter in the same or higher semester.
CO3: Understand Partial differential equation and solve multivariable (partial) differential equations.
CO4: Find Maxima & Minima related to engineering problems.
CO5: Form differential equations and solutions by different methods.
CO6: Illustrate the application of differential equations.

Unit I: Infinite Series:
Convergence of series, Tests for Convergence (p-series test, Comparison test, Root test, Ratio test, Raabe's test). (07Hrs)

Unit II: Differential Calculus:
Successive Differentiation, Leibnitz's Theorem, Taylor's series and Maclaurin's series. (07Hrs)

Unit III: Partial Differentiation:
Partial derivatives, change of variables , Euler's theorem on homogeneous function. (07Hrs)

Unit IV: Application of Partial Differentiation:
Maxima and minima for the function of two variables, Maxima and minima for function of several connected independent variables (Lagrange 's Multiplier). (08Hrs)

Unit V: Differential Equation of First Order and First-Degree:
Solutions of differential equations by using Variable Separable form, Homogeneous DE, Exact DE, Non-Exact DE, Linear DE. (08Hrs)

Unit VI: Applications of Differential equations:

Application of Differential equations of first order and first degree to the problems on Electrical Circuits, Solution of Differential equations of First order and Higher degree by various methods (Solvable by x, y, p)**. (08Hrs)**

Text Books:

1. Wartikar P.N. ,Wartikar J.N. – A text of applied Mathematics, Volume I, II, Pune V.G. Prakashan, Pune.
2. Grewal B. S. – Higher Engineering Mathematics, (latest Edition), Khanna Publishers .
3. Kreyszig E.K. – Advanced engineering Mathematics, John Wiley.
4. Ramana B. V. - Higher Engineering Mathematics, (TMH).
5. Singh R.R. And Bhatt M. - Higher Engineering Mathematics, (TMH).

Reference Books:

1. N.P.Bali and Manish Goyal – A text book of Engineering Mathematics, Laxmi Publications.
2. Veera Rajan T. Engineering mathematics for first year,(TMH).
3.

MOOCs Link s and additional reading, learning, video material:

1. **https://archive.nptel.ac.in/courses/111/105/111105121/**
2. **https://archive.nptel.ac.in/courses/122/104/122104017/**
3. **https://en.wikipedia.org/wiki/Differential_equation**
4. **https://en.wikipedia.org/wiki/Series_(mathematics)**

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1AS101BS ENGINEERING PHYSICS

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
	I	1AS101BS	Engineering Physics	3	45	3 Hrs.	60

Course Description:
Subject Code 1AS101BS Engineering physics is a compulsory course for First Year B.E., B.Tech., B.Text.E. and common to all branches.

Aim: To enable the students to correlate the theoretical principles of fundamentals of modern aspects in Physics with application-oriented studies of engineering.

Course Objectives:

- Physics of modern engineering semiconducting materials.
- Electromagnetic phenomenon and wave propagation.
- Application of Quantum Physics to Electrical& Magnetic phenomena.
- To understand the principles and applications of interference, diffraction, and their experimental methods in optics.
- Application of LASERS and Fiber Optics in Engineering & Technology.
- Application of Fluid dynamics and Ultrasonic.

Course Outcomes:

After completing the course, the students will be able to-

CO1: Gain the knowledge about semiconducting materials and new engineering materials, semiconducting devices and its applications.

CO2: Co-relate the theoretical principles and fundamentals of modern aspects in Physics.

CO3: Learn basics and application of Quantum Physics in areas of optical electromagnetic Phenomenon.

CO4: To analyze and solve problems related to interference, diffraction, and grating phenomena, and effectively communicate their findings and conclusions.

CO5: Know the fundamentals of Optic Fibers, Implement the laws of optics and application-oriented studies like Lasers and fiber optics communication.

CO6: Explain the application of fundamentals of Fluid dynamics and acoustics.

SYLLABUS

Unit I: Solid State Physics: Classification of solids on the basis of energy band diagram, Intrinsic and Extrinsic semiconductors. Fermi level in intrinsic semiconductor, semi-conductor conductivity with derivation, P-N junction diode, Zener diode, Light Emitting Diode, Hall effect. (8 Hours)

Unit II: Modern Physics: Planck's hypothesis, properties of Photons, Compton effect, De-Broglie's concept of matter waves, Heisenberg's Uncertainty Principle (statement and derivation), applications of uncertainty principle (electrons cannot exists in the nucleus), Time energy Relation. (7 Hours)

Unit III: Electric and Magnetic Fields: Motion of electron in uniform transverse electric field and transverse magnetic fields, positive rays, Bainbridge mass spectrograph, Cathode ray oscilloscope: block diagram and working of each block. (7 Hours)

Unit IV: Interference & Diffraction: Fundamental condition of interference, thin film interference due to reflected light, Newton's ring; equation for radius of bright and dark rings, determination of wavelength, R.I. of medium using Newton's ring. Fresnel and Fraunhofer class of diffraction, plane transmission grating; construction and determination of wavelength of light using grating. (8 Hours)

Unit V:Fibre Optics and LASER: Principle and construction of optical fibre, acceptance angle and acceptance cone numerical aperture, types of optical fibres and refractive index profile, attenuation in optical fibres, different mechanisms of attenuation, application of optical fibres.; LASER: spontaneous and stimulated emission of radiation, Characteristics and its applications of LASER, Ruby LASER (Construction and Working). (7 Hours)

Unit VI: Fluid dynamics, ultrasonic and Acoustics: Continuity equation, Bernoulli's theorem (derivation). Viscosity, liquid flow (streamline and turbulent), Stoke's law, Sabine's formula for reverberation of time, Factors affecting architectural acoustics and its remedies. Ultrasonic waves, Production of Ultrasonic waves (piezo-electric and magnetostriction methods), applications of ultrasonic waves. (8 Hours)

Text Book: M.N. Avadhanulu & P.G. Kshirsagar : Engineering Physics, S.Chand Pub., 2008.

Reference Books:

1. R.K.Gaur & S.L.Gupta : Engineering Physics, Dhanpat Rai & Sons.
2. Hitendra K. Malik & A.K.Singh : Engineering Physics, Tata McGraw Hill
3. Beiser: Modern Physics, Tata McGraw Hill
4. Mani & Mehta: Modern Physics, Affiliated East-West Press
5. N.Subrahmanyam, Brijlal, M.N.Avadhanulu : A Text Book of Optics, S.Chand &Company Ltd.)

1AS104BS ENGINEERING PHYSICS - LAB.

Course Outcomes: To enable the students to correlate the theoretical principles of fundamentals of modern aspects in Physics with application-oriented studies of engineering.

Course Objectives: Students will be able to taught:

1. Characteristics of semiconducting diodes.
2. To enhance the basic knowledge of electromagnetic phenomenon and cathode ray oscilloscope.
3. To study the phenomenon of Diffraction.
4. To understand the phenomenon of Interference.
5. Study of Optical phenomenon.

Course Outcomes: at the end of Course, Students will be able to:
CO1: Recognize and study the characteristics of semiconducting devices and its applications.
CO2: Apply the fundamentals of electric and magnetic fields to understand the functioning of Cathode Ray Oscilloscope and Hall effect.
CO3: Learn the interference phenomenon and its applications.
CO4: Employ the phenomenon of Diffraction and its applications.
CO5: Co-relate the principles of Optics with the practical knowledge.

List of Experiments:

(Note: Minimum 08 experiments shall be conducted)

1. Determination of Band gap energy of semiconductor.
2. To study the forward and reverse characteristics of P-N junction diode.
3. To study the forward and reverse characteristics of Zener diode.
4. To study the forward characteristics of Light Emitting Diode.
5. To determine the wavelength of monochromatic light by Newton's Rings experiment.
6. Determination of wavelength of spectral lines using plane diffraction grating.
7. Determination of grating element of a diffraction grating using LASER beam.
8. Study of Hall Effect.
9. Study of CRO.
10. Amplitude and frequency measurement of ac signal using CRO.
11. Determination of unknown frequency of ac signal using Lissajous pattern.
12. To determine resolving power of telescope.
13. Determination of Planck's constant using photocell.
14. To determine the coefficient of viscosity of water by capillary flow.
15. To determine the specific charge (e/m) of electron by Thomson method.
16. Determination of Numerical Aperture & Acceptance angle by using optical fiber kit.

Suggested Books / Reference Books:

1. M.N.Avadhanulu & P.G.Kshirsagar : Engineering Physics, S.Chand Pub., 2008
2. N.Subrahmanyam, Brijlal, M.N.Avadhanulu : A Text Book of Optics, S.Chand & Company Ltd.)

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SYLLABUS OF SEMESTER I & II OF B.E. I YEAR [(COMPUTER SC.& ENGG./COMPUTER ENGG./A.I.D.S./CSE (D.S.)] AS PER NEP-2020

SEMESTER I

1AS003ES COMPUTER PROGRAMMING - [L: 3] Engineering Science Course (ESC)

Course Objectives:
- Comprehend Fundamental Concepts of C Programming
- Develop Problem-Solving Skills Using Control Structures
- Manipulate Data Using Arrays and Strings
- Enhance Program Modularity with Functions and Pointers
- Manage Complex Data Structures and File Operations

Course Outcomes:
At the end of the course, students will be able to:
1. Demonstrate Proficiency in Basic C Programming
2. Implement Control Structures for Decision Making and Looping
3. Effectively Handle Arrays and Strings
4. Utilize Functions and Pointers for Efficient Programming
5. Organize Data Using Structures and Handle File Operations

SYLLABUS

Unit I: C Fundamentals (7 hours)
Introduction, Importance of C, Basic Structure of C Program, Executing a C Program, Character Set, C Tokens, Keywords, Identifiers, Constants and Variables, Data Types, Operators, Basic Input and Output Operations, Expressions and Precedence of Operators, In-built Functions

Unit II: Decision Making, Branching, and Looping (7 hours)
Introduction, Decision Making with If Statement, Simple If Statement, Nesting of If...Else Statements, Else If Ladder, ?: Operator, Goto Statement, While Statement, Do Statement, For Statement, Jumps in Loops, Concise Test Expressions

Unit III: Arrays (7 hours)
Introduction to Arrays, One-Dimensional Arrays, Two-Dimensional Arrays, Multi-Dimensional Arrays, Example Programs Using Arrays

Unit IV: Strings (8 hours)
Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs (with and without using built-in string functions)

Unit V: Functions & Pointers (8 hours)
Introduction to Functions, Need for User-Defined Functions, A Multi-Function Program, Elements of User-Defined Functions, Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions, Recursion, Introduction to Pointers, Declaring Pointer Variables, Initialization of Pointer Variables, Accessing a Variable through its Pointer, Pointer Expressions, Pointer Increments, and Scale Factor

Unit VI: Structures, Unions, and File Management (8 hours)
Defining a Structure, Declaring Structure Variables, Accessing Structure Members, Structure Initialization, Arrays of Structures, Unions and Structures, Introduction to Files, Defining and Opening a File, Closing a File, Input/Output and Error Handling on Files.

Text Book: E. Balaguruswamy, Programming in ANSI C, McGraw-Hill.

Reference Books:
1. Harkut, Kasat & Shah, “The ABC of C - Demystify C: Scan Code Learn” - Publisher: Notion Press, India.
2. Kernighan , Ritchie, “The C programming Language”, Prentice Hall of India
3. Pradeep Dey and Manas Ghosh,“ Computer Fundamentals & Programming in C” Oxford University Press, 2006

Practical Laboratory

1AS006ES COMPUTER PROGRAMMING LAB - [P: 2]

Minimum eight experiments to be performed based on above curriculum and four are to be performed over and above curriculum may be by using Virtual Laboratories.

1CE004ES ENGINEERING MECHANICS (ESC)

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
4.5	I/II	1CE004ES	**Engineering Mechanics (ESC)**	3	39	3 Hours	100

Course Description:
Subject Code 1CE004ES Engineering Mechanics is a compulsory Engineering Science Course for First Year B.E., B. Tech., B. Text. E and common for all branches.

