Jharkhand University of Technology Jharkhand, Ranchi

Proposed Syllabus for B.Tech 3rd Semester

Mechanical Engineering

&
Production Engineering

Mechanical Engineering

3rd semester course structure

Sl. No.	Course Code	Subject	L	T	P	Credit
01	ME301	Thermodynamics	3	1	0	3
02	ME302	Fluid Mechanics	3	1	0	3
03	ME303	Strength Of Materials	3	1	0	3
04	MT301	Materials Engineering	3	1	0	3
05	BSC301	Mathematics-III	3	1	0	4
06	BSC302	Environmental Science	2	0	0	0
01	ME301P	Thermodynamics Lab	0	0	3	1
02	ME302P	Fluid Mechanics Lab	0	0	3	1
03	ME303P	Strength Of Materials Lab	0	0	3	1
04	EX301	Extra Activities (NSO/NSS/NCC/Yoga / Creative Arts/Mini Project)	0	0	2	1
05	HS301	Communication Skill Lab	0	0	2	1
		Total credit				21

Production Engineering

3rd semester course structure

Sl. No.	Course Code	Subject	L	T	P	Credit
01	ME301	Thermodynamics	3	1	0	3
02	ME302	Fluid Mechanics	3	1	0	3
03	ME303	Strength Of Material	3	1	0	3
04	MT301	Materials Engineering	3	1	0	3
05	BSC301	Mathematics-III	3	1	0	4
06	BSC302	Environmental Science	2	0	0	0
01	ME302P	Fluid Mechanics Lab	0	0	3	1
02	ME303P	Strength Of Material Lab	0	0	3	1
03	MT301P	Materials Engineering Lab	0	0	3	1
04	EX301	Extra Activities (NSO/NSS/NCC/Yoga / Creative Arts/Mini Project)	0	0	2	1
05	HS301	Communication Skill Lab	0	0	2	1
Total credit						**21**

Mathematics III

(COMMON FOR ALL BRANCH)

Course code –BSC- 301

L	T	P	CR.
3	1	0	4

Module I

Laplace Transformation: Laplace Transformation and its applications, Inverse Laplace Transformation, Convolution Theorem, Solution of ODE by Laplace Transformation.

Module II

Fourier Transform: Complex form of Fourier series, Fourier Transformation and inverse Fourier Transformation, sine, cosine Transformation, Inverse Transformations -simple illustration.

Module III

Z-Transform: Inverse Z-Transform- Properties – Initial and final value theorems- convolution theorem- Difference equations, Solution of Difference equations using Z-Transformation.

Module IV

Partial Differential Equations: Solution of Wave equation, Heat equation, Laplace's equation by the method of separation of variables and its applications. Solution of PDE by Laplace Transformation.

Module V

Numerical Method: Finite difference, Symbolic relations, Interpolation and Extrapolation, Newton – Gregory forward and backward formula, Gauss forward and backward formula, Lagrange's formula , Inverse Interpolation by Lagrange's formula , Numerical Differentiation and **N**umerical Integration : Trapezoidal rule , Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule ,Weddle quadrature formula.

Text Books

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons.
- Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition.

Reference Books

- R. J. Beerends ,H. G. Ter Morsche ,J. C. Van Den Berg, E. M. Van De Vrie, Fourier and Laplace Transforms, Cambridge University Press.
- Sastry S.S, Introductory Methods of Numerical Analysis, PHI.

THERMODYNAMICS

(ME , PROD)
Course code -ME 301

Objectives:

- To learn about work and heat interactions, and balance of energy between system and its surroundings.
- To learn about application of I law of various energy conversion devices.
- To evaluate the changes in properties of substances in various processes.
- To understand the difference between high grade and low grade energies and II law limitations on energy conversion.

Contents:

Module -I

Fundaments- system and control volume; property; state and process; Exact & inexact differentials; Work-thermodynamic definition of work; examples; displacement work; path dependence of displacement work and illustrations for simple processes; electrical, magnetic, gravitational, spring and shaft work. **(5hrs)**

Module – II

Temperature , definition of thermal equilibrium and zeroth law; Temperature scales; various thermometers-definition of heat; examples of heat/work interaction in systems-first law for cycle & non-cyclic processes; concept of total energy E; Demonstration that E is a property; Various modes of energy; internal energy and enthalpy**.(5hrs)**

Module – III

Definition of pure substance, ideal gases and ideal gas mixture, real gases and real gas mixtures, compressibility charts-Properties of tow phase system-const. temperature and const. pressure heating of water; Definitions of standard states; P-V-T surface; use of steam tables and R134a tables; saturation tables; superheated tables; identification of states and determination of properties, Mollier's chart.(8hrs)

Module – IV

First law of flow processes-Derivation of general energy equation for a control volume; Steady state flow processes including throttling; Examples of steady flow devices; unsteady processes; Examples of steady and unsteady I law applications for system and control volume. **(5hrs)**

Module -V

Second law- Definitions of direct and reverse heat engines; Definitions of thermal efficiency and COP; Kelvin-plank and Clausius statements; Definition of reversible process; internal and external irreversibility; Carnot cycle; Absolute Temperature Scale. **(5hrs)**

Module-VI

Clausius inequality; Definition of energy S; Demonstration that entropy S is a property; Evaluation of S for solids, liquids, ideal gases and ideal gas mixtures undergoing various processes; Determination of S from steam tables-Principle of increase of entropy; Illustration of processes in T-S co-ordinates; Definition of Isentropic efficiency for compressors, turbines and nozzles- Irreversibility and availability, availability function for systems and control volume undergoing different processes, Lost work. Second law analysis for a control volume. Energy balance equation and Energy analysis. **(8hrs)**

Module -VII

Thermodynamic cycles- Basic Rankine cycle; Basic Brayton cycle; Basic vapour compression cycle and comparison with Carton cycle. **(4hrs)**

Course Outcomes:

1. After completing this course, the students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions.
2. Students can evaluate changes in thermodynamic properties of substances.
3. The student will be able to evaluate the performance of energy conversion devices.
4. The students will be able to differentiate between high grade and low grade energies.