Course Objectives:
The objective of this course is to present the basic principles of static and dynamics and help develop proficiency in applying these principles to formulate and solve problems.

Course Outcomes:
After completing the course students will be able to:
CO1: Determine composition and resolution of forces, analyze the equilibrium force systems.
CO2: Analyze beam and simple plane truss.
CO3: Compute frictional forces for simple contact, wedges.
CO4: Identify different properties of area.
CO5: Calculate various kinematic quantities.
CO6: Apply the equations of kinetics.

SYLLABUS

Unit I	**Resultant:** Concept of a force, force systems, moment, couple, resolution and compositions of coplanar force system. **Equilibrium:** Free-body diagrams, equations of equilibrium, problems of equilibrium involving co-planar force system acting on a particle, rigid body and system of rigid bodies.	8Hrs

Unit II	**Beams:** Types of beams, supports, loads and support reactions. **Trusses:** Definitions, assumptions, types, Analysis of simple plane perfect trusses by method of joints.	6 Hrs
Unit III	**Friction:** Definitions of friction, types, angle of friction, angle of repose, cone of friction, Coulomb's laws of friction, wedge friction.	6Hrs
Unit IV	**Centroid and Moment of Inertia:** Centroid of plane areas, Moment of Inertia of Plane area, Radius of Gyration, product of inertia, perpendicular and parallel axis theorem, polar moment of inertia, Definition of principal axes and principal moment of inertia.	7Hrs
Unit V	**Kinematics:** Definitions of displacement, velocity and acceleration and their relations, rectilinear motion under variable & constant accelerations, curvilinear motion using rectangular coordinates, normal and tangential components.	6 Hrs
Unit VI	**Kinetics:** Application of D'Alembert's Principle, concept of dynamic equilibrium, Work-Energy Equation, Impulse-Momentum Equation.	6 Hrs

Text Books:

1. Bhattacharyya Basudeb, Engineering Mechanics, Oxford University Press.
2. Bhavikatti, S. S. and Rajashekarappa, K. G., Engineering Mechanics, New Age International Publishers, New Delhi.
3. Dr Mohammad Zuhair and P.N.Deshmukh Engineering Mechanics (Static and Dynamics), Dnyanpath Publication (INDIA).

Reference Books:

1. Singer, F. L., Engineering Mechanics, Harper Collins Pub., Singapore
2. Timoshenko, S. P. and Young, D. H., Engineering Mechanics, McGraw-Hill International C., Auckland.
3. Beer, F. P. and Johnston, E. R., Vector Mechanics for Engineers, McGraw-Hill International C., Auckland.
4. Shames, I. H., Engineering Mechanics, P.H.I. Pvt. Ltd., New Delhi.

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1CE007ES ENGINEERING MECHANICS - Lab (ESC)

Level	Semester	Course Code	Course Name	Credits	PracticalHours	Exam Duration	Maximum Marks
4.5	I/II	1CE007ES	**Engineering Mechanics Lab (ESC)**	1	02	--	50

Course Objectives:

The objective of this course is to perform practicals on the concepts of Engineering Mechanics and working of Lifting Machines.

Course Outcomes:

After completing the course students will be able to:

CO1: Solve problems of statics graphically.

CO2: Verify by correlating experiments with concepts related to engineering mechanics.

CO3: Determine simple lifting machine parameters.

Practicals:

Minimum EIGHT (8) practical's from the list mentioned below:

1. Two graphical solutions to the problems of statics.
2. Polygon Law of forces
3. Reactions at the supports of simple beam.
4. Forces in members of Jib crane.
5. Determination of coefficient of friction on inclined plane.
6. Determination of law of machine for screw jack.
7. Determination of law of machine for differential axle wheel
8. Determination of law of machine for single purchase crab.
9. Determination of law of machine for double purchase crab
10. Determination of mass moment of inertia of fly wheel.
11. Determination of gravitational acceleration by compound pendulum.

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1ME107EL WORKSHOP (ESC) -

Course Objectives:

1. To give students' hands on experience' of craftsmanship.
2. To make students familiar with different work trades.
3. To develop quality & safety consciousness amongst the students.
4. To develop awareness of fire safety amongst the students.
5. To develop respect towards labor work amongst the students.
6. To develop skill sets for creating entities from primitive engineering materials.
7. To develop skill sets for establishing connections through wires and cables.

This exercise also aims at inculcating respect for physical work and hard labor in addition to some value addition by getting exposed to interdisciplinary engineering domains.

Course Outcomes:

1. Upon completion of this course, the students will gain knowledge of different manufacturing processes which are commonly employed in industry.
2. Upon completion of this course, the students will be able to fabricate the components using various manufacturing techniques.
3. The students will be conversant with the concept of dimensional accuracy and tolerances.

PERFORMANCE:

Students should perform minimum six (6) jobs out of the following:

I) SMITHY: Introduction to smithy operations like upsetting, drawing, bending, Forming; Tools-hammer, hot andcoldchisels,swages,drifts,flatters,tongs,anvilsandvarioussmithytools&equipments,theiruse.Forging Principle, forge welding, use of forged parts.

One job on smithy: Job involving upsetting, drawing down, flattering. Change of cross sectional area like round to rectangular or making a ring from around bar, S –Hook, forming such as a square/hexagonal headed bolt, hook etc.

II) FITTING: Introduction to different fitting tools. Use and setting of fitting tools for marking, center punching, chipping, cutting, filing, drilling, their use, different measuring tools, Files – Material and classification.

One job on fitting: involving operations like marking, filing, hack saw cutting, drilling and tapping, making simple assemblies like a male-female type pair.

III) TAPS & DIES: introduction to Taps & Dies, Different sizes of Taps & Dies their uses, holding instruments of taps & dies.

One job on taps & dies: Job involving, External and internal threads on plate or pipe, marking, center punching, cutting, filing, drilling

IV) SHEET METAL: Introduction to sheet metal tools, their use, different sheet metal joints, soldering, surface development. Specifications of metal sheets, Surface coatings; Operations like cutting, bending, folding, punching, riveting; Joining by brazing and soldering.

One job on sheet metal: Job involving soldering operation like marking, cutting, bending, joining operations of small sheet metal parts. Typical examples: sheet metal tray, funnel, dustbin, etc.

V) WELDING: Classification & brief introduction to welding processes - Arc, Gas and Resistance. Definition of welding, brazing and soldering processes, and their applications. Oxy-Acetylene Gas welding process, Equipment and Techniques, Type of flames and their applications. Manual metal arc welding technique and equipment, AC and DC welding Electrodes, constituents and functions of Electrode coating. Welding positions. Type of welding joint. Common welding defects such as cracks, undercutting, slag inclusions, Porosity.

One job on welding: Job consisting of edge preparation for arc welding of different parts like lap welding of two plates, butt welding of two plates and welding to join plates at right angles.

VI) CARPENTRY: Brief study of various hand tools like chisel, saw, planer. Timber, definition, engineering applications, seasoning and preservation, plywood and ply boards. Use of marking tools & hand tools such as marking gauge, try squares, steel rules, saws, jackplane, etc. Use of power tools, safety precautions.

One job on carpentry: Job like preparing a wooden joint; involving operations like wood sizing, planning, marking, sawing, chiseling and groove making. Use and setting of hand tools like hack saw, jack plane, chisels and gauges for construction of various joints like T –Lap joint, Bridle joint, Corner mortise joint, Dovetail/butt joint such as a tray, frame etc.

VII) MACHINE TOOLS AND PROCESSES: Introduction to different machining tools, different measuring tools.

One job on Lathe: Job involving marking, metal removing showing basic operations like plain turning, facing, step turning etc.

VIII) FOUNDARY: Moldings and preparation of moldings and pattern, core, runner, riser cope & drag box.

One job on molding: Preparation of sand mould with pattern, core with runner riser.

IX) PRINTED CIRCUIT BOARDS: PCB etching and drilling, tinning and soldering techniques. Assembly of Electronic components on the printed circuit board (PCB).

One job of PCB design: Job involving development of PCB for electronic circuit which comprises of layout design, masking, etching, drilling, tinning & component soldering.

X) PLASTIC INJECTION MOULDING: Introduction, principle, equipment & its operation, mould introduction & setting, Safety precautions and demonstration of plastic injection molding process Demonstration)

References:

1. B.S.Raghuvanshi, A Course in Workshop Technology, Vol –I, Dhanapat Rai and Sons.
2. Hajara Choudhari, Elements of Workshop Technology, Vol–I, Media Promoters.
3. Guptaand Kaushik, Workshop Technology, Vol–I, NewHeights.
4. Chapman, Workshop Technology, Vol–I, TheEnglish Language Book Society.
5. H.S.Bawa, Workshop Technology, Vol.-I, TMH Publications, New Delhi.
6. S.K.HajraChoudhary,ElementsOfWorkshopTechnology,MediaPromoters&PublishersPvt.Ltd,
7. Workshop Technology, Vol. I, II and III, Chandola S.P., Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
8. K.T.Kulkarni,IntroductiontoIndustrialSafety,K.T.Kulkarni,PuneReferenceBooks
9. HwaiyuGeng, Manufacturing Engineering Handbook, Mc-Graw Hill Publishing Co. Ltd.
10. Lawrence E.Doyle, Manufacturing Processes and Materials for Engineers, Prentice Hall Inc.

[NOTE: Journal should be prepared and submitted based on information of tools and equipments used, jobs prepared by using various tools, equipments, machines in the above trades of performance sections. The term work shall be assessed based on a) the record of attendance, b) Term work done, c) the written/ practical / oral tests on the term work to decide the depth of understanding. The term work is to be assessed weekly.]

PRACTICAL EXAMINATION:

Practical examination will consists of actual preparation of one job from any of the above performance sections. Duration of examination will be 3 hrs. Total marks are 25, out of which 15 marks are for job preparation and 10 marks for viva voce which should be conducted when the students are on job.

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SEMESTER II

2AS111BS : APPLIED MATHEMATICS II

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
	II	2AS111BS	Applied Mathematics II	3	45	3 Hrs.	60

Course Description: Subject Code 2AS111BS Applied Mathematics- II is a compulsory course for First Year B.E., B.Tech., B. Tech.Chem., B.Text.E. and common to all branches.

Aim: To impart the sound knowledge on the principles of Mathematics involving the different application-oriented topics required for all engineering students.

Course Objectives:

- To familiarize with the concepts of matrices.
- To understand the expansion of Fourier series.
- To familiarize the emerging engineers with techniques in integral calculus.

Course Outcomes:

After completing the course, the students will be able to-

CO1: Learn the fundamentals of matrices in a comprehensive Manner.
CO2: Use the tool of Fourier series for learning advanced engineering mathematics.
CO3: Learn the Gamma, Beta function.
CO4: Trace the curves in Cartesian and Polar form and Understand DUIS.
CO4: Understand double integral and its applications in engineering.
CO5: Understand triple integral and its applications in engineering.

Unit I: Matrices:
Rank of a matrix, System of Linear Equations, Eigen values and Eigen vectors, Cayley-Hamilton theorem. (07Hrs)

Unit II: Fourier Series:
Fourier Expansion of Periodic function in (C , C+2L) , Half Range Fourier Series, Practical Harmonic Analysis. (07Hrs)

Unit III: Integral Calculus: Reduction formulae, Beta and Gamma functions, (07Hrs)

Unit IV: Curve Tracing & DUIS:
Curve Tracing in Cartesian and Polar form, Differentiation under the Integral Sign. (08Hrs)

Unit V: Double Integral: Evaluation of Double integral, Transformation to Polar coordinates, Evaluation of area by using double integration. (08Hrs)

Unit VI: Triple Integral:
Evaluation of Triple integral, Changing to spherical Polar coordinates, Evaluation of volume by using triple integration, mean and RMS value. (08Hrs)

Text Books:

1. Wartikar P.N . , Wartikar J.N. – A text of applied Mathematics, Volume I, II, Pune V.G. Prakashan, Pune.
2. Grewal B. S. – Higher Engineering Mathematics, (latest Edition), Khanna Publishers .
3. Kreyszig E.K. – Advanced engineering Mathematics, John Wiley.
4. Ramana B. V. - Higher Engineering Mathematics, (TMH).
5. Singh R.R. And Bhatt M. - Higher Engineering Mathematics, (TMH).

Reference Books:

1. N.P. Bali and Manish Goyal – A text book of Engineering Mathematics, Laxmi Publications.
2. Veera Rajan T.- Engineering mathematics for first year,(TMH).

MOOCs Link s and additional reading, learning, video material:

1. https://nptel.ac.in/courses/122104018
2. https://onlinecourses.nptel.ac.in/noc21_ma11/preview
3. https://archive.nptel.ac.in/courses/111/105/111105122/
4. https://en.wikipedia.org/wiki/Matrix_(mathematics)
5. https://en.wikipedia.org/wiki/Fourier_series
6. https://en.wikipedia.org/wiki/Multiple_integral

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2AS112BS ENGINEERING CHEMISTRY

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
	II	2AS112BS	Engineering Chemistry	3	45	3 Hrs.	60

Course Description:
Subject Code 2AS112BS Engineering Chemistry is a compulsory course for First Year B.E., B.Tech., B.Text.E. and common to all branches.

Aim: To impart the sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering students.

Course Objectives:

- To provide the fundamental background required for industrial setups.
- To provide the knowledge on water impurity analysis and treatment methodologies.
- To provide the knowledge about properties of materials like nanomaterials, and corrosion and their applications.
- To encompasses principles, practices, and applications of Green Computing and Chemistry.
- To provide the knowledge about energy science, fuel properties, Lubricants and energy storage systems for sustainability.
- To addresses environmental challenges, biochemical processes, and bioinformatics for sustainable solutions.

Course Outcomes:
After completing the course, the students will be able to -
CO1: Analyze impurities present in the water and suggest the methodology for its removal.
CO2: Understand the properties, applications, and advancements of nano-materials, and corrosion in engineering and technology.
CO3: Provide comprehensive understanding of the principles, practices, and applications of green Computing and chemistry.
CO4: Apply the knowledge about energy science, fuel properties and foundational understanding of energy storage systems for fostering sustainable development contributions.
CO5: Understand and apply energy storage technologies and lubricants for improved system efficiency and reliability.
CO6: Identify key environmental challenges and their technological implications and develop strategies for using biochemical and bioinformatics tools to create sustainable technological solution.

SYLLABUS:

Unit-I: Water Treatment & Analysis:
Hardness of water & their types, Units of Hardness, Estimation of Hardness by EDTA method, Softening of water by Ion exchange, Zeolite process. Boiler troubles: Scale and Sludge formation, Caustic embrittlement, Priming & Foaming, Boiler corrosion. Numerical problems based on Zeolite process and Hardness calculations. (08 hours.)

Unit-II: Nanomaterials, Corrosion and Corrosion control:
(A) Nanomaterials: Basics of Nanochemistry, Properties of Nanomatrials, Applications of nanomaterials, Synthesis methods: Sol -gel and chemical vapour deposition, Carbon nanotubes.

(B) Corrosion and Corrosion control:
Corrosion: Introduction, Dry & Wet corrosion and their mechanism, Types of corrosion: Pitting corrosion, waterline corrosion, inter-granular corrosion and Stress corrosion. Corrosion Control by Hot Dipping (Galvanizing and Tinning). (07 Hours)

Unit-III: E-Waste, Recycling and Green Computing:
Metal extraction from E-wastes: Constraints and opportunities, Chemical exposure (Lead, Mercury, Cadmium, Chromium) and contamination, Definition and concept of green chemistry, Twelve principles of green chemistry, Green Computing, Role of Green Computing in Environment and Research, Green devices and Green data Server. (07 Hours)

Unit-IV: Energy Science:
Introduction, Classification, Characteristic of Good fuel, Calorific value, HCV & LCV. Analysis of Coal: Proximate, Ultimate analysis and their significance. Cracking of petroleum fractions, Types of cracking, Fixed bed and Moving bed cracking. Knocking in IC engine, Octane number, Cetane Number. (07 Hours)

Unit-V: Energy Storage Systems and Lubricants:
(A) Energy Storage Systems: Introduction, Classification of batteries, Lithium-ion battery, Ni-Cd Battery, Photovoltaic cells, Fuel cell (H_2-O_2), H_2 as a green fuel: Introduction, production, storage, and utilization.
(B) Lubricants: Introduction, Classification of lubricant, Properties of liquid lubricants (Definition) –Viscosity and viscosity index, Flash and fire point, Cloud and pour point, Acid value. (08 Hours)

Unit-VI: Environmental Challenges, Biochemical technology and Bioinformatics:
(A) Environmental Challenges: Definition, causes, effects and control measures: Air Pollution, Water pollution, Global warming, Acid Rain, Ozone Layer depletion, Solid waste management : Causes, effects and control measures of urban and industrial wastes.

(B) Biochemical technology and Bioinformatics:
Definition of biochemical technology, Structure and function of DNA and RNA, basic genetic engineering and recombinant DNA technology, Industrial Bio chemical technology (fermentation, biofuels and bioplastics). Waste treatment and management using biotechnology, Bioinformatics and its relation with molecular biology. (08 Hours)

TEXT BOOKS:

1. S S. Dara , A Text book of Engineering Chemistry , S.Chand & Co New Delhi. Eleventh Edition.
2. P.C. Jain and Monica Jain , Engineering Chemistry , Dhanpat Rai & sons New Delhi , Sixteenth Edition.
3. M Afshar Alam, Sapna Jain, Hena Parveen, Green Computing Approach Towards Sustainable Developent, Wiley Interscience Publications
4. A. K. Das and M. Das, An Introduction to Nanomaterials and Nanoscience, CBS Publishers and Distributors.
5. Voet, D.J., Voet, J.G., Pratt, C.W., Principles of Biochemistry, John Wiley, Fouth Edition
6. Masters, G. M., Introduction to Environmental Engineering and Science, Prentice-Hall of India Pvt. Ltd.

REFERENCE BOOKS:

1. Sunita Rattan, A Text book of Engineering Chemistry, S.K.Kataria & Sons.
2. Rajaram & Kuriacose, Text book of Engineering &Technology, Vol I & II
3. Manasi Karkare, Nanotechnology Fundamentals and Applications, I K International Publishers.
4. William C. O'Mara, Robert B. Herring, Handbook of Semiconductor Silicon Technology ,Noyes Publications Park Ridge, NJ, USA.1st Edition.

2AS115BS ENGINEERING CHEMISTRY – LAB.

Course outcomes: The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

After completion of this course the student shall be able to:

CO1: Estimate the amount of different impurities in water/waste water samples
CO2: Gain skills in precise pH-metric titration for concentration determination.
CO3: Apply green chemistry in synthesizing eco-friendly compounds and nanomaterials.
CO4: Measure molecular/system properties such as surface tension, viscosity, flash point of aqueous or other industrially important liquids/mixture.
CO5: Apply theoretical knowledge to solve real-world challenges in scientific research.

List of Experiments:

1. Estimation of temporary, permanent and total hardness present in the water sample by EDTA Method.
2. Determination of chloride content of water by Mohr's method
3. Estimation of type and extent of alkalinities present in a given water sample.
4. Determination of chlorine in water sample (Iodometry)
5. Determination of Dissolved oxygen from water sample.
6. Determination of p^H of given samples.
7. Preparation of a nanomaterial.
8. Preparation of a chemical compound using green chemistry pathway.
9. Determination of viscosity of lubricating oil by Redwood Viscometer I or II.
10. Proximate analysis of given coal sample.
11. Determination of Flash point by Abel's or Pensky Martin Apparatus.
12. Determination of Surface tension of a given liquid/mixture by using stalagmometer.
13. Estimation of acid value of oil.
14. Determination of Fe^{2+} and Fe^{3+} in given solution
15. Estimation of Cu and Zn in a brass sample.
16. To produce ethanol using yeast and measure the ethanol concentration using fermentation process.

(**Note**: Minimum 08 experiments shall be conducted)

Suggested Books / Reference Books:

1. "A Text Book on Experiments and Calculations in Engineering Chemistry", by S.S. Dara, S. Chand Publications.
2. "Advanced Practical Physical Chemistry", by J.B.Yadav ,Krishna's Prakashan Media (P)Limited.
3. "Collection of Interesting General Chemistry Experiments," by A. J. Elias, Universities Press Publications.

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2116ES BASIC ELECTRICAL ENGINEERING

Course Outcomes: After successful completion of this course students will be able to:

1] Apply the basic Laws and theorems to DC Circuits.
2] Apply the principles of magnetic circuits to solve the engineering problems.
3] Demonstrate the knowledge of single phase A.C. circuits.
4] Solve the three phase Star and Delta connected balanced circuits.
5] Explain the construction, working and performance evaluation of single-phase transformer.

SYLLABUS

Unit I:

DC Circuits: Basic concepts of voltage, current, power, energy and relationship between them, definition of resistance, resistivity, and conductivity, effect of temperature on resistance of different materials, temperature coefficient of resistance, series and parallel circuits, Ohm's law, types of sources, current division and voltage division rule, Kirchhoff's laws, Superposition theorem, Star-Deltatrans formation.

Unit II:

Magnetic Circuits: Concept of Magnetic flux, Flux density, MMF, reluctance, magnetic field intensity and their relationship, Fleming's left and right -hand rule, leakage and fringing of flux, magnetization curve, hysteresis loop, series and parallel magnetic circuits. Faraday's laws of electromagnetic induction.

Unit III:

A.C. Fundamentals: Generation of alternating voltages, mathematical and graphical representation of sinusoidal voltage and current, concept of cycle, period, frequency, instantaneous, peak, average, and RMS values, peak factor, form factor, phase difference, lagging, leading and in phase quantities and phasor representation, rectangular and polar representation of phasors. Study of A.C circuits of pure resistance, inductance and capacitance and corresponding voltage and current phasor diagrams, voltage, current and power waveforms.

Unit IV:

AC Single phase Circuit: Study of series and parallel R-L, R-C, R-L-C circuits, concept of impedance and admittance, waveform and voltage current phasor diagrams. Concept of active, reactive, apparent power and power factor.

Unit V:

Three Phase Circuits: Generation of three phase voltages, phase sequence, Balanced & unbalanced three phase circuits, Star and Delta connections. Relationship of Phase and line values of voltage and current for Star and Delta circuits, Star and Delta balanced load, Concept of active, reactive, apparent power and power factor in three phase circuit.

Unit VI:

Single Phase Transformer: Construction and working of single-phase transformer, types of single-phase transformer, transformation ratio, EMF equation, losses, efficiency and voltage regulation of transformer.

TEXT BOOKS:

1. Basic Electrical Engineering, V. N. Mittle, TMH Publishing company Ltd.
2. Basic Electrical Engineering, First Ed., Kulshreshtha D.C., TMH.

REFERENCE BOOKS:

1. D. P. Kothari & I. J. Nagrath, "Basic Electrical Engineering", TMH Pub. Co. Ltd., New Delhi
2. Engineering Basics, T. Thyagarajan, K. P. SendurChelvi, T. R. Rangaswami, Wiley Eastern ltd.
3. Basic Electrical Engineering, First ed., R. Anand Natarajan & P. Ramesh.
4. Electrical Technology – Volume - I, B. L. Theraja, S. Chand & Co. Publication.

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BRANCH WISE VOCATIONAL & SKILL ENHANCEMENT COURSES (VSEC) & PROGRAM CORE COURSES (PCC)

[SEMESTER I & II COMBINED]

(I) CIVIL ENGINEERING: 2CE303VS SURVEYING SKILLS [VSEC-I]

Level	Semester	Course Code	Course Name	Credits	Teaching/Practical Hours	Exam Duration	Maximum Marks (Practical)
4.5	I/II	2CE303VS [VSEC-I]	**Surveying Skills**	T-1+P-1=02	T-1 hour P-2 hours	--	50

Course Description:

Subject Code 2CE303VS Surveying Skills is a compulsory Vocational Skill Course for First Year B.E. in Civil Engineering.

Course Objectives:

The course is related to basic surveying skills. It will provide hands on experience to conduct preliminary surveys necessary for planning and designing.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome
CO1	Conduct preliminary survey related to ranging and bearing of lines.
CO2	Illustrate maps and analyze area and volumes.

DETAILS OF SYLLABUS

Unit I	**Introduction to Surveying:** Surveying instruments –levels, theodolite, plane tables and other related devices. Measurement of distances, directions and elevations by different methods.	7Hrs
Unit II	**Mapping:** Mapping details and contouring, measurement of area and volume Introduction to modern survey equipment's	6Hrs

Practicals:

Minimum six (6) practicals on the following:

1. Introduction to Survey equipment's
2. Study of Chain & its accessories
3. Aligning Ranging and Chaining
4. Chain Traversing
5. Compass Traversing
6. Plane Table survey
7. Measurement of area by planimeter

Text Books:

1. T.P. Kanetkar &S.V.Kulkarni: Surveying and Leveling Part II, Pune Vidyapetth Graha Prakashan.
2. B.C. Punmia, Ashok Jain, Arun k. Jain: Surveying Vol. I, Laxmi publications (P), Ltd.

Reference Books:

1. D. Clark.: Plane and Geodetic Surveying Vol II, CBS Publishers & Distributors Pvt. Ltd,
2. Kang-tsung Chang: Introduction to Geographic Information Systems, McGraw-Hill Book Company, 2006.
3. Dr. S. Kumar: Basics of remote sensing and GIS, Laxmi publications (P), Ltd.

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2CE303VS SAFETY PRACTICES AT CONSTRUCTION SITES [VSEC-II]

Level	Semester	Course Code	Course Name	Credits	Teaching/ Practical Hours	Exam Duration	Maximum Marks (Practical)
4.5	I/II	2CE303VS [VSEC-II]	**Safety practices at Construction Sites**	T-1+P-1=02	T-1 hour P-2 hours	--	50

Course Description:

Subject Code 2CE303VS is a Skill Enhancement Course preferably for First Year B.E. in Civil Engineering.

Course Objectives:

This course will provide a basic understanding of typical hazards on site, how to respond to emergencies, and essential safety rules for high risk activities. This course aims to make the students aware about safety and health regulations and the Indian Standards applicable to the construction industry.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcomes
CO1	Show concern for safety at construction site.
CO2	Apply safety skills during construction related activities.

SYLLABUS

Unit I	Introduction safety at construction site, basic terminologies in safety, risk assessment, importance of safety management and safety culture, Site Safety Programs, safety norms.	6Hrs

Unit II	Safety during construction, alteration, demolition works – Earthwork, steel construction, temporary structures, masonry & concrete construction, cutting & welding, SoPs (Safe Operating Procedures) – Construction equipment, materials handling.	7 Hrs

Practicals:

A. Minimum five (5) practical's on introduction to:
   1. Safety Signs and Fire Safety
   2. Accidents, PPE and First Aid
   3. Site Transport and Lifting operations
   4. Electrical Safety, Tools and Equipment
   5. Working at Heights, Excavation and Confined Space
   6. Dust, Noise and Vibration

B. Report writing on site visits and available safety measures.

Text Books:

1. Bhattacharjee, S.K. (2011) Safety Management in Construction, Khanna Publishers
2. Hinze, J.W. (1997) Construction Safety, Prentice Hall
3. MacCollum, D.V. (2007) Construction Safety Engineering Principles, McGraw Hill Publishers

Reference Books:

1. MacCollum, D.V. (1995) Construction Safety Planning, John Wiley & Sons
2. Reese, C.D. &Eidson, J.V. (2006) Handbook of OSHA Construction Safety and Health, Taylor & Francis.
3. Lingard, H. & Rowlinson, S. (2005) Occupational health and Safety in Construction Project Management, Spon Press.
4. Holt, A.S.J. (2005) Principles of Construction Safety, Wiley-Blackwell Publishers
5. Li, R.Y.M. & Poon, S.W. (2013) Construction Safety, Springer Publishers.

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PROGRAM CORE COURSE (PCC)

2CE200PC FUNDAMENTALS OF CIVIL ENGINEERING [PCC]

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Maximum Marks
4.5	I/II	2CE200PC (PCC)	**Fundamentals of Civil Engineering**	2	26	2 Hrs	50

Course Objectives:

The objective of the course is to provide orientation about the Civil Engineering. It will enable students to get acclimatize with the elements of building construction and construction material.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcomes
CO1	describe scope of civil engineering and applicable standards and Codes.
CO2	identify constituents for building construction.
CO3	classify construction materials based on properties, use, types and cost.

SYLLABUS

Unit I	**Introduction:** Scope of Civil Engineering: Various disciplines of Civil engineering, Importance of Civil engineering in infrastructure development of the country. Introduction to types of buildings as per NBC, Introduction to BIS and its importance.	8Hrs
Unit II	**Elements of Building Construction:** Components in building – Need, function and types of: Foundation, Beams, Columns, Masonry wall, Plinths, Lintels, Roof/slabs, Doors, Windows, Flooring, Plastering and Painting. Dampness and its protection.	9 Hrs
Unit III	**Construction Materials:** Cement, stones, sand, bricks, steel, timber - types, properties, tests, use; Cement mortar and cement concrete – proportioning, mixing, curing, properties, tests and use; glass, aluminium, plastic, paints, concrete blocks, tiles, plumbing materials – types and its use.	9 Hrs

Text Books:

1. Basic Civil Engineering, Bhavikatti, S. S., New Age.
2. Building Construction Punmia B. C.
3. Building Materials, Duggal S. K, New Age International Publication.

Reference Books:

1. Basic Civil engineering, Gopi, S., Pearson Publication
2. Building Construction, Sushilkumar, Standard Publishers Distributors.
3. Building Construction, Mackay W.B.:Vol. I, Longmans.
4. Building Materials Gambhir M. L. NehaJaiswal, McGraw Hill.

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(II) MECHANICAL ENGINEERING: 1ME108VS: DESIGN THINKING AND IDEA LAB. [VSEC-I]

[L-P-T: 1-2- 0 (2 Credits)]

Course Objectives:

1. Inculcate the fundamental concepts of design thinking
2. Develop the students as a good designer by imparting creativity and problem solving ability
3. Conceive, conceptualize, design and demonstrate innovative ideas using prototypes.

Course Outcomes (COs):

Upon successful completion of the course the student will able to-

1. Develop new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products
2. Prepare empathy maps and journey maps for problems.
3. Develop a mind maps for design thinking process
4. Construct mock-up models through ideation and innovation techniques
5. Perceive individual differences and its impact on everyday decisions and further Create a better customer experience.

SYLLABUS:

Unit I: Foundation of Design Thinking:

Introduction-Design Thinking as a problem-solving tool, Traditional design, Significance of Design Thinking, Design Thinking Process, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, Test.

Unit II: Empathise with Users:

Understanding the user and context of use, Foundation of Empathy, Purpose of empathy, Observation as a tool of empathy, Methods of Observation, Empathetic Interview, Stakeholder maps, Empathy Maps. Application with Peers.

Unit III: Creative Ideation:

Introduction to creative Ideation, Divergence and Convergence, Collaborative ideation, Creative ideation techniques, Double Diamond, Brainstorming tools, Sketching, Visualisation, Storytelling. Mind Mapping.

Unit IV: Prototype- Foundation and Tools:

Principles of Prototyping, Ideas to presentable concepts, Storyboard prototype, Developing mock-ups, models, and Prototypes, Quick and Dirty Prototyping, Experimenting/testing.

TEXT BOOKS:

1. E Balaguruswamy (2022), Developing Thinking Skills (The way to Success), Khanna Book Publishing Company
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons Inc.
3. Pavan Soni (2020), Design Your Thinking: The Mindsets, Toolsets, and Skill Sets for Creative Problem-solving, Penguin Random House India Private Limited.

REFERENCE BOOKS:

1. Roger Martin (2009), The Design of Business, Harvard Business Review Press
2. Devyani Lal Design Thinking- Beyond the sticky Notes, Sage.

SUGGESTIVE LIST OF EXPERIMENTS:

The suggestive list of activities is given below. However, teachers may conduct similar activities during the practical hours of engagement and assess the performance of the students. Minimum six experiments are to be conducted:

1. Design a mind map of design thinking
2. Thirty circle Exercise ---ideation
3. Prepared a toothpick bridge (mock-up model)
4. Prepared a marble maze (mock up model)
5. Build a wind power car (mock up model)
6. Make a hydraulic elevator (mock up models)
7. Construct empathy maps for a given case study-1
8. Develop customer journey map for a given case
9. Make a paper prototype for user testing (mock-up model)

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2ME118VS COMPUTER AIDED DESIGN AND DRAFTING [VSEC-II]

Course Code	Course Title	L	T	P	C
2ME118VS [VSEC-II]	**Computer Aided Design And Drafting**	01	00	02	02

Course Learning Objectives:

1. To understand the fundamentals of CAD.
2. To study the basic geometries by using drafting fundamentals.
3. To create 3D geometries for preparation of complex models.

Course Outcomes:

After completion of this course, the student shall be able to:

1. Understand the fundamentals of CAD and its applications.
2. Construct a 2-D model using a CAD Software.
3. Construct a 3-D model using a CAD Software.
4. Create 3-D models using CAD modeling Software.

SYLLABUS

Unit-I: Introduction to Computer Aided Design &Drafting
Overview of Computer aided design (CAD), types of CAD software like Auto CAD, Solid Works, Catia, etc. Comparison of Two-Dimensional (2D) & Three-Dimensional (3D) CAD applications. Applications of CAD software for Mechanical engineering.

Unit-II: Introduction to CAD Software:
Introduction to drafting environment, Study of all the basic tools, layouts and drafting environment, Co-ordinate systems, selection of Units, drafting and dimensioning commands, scales, snap & navigation commands, modification & editing commands. Drafting of basic geometrical shapes.

Unit-III: Drafting of 2D Geometries:
Creating and editing 2Dgeometries, Drafting & publication of constructed geometries.

Unit-IV: Drafting of 3D Geometries:
Conversion of 2D geometries into 3D objects, basic operations used for 3D modelling like extrusion, subtraction, revolute etc. Editing & Modification of 3D objects. Construction of complex pictorial objects.

List of Experiments: (Minimum Six (6) Practical's to be performed out of the given list)

1. Study of layouts and drafting environment in Auto CAD software.
2. Study of all basic drafting & modeling tools in Auto CAD software.
3. Study of coordinate systems, dimensioning commands and Auto CAD software customization.
4. Drafting of the basic geometrical shapes like line, circle & polygons in Auto CAD software.
5. Study of all dimensioning tools in Auto CAD software.
6. Drafting of basic 2D geometrical components using Auto CAD software.
7. Drafting of basic 3D geometrical components using Auto CAD software.
8. Creation of assembly of a basic 3D component in Auto CAD software.

TEXT BOOKS:

1. Bhatt N.D.& Panchal V.M. "EngineeringDrawing",49th Edn.,Charotar Pub. House, Anand, Gujrat, 2007.
2. Shah P.J.–"Engineering Drawing", S.Chand Publication, 2008.
3. Dhawan R.K.–"Engineering Drawing", S.Chand Publication, (5th edition, 2008).
4. Tickoo Sham–"Auto CAD, BPB Publications.

REFERENCE BOOKS:

1. Naraynan K.L.,Kannaiah P.–"Engineering Drawing", Sci.Tech.
2. Jolhe D.A.–"Engineering Drawing", Tata Mc-Graw Hill Publication, 2008.

Auto CAD Student Version free warelink:

https://www.autodesk.com/education/edu-software/overview?sorting=featured&filters=individual

(Student registration required prior downloading of the software)

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(2ME119PC) ELEMENTS OF MECHANICAL ENGINEERING [PCC]

SYLLABUS:

Unit I: Engineering Materials: Evolution during industrial revolutions, Introduction to Engineering Materials, Classification and Properties.

Unit II: Design Engineering: Evolution during industrial revolutions, Simple to complex mechanisms -kinematics, dynamics, evolution of Automobile Engineering, Power Transmission, Fasteners and Bearings, introduction to - design of machine elements, CAD.

Unit III: Thermal Engineering: Evolution during industrial revolutions, Fundamentals of Thermodynamics, Fluid mechanics and Heat transfer, Energy sources, Renewable Energy, Energy conversion, Prime movers - Steam power, IC Engines, Refrigeration and Air-Conditioning.

Unit IV: Production Engineering: Evolution during industrial revolutions, Manufacturing Processes – subtractive, confirmative and additive, Machine Tools – classification, working principle, surface finishing processes, introduction to CAM.

Unit –V: Industrial Engineering: Evolution during industrial revolutions, Scientific management, introduction to – work study, CPM, PERT and Operations Research. Industry 4.0- principles and concepts, Introduction to Robotics.

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(III) ELECTRICAL ENGINEERING (Incl.EPS): 1EP108VS ELECTRICAL WORKSHOP [VSEC-I]

1EP108VS ELECTRICAL WORKSHOP [VSEC-I]

Course Outcomes:

After successful completion of this course students will be able to:

1. Identify and understand importance of various electrical tools and materials for house wiring
2. Apply Skills to carry out different types of wiring,
3. Understand basic construction, operation and trouble shooting of various electrical appliances.

SYLLABUS

Introduction of electrical tools, Symbols and abbreviations used in electrical drawings, wiring accessories like switches, sockets. Fan regulators, ceiling rosesfuses, MCB, RCCB, etc. Types of wires& cables, lugs, glands. Types of wiring, domestic Wiring, Stair case wiring, Hospital wiring, Godown wiring, Master switch control wiring,

Construction, working and trouble shooting of tube light, LED, electric mixer, ceiling fans, Electric iron, Geyser, electric pumps, Inverter connections and installation, Electrical safety, earthing, study of electric bills.

Experiments: At least **eight (8)** experiments based on the above syllabus.

Text Books:

1. Practical in Electrical Engineering," Dr.N.K. Jain Dhanpat Rai & Sons"
2. Electric Wiring,"Mr. S.Samaddar New Central Book Agency (P) Ltd., Calcutta."

Books Recommended:

1. Electrical Workshop by R. P. Singh I.K. International Publishing House Pvt. Ltd.,
2. Handbook of Electrical Engineering by S.L. Bhatia Khanna Publication
3. Electrical Wiring, Estimating and Costing by S. L. Uppal & G. C. Garg.

Learning websites:

1. https://nptel.ac.in (for online courses and video of all engineering branches)
2. https://uk.rs-online.com/web/generalDisplay.html?id=ideas-and-advice/cable-glands-guide (for cable Gland installation guideline.

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2EP118VS ELECTRONICS WORKSHOP [VSEC-II]

Course Outcomes:

After successful completion of this course students will be able to:

1. Explain the principles and applications of electronic components.
2. Utilize measuring instruments such to accurately measure electrical properties.
3. Develop electronic circuits and assess the performance.
4. Make use of circuit simulation software to run simulations and analyze results.

Introduction to Electronic Components: Overview of electronic components: resistors, capacitors, inductors, diodes, transistors, and ICs.

Measuring Instruments and Equipment: Digital Multi-meter (DMM), Oscilloscope, Function Generator, Power Supply, LCR Meter.

Resistor Identification and Measurement: Resistor types, Resistor color code, Digital multi-meter (DMM) to measure resistance.

Capacitor Identification and Measurement: Capacitor types, Capacitor identification code, Capacitor color code, Digital multi-meter (DMM) to measure capacitance.

Inductor Identification and Measurement: Inductor types, Inductor color code, Digital multimeter(DMM) to measure inductance.

Breadboard Usage and Circuit Construction: Breadboard fundamentals, Building a circuit on Breadboard.

Soldering and De-soldering Techniques: Soldering tools and materials, Proper soldering techniques, Desoldering methods.

PCB Design and Fabrication: Introduction toa PCB design software, PCB layout and design principles, PCB fabrication process.

Electrical Circuit Simulation: Introduction to a circuit simulation software, Drawing schematics, Running simulations and analyzing results.

Text Books:

1. "The Art of Electronics" by Paul Horowitz and Winfield Hill.
2. "Practical Electronics for Inventors" by Paul Scherz and Simon Monk.

Experiments shall be conducted based on following syllabus:

1. To study the different electronic components.
2. To study the different measuring instruments and equipment.
3. To find the value of resistor using resistor color code and digital multi-meter (DMM).
4. To find the value of capacitor using capacitor identification code and capacitor color code.
5. To find the value of inductor using inductor color code.
6. To study the use of breadboard and build a LED circuit on breadboard.
7. To perform soldering and De-soldering of electronic components.
8. To study the PCB design and fabrication.
9. To simulate a simple Electrical Circuit.

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2EP119PC GENERATION OF ELECTRICAL ENERGY [PCC]

Course Outcomes:

After successful completion of this course, a student will be able to:

1. Understand the current energy scenario in India and the various load- Generation factors.
2. Explain the working of Thermal, Hydro & Nuclear power plants.
3. Explain the working of solar & Wind energy conversion systems.

SYLLABUS

UNIT I: Introduction to Indian Energy Scenario:

Load-Generation factors: connected load, maximum demand, demand factor, load factor, diversity factors, plant capacity and utilization factor load curve, chronological load curve, load duration curve, base load & Peak load.

Thermal power plant: Layout of Thermal power plant, Selection of site, working of various parts: Economizer, air preheater, condenser, cooling tower, ash &coal handling plant, advantages & disadvantages.

UNIT II: Hydro power plant: Layout of Hydro power plant, classification of hydro power plant according to available head, nature of load, functions of different components and their working, mini and micro hydro-electric power generation, advantages & disadvantages.

Nuclear power plant: Layout of Nuclear power plant, Selection of site, Functions of different components of nuclear plant, types of nuclear reactors, advantages & disadvantages of different nuclear reactors, nuclear waste disposal, safety measures.

UNIT III: Renewable Energy Resources:

Solar Energy: Solar cell, array &module, Solar constants, solar radiation, solar radiation measurement, estimation of average solar radiation, principle of solar energy conversion in to heat, types of solar collectors, energy balance equation and collector efficiency. Calculations for domestic roof top solar plant.

Wind energy: Basic principle of wind energy conversion, wind data and energy estimation, selection of site, basic components of wind energy conversion system, classification of WEC systems.

BOOKS RECOMMENDED:

Text Book: Generation of electrical energy by B.R.Gupta, Eurasia Publishing House, New Delhi.

Reference Books:

1. Non-conventional energy resources. By G.D.Rai, Khanna Publishers New Delhi.
2. Solar energy by S.P.Sukhatme Tata McGraw Hill Publication.
3. Principles of Power System by V.K.Mehta, S.Chand publication.
4. Elements of Electrical power station design by M.V.Deshpande, Wheeler Publishing.
5. Conventional energy technology by S.B.Pandya, Tata McGraw Hill Publication.

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(IV) COMPUTER ENGINEERING (: 1DS300VS/1CS300VS/1KE300VS/1AD300VS/ 1IT303VS [VSEC-I]

INTRODUCTION TO WEB TECHNOLOGY (VSEC-I) - [L:1, P:2]

Unit I: Introduction to Web Technologies (5 hours)
Overview of the Internet and Web: Understanding the internet, web browsers, and web servers.
HTML Basics: Introduction to HTML, structure of an HTML document, commonly used tags (headings, paragraphs, links, images, lists, tables, forms).
CSS Basics: Introduction to CSS, inline, internal, and external CSS, selectors, properties, and values.

Unit II: Advanced HTML and CSS (5 hours)
HTML5 Features: Semantic elements (header, footer, article,section), multimedia (audio, video), forms and form elements.
CSS3 Features: Box model, flexbbox, grid layout, CSS transitions and animations.
Responsive Web Design: Media queries, mobile-first design, responsive frameworks (e.g., Bootstrap).

Unit III: Introduction to JavaScript and Web Development Tools (5 hours)
JavaScript Basics: Variables, data types, operators, control structures (if, switch, loops), functions.
DOM Manipulation: Selecting and manipulating HTML elements, event handling.
Web Development Tools: Introduction to code editors (e.g., VSCode), browser developer tools, version control (Git basics).

Reference Books:
1. HTML & CSS: The Complete Reference, Thomas A. Powell
2. Internet and Web Technologies, Raj Kamal
3. Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP, Ivan Bayross

Reference Websites:
https://www.w3schools.com/
https://www.tutorialspoint.com/

Practical Laboratory:

Practical Laboratory:

Tentative list of experiments (ideas) based on the syllabus:

1. Introduction to HTML
   Create a simple HTML page with headings, paragraphs, and lists.
   Add images and links to the HTML page.
2. HTML Forms and Tables
   Design a form with different input elements (text, radio buttons, checkboxes, dropdowns).
   Create a table with rows and columns.
3. CSS Styling
   Apply basic styles to an HTML page using inline, internal, and external CSS.
   Use CSS selectors to style different elements.
4. Advanced CSS
   Implement the box model, and use flexbox and grid layout for a complex layout.
   Create a responsive webpage using media queries.
5. HTML5 Multimedia and Semantic Elements
   Embed audio and video elements in a web page.
   Use semantic HTML5 tags to structure a web page.

6. Introduction to JavaScript
   Write basic JavaScript code for arithmetic operations and control structures.
   Create functions and call them within the HTML page.

7. JavaScript and DOM Manipulation
   Select and manipulate HTML elements using JavaScript.
   Handle events like button clicks and form submissions.

8. Creating a Simple Interactive Web Page
   Combine HTML, CSS, and JavaScript to create an interactive web page (e.g., a simple calculator or to-do list).

9. Using Web Development Tools
   Explore browser developer tools to inspect and debug web pages.
   Use a code editor to write and manage HTML, CSS, and JavaScript files.

10. Version Control with Git
    Set up a Git repository, commit changes, and push to a remote repository.
    Collaborate on a simple project using Git (optional for advanced practice).

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SEMESTER II

Vocational and Skill Enhancement Courses (VSEC II)

Computer Hardware & Networking - 2DS303VS/2CS303VS/2KE303VS/ 2AD303VS/ 2IT303VS [L: 1, P: 2]

Course Objectives:
- Understand the fundamental concepts of computer hardware and networking.
- Gain hands-on experience in assembling and configuring computer systems.
- Learn basic networking concepts and how to set up and troubleshoot a network.

Course Outcomes:
- Identify and understand the functions of various computer hardware components.
- Assemble a basic computer system and install an operating system.
- Understand basic networking concepts, topologies, and protocols.
- Set up and troubleshoot a simple network.

SYLLABUS

Unit I: Introduction to Computer Hardware (5 hours)
Computer Components: Overview of the system unit, motherboard, CPU, RAM, ROM, storage devices (HDD, SSD), power supply, and peripheral devices.
Input and Output Devices: Keyboards, mice, monitors, printers, and other I/O devices.
Assembly and Disassembly: Steps for assembling and disassembling a computer system.

Unit II: Operating System Installation and Configuration (5 hours)
Operating Systems Basics: Introduction to various operating systems (Windows, Linux), their features and functionalities.
Installation: Installing an operating system, understanding BIOS/UEFI settings, partitioning, and file systems.
Configuration and Maintenance: Device drivers, system utilities, and basic troubleshooting.

Unit III: Basic Networking Concepts (5 hours)
Networking Fundamentals: Definition, advantages, and types of networks (LAN, WAN, MAN).
Network Topologies: Star, bus, ring, mesh, and hybrid topologies.
Network Devices and Cabling: Routers, switches, hubs, modems, cables (UTP, STP, coaxial, fiber optics).
Basic Network Configuration: Setting up a network, IP addressing, subnetting, and basic network troubleshooting.

Reference Books:
1. PC Hardware: The Complete Reference by Craig Zacker and John Rourke
2. PC Hardware: A Beginner's Guideby Ron Gilster
3. Computer Fundamentals - by P.K.Sinha
4. Networking The Complete Reference, Third Edition by Bobbi Sandberg
5. Basics of Computer Networking by Thomas Robertazzi

PRACTICAL LABORATORY –

Tentative list of experiments (ideas) based on the syllabus:

1. Identifying Computer Hardware Components
- Identify and understand the function of various computer components (motherboard, CPU, RAM, HDD, SSD, power supply, peripheral devices).

2. Assembling a Computer
- Assemble a basic computer system from individual components.
- Connect all internal and external components and ensure proper cable management.

3. Installing an Operating System
- Install Windows or Linux on a newly assembled computer.
- Configure BIOS/UEFI settings, partition the hard drive, and install necessary drivers.

2. Basic OS Configuration and Maintenance
- Configure system settings and personalize the operating system.
- Install and update device drivers, use system utilities for maintenance.

3. Introduction to Networking Devices
- Identify different networking devices (routers, switches, hubs, modems).
- Understand the use of various network cables and connectors (UTP, STP, coaxial, fiber optics).

4. Setting Up a Simple Network
- Connect and configure a basic LAN using routers and switches.
- Assign IP addresses and set up a basic network topology.

5. Basic Network Configuration
- Configure network settings on a computer (IP address, subnet mask, gateway).
- Use command-line tools (ping, tracert, ipconfig) for network troubleshooting.

6. Understanding Network Topologies
- Create and compare different network topologies (star, bus, ring, mesh).
- Discuss advantages and disadvantages of each topology.

7. Network Security Basics
- Introduction to basic network security practices.
- Set up a firewall and understand basic firewall configurations.

8. Basic Network Troubleshooting
- Use network diagnostic tools to troubleshoot common network issues.
- Understand and resolve issues related to connectivity and network performance.

PROGRAMME CORE COURSE (PCC)

COMPUTER FUNDAMENTALS - 2DS200PC/ 2CS200PC/ 2KE200PC/ 2AD200PC/2IT200PC [L: 2]

Course Objectives:
- Introduce students to the basic concepts of computers and their applications.
- Develop an understanding of data representation and basic algorithms.
- Familiarize students with software applications and their practical use in various domains.

Course Outcomes:
- Understand the basic structure and functioning of computers.
- Grasp fundamental data representation concepts and number systems.
- Apply basic algorithms and problem-solving techniques.
- Gain practical knowledge of software applications and their use cases.

SYLLABUS

Unit I: Introduction to Computers and Software (10 hours)
Introduction to Computers: Definition and characteristics of computers, Evolution and generations of computers.
Types of computers: supercomputers, mainframes, minicomputers, microcomputers Computer Software: Types of software: system software, application software, utility software
Operating systems: purpose, functions, types (single-user, multi-user, multitasking, real-time)
Introduction to popular operating systems: Windows, Linux, mac OS Applications of Computers: Overview of different application areas: education, business, healthcare, entertainment, scientific research

Unit II: Data Representation and Number Systems (10 hours)
Data Representation: Number systems: binary, octal, decimal, hexadecimal, Conversion between number systems
Representation of data: integers, floating-point numbers, characters, strings.
Binary arithmetic: addition, subtraction, multiplication, division.
Computer Codes: Introduction to computer codes: ASCII, Unicode, BCD, Error detection and correction codes

Unit III: Basic Algorithms and Problem Solving (10 hours)
Introduction to Problem Solving:

Steps in problem-solving: understanding the problem, planning, implementation, testing, and debugging, Algorithm definition and characteristics, Pseudo code and flowcharts.
Basic Algorithms: Searching algorithms: linear search, binary search.
Sorting algorithms: bubble sort, selection sort, insertion sort.
Introduction to Data Structures: Arrays, linked lists, stacks, queue.
Basic operations on data structures: insertion, deletion, traversal.

Text Books:
1. Computer Fundamentals by Anita Goel
2. Comprehensive coverage of basic computer concepts, software, and applications.
3. Introduction to Computing Systems: From Bits & Gates to C & Beyond by Yale N. Patt and Sanjay J. Patel

Reference Books:
1. Fundamentals of Computers by V. Rajaraman
2. Data Structures and Algorithm Analysis in C by Mark Allen Weiss
3. Computer Fundamentals and Programming in C by Dey, Pradip Ghosh, Manas.

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(V) ELECTRONICS & TELECOMMUNICATION ENGINEERING : [VSEC-I]

ELECTRICAL MEASUREMENT AND MEASURING INSTRUMENTS [VSEC-I]

Course Code	Course Title	L	T	P	C
	Electrical Measurement and Measuring Instruments	01	00	00	02

Pre-requisites:
1. Concepts of Electrostatics and Current Electricity.
2. Fundamentals of Magnetic effect of electric current, magnetism and Electromagnetic Induction.

Course Learning Objectives:
1: To analyze of Static characteristics &types of Errors
2: To analyze statistical parameters in measuring system
3 : To Understand Measurement of Resistance and Wheatstone Bridge
4: To Understand Measurement of Capacitance
5 : To Understand Measurement of Inductance
6: To Understand Measurement of current, voltage & range increment.

Course Outcomes:
After completion of this course the student shall be able to:
1: Analyze Static characteristics, Comprehend types of Errors
2: Exhibit the knowledge of various Statistical Parameters
3: Measure medium and low resistances using appropriate bridges.
4: Measure Capacitance using appropriate bridges.
5 : Measure Inductance using appropriate methods.
6: Demonstrate the knowledge of Current & Voltage measurements with range extension.

Unit No.	Content	No. of Lectures Required
I	**Static characteristics:** Accuracy, Precision, Sensitivity, Linearity, Threshold, Resolution, Repeatability and Hysteresis. **Errors:** Gross error, Systematic error, Random error, Limiting error.	**03**
II	**Statistical Parameters:** Arithmetic mean, Range, deviation, average deviation, Standard deviation, variance Probable error. (Numerical Expected)	**03**
III	**Measurement of Resistance:** Classification of Resistance, Wheatstone Bridge, Sensitivity of Wheatstone Bridge, Low resistance measurement using Kelvin double bridge	**03**
IV	**Measurement of Capacitance:** Measurement of Capacitance using Schering Bridge and modified De Sauty's Bridge.	**02**
V	Measurement of Inductance using Maxwell's Bridge and Hay's Bridge	**02**
VI	**Electrical Measuring Instrument:** Measurement of Current and Voltage using PMMC, Range extensions of ammeters and voltmeters, Numerical on Range extensions	**03**
	Total	**16 – Lectures**

Text Books:

1. H. S. Kalsi, Electronic Instrumentation, McGraw Hill Education Pvt Ltd., New Delhi, 1995.
2. A.K.Sawhney, A course in Electrical and Electronic Measurement and Instrumentation – DhanpatRai and Sons, New Delhi, 1999
3. B.C.Nakra and K.K.Chaudary, Instrumentation Measurement and Analysis, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1985.

Reference Books:

1. David A. Bell, Electronic Instrumentation and Measurements, Third Edition, Oxford Higher Education,
2. D.Patranabis, Principles of Industrial Instrumentation, Tata McGraw Hill Publishing Ltd., NewDelhi, 1999.
3. R.K.Jain, Mechanical and Industrial Measurements, Khanna Publishers, New Delhi, 1999.
4. Ernest O.Doebelin, Measurement systems Application and Design, International Student Edition,IV Edition, McGraw Hill Book Company, 1998.
4. Robert L.Boylestad, "Electronic Devices and Circuit theory", Publ. Pearson Education.

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ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS – LAB.

Course Code	Course Title	L	T	P	C
	Electrical Measurement and Measuring Instruments Lab.	0 0	00	02	01

Contents: Minimum Eight practicals are to be performed out of the following:

List of Experiments:

1. Measurement of resistance using Wheatstone's Bridge
2. Measurement of resistance using Kelvin double bridge
3. Measurement of capacitance using Schering Bridge
4. Measurement of capacitance using modified De Sauty's Bridge
5. Measurement of Inductance using Maxwell's Bridge
6. Measurement of Inductance using Hay's Bridge
7. Design of multi-range DC ammeter
8. Design of multi-range DC voltmeter
9. Measurement of high resistance using Megger
10. Measurement of Arithmetic mean, Range deviation, average deviation for voltage/current.

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ELECTRONIC WORKSHOP [VSEC-II]

Unit: I- Introduction to basic Electronic Components:

Study of passive components such as Resistance, Capacitor, Inductor and its types. Introduction of Active components such as Diode, Transistor and MOSFETS. (07 Hrs)

Unit: II- Printed Circuit Boards

Introduction, Preparation of single sided PCB, Soldering Techniques, PCB fabrication Process: Etching, cleaning, drying and drilling. (08 Hrs.)

References: Raghbir Singh Khandpur: Printed circuit Boards: Design, fabrication, Assembly: McGraw-Hill Electronic Engineering-2006.

ELECTRONICS WORKSHOP: LAB.

Note: Minimum 8 practicals are expected to be performed but not limited from the following list of practicals:

1. Study and Identification of electronic components active & passive.
2. To measure the resistor value by color code and verify the same using multimeter
3. To identify different inductors and measure the values using LCR meter.
4. To identify different capacitors and measure the values using LCR meter.
5. Implement small electronic circuits using active & passive components on breadboard
6. Execute soldering & de-soldering of various electrical components for electronic circuits.
7. Verify operation, truth table of basic logic gates and universal logic gates.
8. Execute repairs of any household electronic appliance such as Home Inverter
9. Testing of electronic circuits and its use in Mobile Phone
10. Getting overview of PCBs available in PC &Laptop.

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Subject: INTRODUCTION TO DIGITAL ELECTRONICS [PCC]

Unit-I Number systems:
Number system and their conversions: Binary, octal, Decimal, Hexa-decimal number, BCD code, Grey Code, Excess 3 Code, binary arithmetic, one' sandtwo 's complements. (05 Hrs)

Unit-II Boolean Algebra:
Boolean Algebra, Boolean laws, De-Morgan's Theorem, Simplifications of logic expression using Boolean Algebra, Introduction, AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR logic Gates, Universal gates, Realization of logic gate using Universal gates. (06 Hrs)

Unit- III: Karnaugh-Map: SOP and POS form, Conversion of logic expression into standard or canonical SOP and POS form, Minterm and Maxterm, Simplifications of logic expression using Karnaugh-Map upto 4 variables. (05 Hrs)

Unit -IV: Introduction to Combinational Circuits:
Combinational logic circuits such as Adder, Subtractor, Multiplexer, Demultiplexer, Encoder, Decoder etc., (06 Hrs)

Unit V: Flip Flops: SR, Clocked SR, JK, JKMS, D & T Flip Flops. (05 Hrs)

Unit VI: Introduction to sequential logic: Three bit & Four bit counter (Only Asynchronous), Up counter and down counter. (05 Hrs)

TEXT BOOKS:
1. M.Morris Mano and M.D.Ciletti, "Digital Design", Pearson Education.
2. R P Jain, "Modern Digital Electronics", TMH.
3. Anand Kumar, "Fundamentals of digital circuits" 1st edition, Prentice Hall of India, 2001.

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(VI) TEXTILE ENGINEERING : [VSEC-I]

COURSE: FABRIC STRUCTURE AND DESIGN-I

Course Description:

This course serves as vocational skill course of the program. It aims to enhance vocational skills by blending theoretical knowledge with practical applications. It focuses on the fabric structures and designing, created using graphical and computational techniques. This course provides foundational knowledge in fabric structure, basic weaves, and color effects. The course underscores practical skills and vocational training by blending theoretical knowledge with hands-on experience.

[Course Credits: 2] **[Course Hours: 1Th, 2 Pr]**

Course Outcomes:
Upon completing the Fabric Structure and Design-I course, students will be able to:

1. Discuss fabrics forming processes by weaving.
2. Illustrate the fabric weave design and its components by using graphical method.
3. Prepare plain, twill, satin and sateen weaves designs.
4. Prepare honeycomb, mock leno, and welt weaves designs.
5. Prepare woven fabric designs using color and weave effect.
6. Prepare woven fabric designs using CAD software and its basic functionalities.

SECTION A

UNIT I: Introduction to Fabric Forming
Fabric forming by weaving: Process flow of fabric formation.
Loom motions: Objects and classification of loom motions needed for fabric formation by the weaving process.

UNIT II: Fabric Structure and its Components
Definitions: Warp, weft, end, pick, selvedge, yarn crimp in woven fabric.
Weave details: Warp and weft intersection, weave repeat size
Weave representation: Methods of fabric weave representation,

UNIT III: Components of Fabric Design
Components of weave design: design, draft, and peg plan.
Types of draft: Various types of drafting techniques.

SECTION B

UNIT IV: Elements of Fabric Weave

Basic weaves and derivatives: Plain, twill, satin and sateen weaves.
Introduction to CAD software: Basic usage for fabric design.

UNIT V: Decorative Weaves

Diamond and diaper designs: Construction and applications.
Honeycomb weaves: Ordinary and bright on honeycomb, huck-a-back, mock leno.
Stripe and check weave combinations: Techniques and examples.

UNIT VI: Color Theory and Weave Effects

Light and pigment theory of color: Basics of color theory.
Elements of color: Understanding simple color and weave effects.
Weave effects construction: Line effects, Hound's tooth pattern, Bird's eye, and spot effects, hairline effects, step pattern.

Lab work for Hands-On Practical Vocational Skills:

1. Hands-on training of analyzing various fabric structures mentioned in above six units.
2. Hands-on designing sessions to construct various fabric structures mentioned in above six units.
3. Software Training sessions on CAD software for practical fabric designing experience.

Reference Books:

1. **Fabric Structure and Design** by N. Gokarneshan.
- **Relevance**: Comprehensive details on fabric structures and basic weaves, including plain, twill, and satin/sateen.

2. Textile Design and Colour by W. Watson
Relevance: Extensive coverage of color theory and its application in fabric design, essential for understanding color and weave effects.

3. Advanced Textile Design and Colour by W. Watson
Relevance: In-depth exploration of complex textile design concepts, including compound color and weave effects.

4. NCUTE - Woven Fabric by NCUTE
Relevance: Practical insights on weaving techniques, including leno structures and terry pile fabrics.

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COURSE: FABRIC STRUCTURE AND DESIGN-II [VSEC-II]

[Course Code: Course Hrs: 1Th, 2Pr Course Credits: 2]

Course Description:
This course serves as vocational skill course of the program. It aims to enhance vocational skills by blending theoretical knowledge with practical applications. It focuses on the fabric structures and designing, created using graphical and computational techniques. It aims to enhance vocational skills through practical applications and software proficiency. The course covers Bedford cords, backed cloths, double cloth constructions, leno structures, weft pile, and terry pile fabrics, integrating both theoretical knowledge and hands-on experience.

Course Outcomes:

Upon completing the Fabric Structure and Design-II course, students will be able to demonstrate proficiency in:

1. Construction of bedford fabric structures design.
2. Construction of backed fabric structures design
3. Describing the techniques of double cloth and leno structures.
4. Preparing the fabric design of weft pile structures.
5. Preparing the fabric design of terry pile structures
6. Preparing woven fabric designs using CAD software and its basic functionalities

SECTION A

UNIT I: Bedford Cords:

Plain face bedford cords: Basic construction, characteristics, and uses.
Wadded bedford cords: Integration of wadding threads, effects, and applications.
Twill Face bedford cords: Twill weaving techniques applied to bedford cords.

UNIT II: Backed Cloth:

Warp backed cloth: Structure, benefits, and applications.
Weft backed cloth: Comparison with warp backed cloth and practical uses.
Backed cloth with wadding threads: Incorporation of wadding threads in backed cloth.
Reversible backed cloths: Techniques for creating reversible designs and their advantages.

UNIT III: Double Cloth Construction:

Types and classifications of double cloth constructions. Self-Stitched Double Cloth: Concept, design and its benefits.
Thread interchange stitching: Design and practical implications.
Cloth interchange stitching: design and structural benefits.
Centre stitched double cloth: Design and applications of centre stitching.

SECTION B

UNIT IV: Leno Structure:

Principles of leno structures: Fundamental principles and design.
Production methods: Technique for producing leno fabric.
Simple constructions: Basic leno weaves structures and their applications.

UNIT V: Weft-Pile Structure:

Introduction: Fundamentals of weft-pile fabric construction.
Simple constructions: Basic weft-pile weaving techniques.
Jacquard design: Introduction to design and its applications.
CAD software: Introduction to the jacquard designing by CAD software.

UNIT VI: Terry Pile Structure

Introduction: Basic principle and importance of terry pile fabrics.
Pile formation: Mechanisms and processes for creating terry pile.
Simple terry weaves: Basic structures and design of terry weaves.
Terry pile forming mechanism: study of the mechanisms behind terry pile formation.
CAD software: Use of the software for designing terry pile fabrics.

Lab work for Hands-On Practical Vocational Skills:

1. Hands-on training of analyzing various fabric structures mentioned in above six units.
2. Hands-on designing sessions to construct various fabric structures mentioned in above six units.
3. Software Training sessions on CAD software for practical fabric designing experience.

REFERENCE BOOKS:

1. Fabric Structure and Design by N. Gokarneshan
Relevance: Provides detailed insights on various fabric structures, including Bedford cords, backed cloths, and terry pile fabrics
2. Textile Design and Colour by W. Watson
Relevance: Comprehensive coverage of textile design principles, relevant to weft-pile structures and Jacquard designs.
3. Advanced Textile Design and Colour by W. Watson
Relevance: In-depth analysis of advanced textile design concepts, suitable for understanding complex structures like double cloth and weft-pile fabrics.
4. NCUTE - Woven Fabric by NITRA
Relevance: Practical insights on weaving techniques, including leno structures and terry pile fabrics.

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INTRODUCTION TO TEXTILE MATERIALS AND PRODUCTS [PCC]

Course Code:

[Course Hours: 2 Th. Credits: 2]

Course Description:
This course serves as a core subject of the program. This course focuses on the brief introduction to the fundamental concepts related to textile engineering materials, manufacturing processes and products. Through a series of lectures, students will be briefly introduced to key terms, principles, and processes involved in textile production.

Course Outcomes:

By the end of this course, students should be able to:

1. State the importance of the textile engineering field.
2. Identify different types of textile fibers and state their applications.
3. Illustrate the process flow of yarn formation.
4. Illustrate the process flow of fabric formation.
5. Illustrate the process flow of chemical processing treatments.
6. Describe the concept of garment making and sustainable practices in the textile field.

Course Topics:

SECTION 'A'

Unit I: Introduction to Textile Engineering

Global scenario of textile engineering fields and their products.
Brief outline of the fashion, clothing, and textile ecosystem.
Historical development in textile engineering sector and its significance.
Classification of textile engineering fields and their brief concepts.
Basic terminologies related to diverse areas in textile fields.

Unit II: Textile Fibers and Yarns

Classification of textile fibers and yarns.
Important terminologies related to fibers and yarns.
Applications of various fibers and yarns in diverse fields of textiles.

Unit III: Yarn Formation

Process flow of yarn manufacturing (spinning) methods.
Key terms of yarn and intermediate spinning products.
Brief introduction and classification of various yarn production techniques.
Applications of various types of yarns.

SECTION 'B'

Unit IV: Fabric Construction

Process flow of fabric manufacturing (weaving) methods.
Introduction to Woven fabric applications.
Brief introduction to knitting concepts, types, and applications.
Brief introduction to nonwoven concept and its applications.

Unit V: Textile Finishing

Need and process flow of chemical processing treatments.
Brief introduction to dyeing, printing, mechanical, and chemical finishes.
Introduction to the environmental impact of textile production.

Unit VI: Garment Making Techniques and Sustainability in Textile Engineering

Process flow of garment construction and apparel production.
Brief introduction to cutting, sewing, and finishing process.
Brief introduction to the concepts of sustainable practices in textile fields.

TEXT BOOKS AND REFERENCES:

1. **Shenai, V.A.** ***Technology of Textile Processing: Chemistry of Textile Auxiliaries.*** **Sevak Publications, 1973.**
   Relevance: This book provides comprehensive information on the chemistry and technology of textile processing, including dyeing, printing, and finishing techniques, which are crucial for understanding Units 5 and 6 of your syllabus.
2. **Kothari, V.K.** ***Textile Fibres: Developments and Innovations.*** **IAFL Publications, 2000.**
   Relevance: This book covers various types of textile fibers, their properties, and applications, which directly relates to Unit 2 (Textile Fibers and Yarns) and Unit 3 (Yarn Formation).
3. **Parthasarathi, G., and V.K. Kothari.** ***Textile Raw Materials.*** **NCUTE Publication, 2003.**
   Relevance: This book offers detailed information on different textile raw materials, including fibers and yarns, making it pertinent to Unit 2 (Textile Fibers and Yarns).
4. **Gulrajani, M.L.** ***New Millennium Fibres.*** **Woodhead Publishing India, 2016.**
   Relevance: This book discusses modern fibers and their applications, which supports the topics covered in Unit 2 (Textile Fibers and Yarns) and introduces innovative materials.
5. **Chakraborty, Supriya.** ***Textile Science and Technology.*** **Woodhead Publishing India, 2013.**
   Relevance: This book provides a broad overview of textile science and technology, including fibers, yarns, and fabric construction, making it relevant for Units 1, 2, 3, and 4.

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(VII) B.TECH. (CHEMICAL ENGG.) / B.TECH. (CHEM.TECH.) (FPOPC) : [VSEC-I]

1CH020PC BASICS OF CHEMICAL PROCESSES [Level :]

Subject Code: 1CH020PC	**Title: Basics of Chemical Processes [VSEC- I]**	**Credits - 02**		
		L	**T**	**P**
Semester: I	Total Contact Hours	**0**	**0**	**4**

List of Experiments: (Any 10)

General Introduction to Preparation of solutions, Preparation of Normal solutions and molar solutions

1. Determination of PH, TDS & Conductivity of given water sample.
2. Determination of acid value of lubricating oil.
3. Determination of saponification value of lubricating oil
4. Determination of iodine value of lubricating oil
5. Determination of NaOH & Na2CO3 in a given alkali mixture.
6. Determination of NaHCO3 & Na2CO3 in a given alkali mixture.
7. Determination of capacity of a cation exchange resin.
8. Determination of capacity of an anion exchange resin.
9. Determination of free chlorine in water.
10. Determination of total hardness of water by soap solution method.
11. Determination of temporary hardness of water by hehners method.
12. Identification of Plastic using flame test.
13. Determination of Acid value of a plastic material.
14. Determination of Iodine value of a plastic material.
15. Determination of saponification value of a plastic material.
16. Determination of carboxyl value of a plastic material.
17. Determination of hydroxyl value of a plastic material.
18. Preparation of phenol formaldehyde resin.
19. Preparation of urea formaldehyde resin.
20. Synthesis and hydrolysis of nylon 6-6.
21. Determination of molecular weight of polymer

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SEMESTER - II

2CH019VS Computer Applications for Chemical Engineering [VSEC-II] [Level :]

Subject Code: 2CH019VS	**Title: Computer Applications for Chemical Engineering [VSEC-II]**	**Credits - 02**		
		L	**T**	**P**
Semester: II	Total Contact Hours	**1**	**0**	**2**

1. **Pre-requisite of Subject**: Applied Mathematics I and Computer Programming

2. **Course Objectives** of Computer Applications for Chemical Engineering:
On Completion of the students are expected:

- To understand the knowledge of EXCEL® used in chemical Industries.
- To understand the knowledge of MATLAB® used in Chemical Industries.
- To understand the knowledge of UniSim Simulation Software®used in chemical Industries

Unit –I: General Introduction of EXCEL® for Chemical Engineering: Introduction , Excel Basics, Built-in Functions, Operations with Columns and Rows Plotting Examples. Fitting, Plotting, and Solving, (4 Hrs.)

Unit-II: General Introduction of MATLAB® for Chemical Engineering: Introduction, MATLAB® Basics, Basic Functions, Fitting and Plotting, Using Built-in Functions Examples. Momentum, Mass and Energy Transfer. (4 Hrs.)

Unit-III: General Introduction of Unisim Simulation Software® for Chemical Engineering: Introduction, Unisim Simulation Software® Basics, Basic Functions, Fitting and Plotting, Using Built-in Functions Examples in chemical engg. Operations. (4Hrs)

Reference Books:

1. "Introduction to software for Chemical Engineering" Second Edition, Edited by Mariano Martín Martín, CRC Press Taylor & Francis Group.
2. UniSim ® Design Tutorials and Applications by Honeywell.Copyright Honeywell

Practicals: (Four Practicals)

- **Based on the syllabus of Computer Applications for Chemical Engineering**

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2CH020PC INTRODUCTION TO CHEMICAL ENGINEERING [PCC] [Level :]

Subject Code: 2CH020PC	**Title: Introduction to Chemical Engineering [PCC]**	**Credits - 02**		
		L	**T**	**P**
Semester: II	Total Contact Hours	**2**	**0**	**0**

Course Description:
This course provides an introduction to the field of chemical engineering, focusing on fundamental concepts, principles, and techniques. The syllabus is designed to offer students a comprehensive overview of chemical engineering, preparing them for advanced coursework and practical applications in their engineering careers.

Course Objectives:
1. To understand the role and scope of chemical engineering.
2. To learn the fundamental principles and calculations involved in chemical engineering processes.
3. To develop problem-solving skills related to chemical engineering.
4. To gain insight into the various applications of chemical engineering in different industries.

Unit I: General Introduction to Chemical Engineering and Basic Concepts:
History, evolution and scope of chemical engineering. Role of chemical engineers in industry and society. Overview of chemical engineering disciplines (process engineering, biochemical engineering, materials engineering, Polymer/ Plastic Engineering etc.) Introduction to various chemical industries. **(06 Hrs.)**

Unit II: General Introduction to the Basic Concepts of various Chemical Processes
Basics of Heat and Mass Transfer. Introduction to unit operations and unit processes: Modes of Heta transfer, Distillation, Absorption, Adsorption, Extraction, Crystallization, Filtration, Drying & humidification. **(06 Hrs.)**

Unit III: General Introduction to Basic Chemical Engineering Instrumentation
Instruments and Instrumentation. Need & Scope of Instrumentation. Basic method of measurements. Basics of Temperature, Pressure, Flow, Level measurement. **(06 Hrs.)**

Unit IV: General Introduction to Basic Chemical Engineering calculations:
Introduction to Units, conversions and dimensions, Atoms, moles and molecular weight, mole and mass fraction, Composition of solids, liquids and gases, Concept of Normality, Molarity and Molality, PPM (Parts Per Million),Molar concentration and Mass concentration and basics of Material balance. **(06 Hrs.)**

List of Books Recommended:

1. "Fundamentals of Chemical Engineering" by K.A. Gavhane.
2. "Introduction to Heat & Mass Transfer" by Dr. S.D. Dawande.
3. "Introduction to Chemical Engineering" By Sudhakar J, Sharmila S.
4. "Process instrumentation and control by A.P. Kulkarni.
5. "Basic principles and calculations in Chemical Engineering" by David M Hammelbleau.

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ABILITY ENHANCEMENT COURSE (AEC)

SUBJECT: PROFESSIONAL COMMUNICATION

Level	**Semester**	**Course Code**	**Course Name**	**Credits**	**Teaching Hours**	**Exam Duration**	**Internal Marks**
	I	1AS109AE	Professional Communication	1	15	-	-

Course Objectives:
The main objectives of the course are:
- To identify, analyze, develop, and evaluate professional communication skills in interpersonal situations, group interactions, personal and professional presentations.
- To develop competencies in professional and corporate communications.
- To develop clarity and conciseness in speaking, reading &writing.
- To improve the dynamics of professional presentations.
- To enable students to read newspapers for their communicative competence.
- To develop communication and social graces necessary for functioning like employable ready skills, success in the job interviews and building confidence to handle professional tasks.

Course Outcomes:

At the end of the course, the students would be able to:

CO1: Develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others.

CO2: Learn corporate etiquette - organizing and managing professional events and will understand how reading enhances their communicative competency.

CO3: Practice and adhere to the 7Cs of Communication.

CO4: Understand and practice professional communication Etiquettes.

CO5: Conduct effective correspondence and prepare reports which produce results.

CO6: Develop all-round personalities with a mature outlook to function effectively in different circumstances.

Unit I: Developing Professional Communication:

Concept & process of communication, Types, 7Cs of communication, Verbal & Nonverbal communication, and its professional use at workplace, Effective communication, communication with family and friends, dos and don'ts of communication, professional communication Etiquettes & communication barriers. (05 Hours)

Unit II: Developing Listening, Reading & Writing Skills:

Listening*:* **-** Basic skills of listening, listening models, listening habits, barriers, effective listening& activities to improve listening.

Reading*:* **-**Basic of effective reading, Intensive & extensive reading & activities to improve effective reading.

Writing*:* - Structural pattern of writing, difference between speech and writing& grammatical accuracy. (05 Hours)

Unit III: Developing Speaking& Presentation Skills:

Basic skills of speaking, speech acts, conversations, small talk, speeches, debates, group discussion, elocution, extempore, elements of effective speaking, 3Ps of speaking and dos and don'ts of speaking, fundamentals of presenting, planning and structuring a presentation and effective presentation. (05 Hours)

Reference Books:

1. S. Mishra & C. Muralikrishna, "Communication Skills for Engineers", Pearson Education.
2. T.M. Farhatullah , "Communication Skills for Technical Students", Orient Longman.
3. Saran Freeman, "Written Communication in English", Orient Longman.
4. Krishna Mohan & Meera Banerji, "Communication Skills", Macmillan.
5. R. C. Sharma & Krishna Mohan, "Business Correspondence and Report Writing", Tata McGraw Hill.
6. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011.
7. Effective communication, John Adair, 4thEdition, Pan Mac Millan,2009.
8. Adair, John. Effective Communication. London: Pan Macmillan Ltd., 2003.
9. Ajmani, J. C. Good English: Getting it Right. New Delhi: Rupa Publications, 2012.

Websites:

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3. https://www.englishcentral.com
4. https://www.busuu.com
5. https://www.memrise.com
6. https://www.englishpage.com

PROFESSIONAL COMMUNICATIONS - PRACTICAL

Course Objectives:

The main objectives of the course are:

- To enhance professional communication proficiency by providing adequate exposure to reading, listening, and writing skills.
- To develop competencies in professional and corporate communications.
- To improve the dynamics of professional presentations.
- Enable students to read newspapers for their communicative competence.
- To develop professional communication and social graces necessary for functioning like employable ready skills, success in the job interviews and building confidence to handle professional tasks.

Course Outcomes:

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

CO1: Revealed that they can reproduce their understanding of concepts/principles of professional communication.
CO2: Develop all-round personalities with a mature outlook to function effectively in different circumstances.
CO3: Make effective presentation using recent technologies.
CO4: Listen, speak, read, and write to meet the challenges of the world.
CO5: Conduct effective correspondence and prepare reports which produce results.
CO6: Improve clarity and conciseness in speaking, reading & writing.

LIST OF EXERCISES / ACTIVITIES:

Exercise 01: Communication Practices

- Formal Situations – greetings, talking with - Principal, Government officer,doctor, bank officers, employees, and college guests,
- Informal Situations - greetings, talking with - parents, siblings, other familymembers, relatives, friends, and neighbours, formal, informal, and functional expressions, recognition in listening and appropriateness in speaking/writing, formal and informal expressions.

Exercise 02: Presentation skills

- Presentations - public speaking- paper & seminar presentation, digital presentations -power point - video presentation -poster presentation, stage dynamics - body language, gesture, and posture.
- Personality & finishing skills training videos.
- How to make effective presentations, methodology, structure, using technology and Conclusion.

Exercise 03: Speech development skills.

- Welcoming guests onto the stage.
- Anchoring and proposing vote of thanks.
- Invite and thank people with professional etiquette.

Exercise 04: Reading skills.

- Newspaper reading
- Reading and interpretation
- Newspaper reading - loud reading within the groups.
- Reporting the news with one another without the help of the newspaper. (Besides this, motivates students to read the News Paper every day without fail.)

Exercise 05: Writing Skills

- Report writing.
- Feasibility report
- Project report (Writing an Abstract - Parts of a report - Title page - Declaration - Acknowledgements - Table of contents - Introduction - Conclusion - Citations - References - Appendices.)

Exercise 06: Career skills

- Resume & Cover letter.
- Interview - The purpose & preparation for an interview.
- **Discover oneself** - Self Introduction - Social background (family, home, and town) - interests, Hobbies, likes & dislikes (persons, places, food, music, etc) - Strengths, Weaknesses, Skills, Qualities, Achievements - Opinions (love, life, marriage, politics, India, etc) what is life according to me? A creative narration with information is expected.
- **Effective Resume writing**: structure and presentation - planning and defining the career objective - strengths and skills set - format - cover letter.
- **Facing Interviews**: Interview Process - Understanding employer expectations - Pre-interview planning - Opening strategies - Answering strategies, Frequently Asked Questions (FAQs).

Text books / Reference Books:

1. S. Mishra & C. Muralikrishna, “Communication Skills for Engineers”, Pearson Education.
2. T.M. Farhathullah , “Communication Skills for Technical Students”, Orient Longman.
3. Shirley Tailor, “Communication for Business: A Practical Approach”, Longman Developing.

4. Krishna Mohan &MeeraBanerji, “Communication Skills”, Macmillan.
5. R. C. Sharma & Krishna Mohan, “Business Correspondence and Report Writing”, Tata McGraw Hill.
6. Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition, Pearson Education, 2011.
7. Communication skills, Sanjay Kumar, Pushpalata, 1stEdition, Oxford Press, 2011.
8. Personality development and soft skills, Barun K Mitra, 1stEdition, Oxford Press, 2011.
9. Soft skill for everyone, Butter Field, 1st Edition, Cengage Learning India pvt.ltd, 2011.
10. Soft skills and professional communication, Francis Peters SJ, 1st Edition, McGraw Hill Education, 2011.
11. Effective communication, John Adair, 4thEdition, Pan Mac Millan, 2009.
12. Bringing out the best in people, Aubrey Daniels, 2ndEdition, Mc Graw Hill, 1999.
13. Business Communication, II Ed, OUP, by Meenakshi Raman & Prakash Singh, 2012.
14. Technical Communication - English Skills For Engineers, II Ed, OUP by Meenakshi Raman & Sangeetha Sharma, 2011.(Unit-IV).
15. Technical Communication - Principles and Practice, II Ed, OUP by Meenakshi Raman & Sangeetha Sharma, 2015.(Unit-V)

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2. http://www.english-4u.de/
3. http://www.nonstopenglish.com/
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