Text Books:

1. Sonntag R.E., Borgnakke C. and Van wylen G. J., 2003- 6th edition, *Fundamentals of thermodynamics*, John Wiley and sons.
2. Jones, J.B. and Duggan R.E., 1996, *Engineering Thermodynamics*, Prentice-Hall of India.
3. Morgan, M.J and Shapiro, H.N., 1999, *Fundamentals of Engineering Thermodynamics*, John Wiley and Sons.
4. Nag P.K.,1995, *Engineering Thermodynamics*, Tata McGraw-Hill Publishing Co. Ltd.

FLUID MECHANICS

Course Code-ME302

Module I

Fluids and Their Properties: Introduction of fluid, fluid classifications, hypothesis of continuum, Shear stress in a moving fluid, molecular structure of material, fluid density, viscosity, causes of viscosity in gases and liquids, surface tension, capillary effect, vapor pressure, cavitation, compressibility and the bulk modulus

Module II

Pressures and Head: Types of Pressure, Pascal's law of pressure at a point, variation of pressure vertically in a fluid under gravity, equality of pressure at the same level in a static fluid, general equation for the variation of pressure due to gravity from a point to point in a static fluid, pressure and head, the hydrostatic paradox, pressure measurements using Elastic Pressure Transducers, Force Balance Pressure gauge, Electrical Pressure Transducers

Module III

Static Forces on Surface and Buoyancy: Fluid static, action of fluid pressure on surface, resultant force and center of pressure on a plane surface under uniform pressure, resultant force and center of pressure on a plane surface immersed in a liquid, pressure diagrams, forces on a curved surface due to hydrostatic pressure, buoyancy, equilibrium of floating bodies, stability of a submerged body, stability of floating bodies, determination of the metacentric height, etermination of the position of the metacentre relative to the center of buoyancy

Module IV

The Energy Equation and its Application: Momentum and fluid flow, Momentum equation for 2-D and 3-D flow along a stream line, momentum correction factor, Euler's equation of motion along a stream line, Mechanical energy of a flowing fluid – Bernoulli's theorem, kinetic energy correction factor, pitot tube, determination of volumetric flow rate via pitot tube, changes of pressure in tapering pipe, principle of venturimeter, pipe orifices, theory of small orifices discharging to atmosphere, theory of large orifices, Rotameter, elementary theory of notches and weirs, flow in a curved path

Module V

Dimensional Analysis And Similarities: Dimension reasoning, dimensional homogeneity, dimensional analysis using Rayleigh's method, Buckingham π-theorem, significance of dimensionless, use of dimensionless numbers in experimental investigation, geometric similarity, dynamic similarity, Kinematic similarity, model testing-Model laws, Undistorted and Distorted models.

Module VI

Viscous Flow: Reynolds number and Reynolds experiment, flow of viscous fluid through circular pipe- Hagen Poiseuille formula, Flow of viscous fluid between two parallel fixed plates, power absorbed in viscous flow through - journal, foot step and collar bearing , movement of piston in dash pot, methods of measurement of viscosity Turbulent Flow: Expression for coefficient of friction -Darchy Weishbach Equation, Moody diagram resistance of smooth and rough pipes shear stress and velocity distribution in turbulent flow through pipes.

Module VII

Flow through pipes: Major energy losses, Minor energy losses, Hydraulic gradient and total energy lines, Pipes in series and parallel, Equivalent pipes, Siphon, power transmission through pipe, Flow through nozzle at end of pipe, Water hammer in pipes

Compressible Flow: Basic equations for one dimensional compression, Pressure wave propagation, sound velocity in fluid, Mach number, Stagnation properties

Reference Books:

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, S.K.Kataria & Sons
2. Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Laxmi Publications
3. Fluid Mechanics and Hydraulic Machines by R.K. Rajput, S.Chand & Co.
4. Fluid Mechanics by Frank .M. White, McGraw Hill Publishing Company Ltd.
5. Fundamentals of Fluid Mechanics by Munson, Wiley India Pvt. Ltd
6. Fluid Mechanics by A. K. Mohanty, PHI Learning Pvt. Ltd.
7. Laboratory Manual Hydraulics and Hydraulic Machines by R V Raikar

Course Outcome: After learning the course the students should be able to: Understand the basic concept of fluid mechanics.

- Understand statics, dynamics and various approaches to fluid mechanics.
- Understand fundamentals of flow through pipes
- Understand basics of compressible flow
- Correlate fundamentals of fluid mechanics with various mechanical systems

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STRENGTH OF MATERIALS
(ME , PROD,CE)
Course code -ME 303

Objectives:

- To understand the nature of stresses developed in simple geometries such as bars, cantilevers, beams,shafts cylinders and spheres for various types of simple loads.
- To calculate the elastic deformation occurring in various simple geometries for different types of loading.

Contents:

Module-1

Deformation in solids-Hooks law, stress and strain-tension, compression and shear stresses – elastic constants and their relations-volumetric, linear and shear strains-principal stresses and principal planes-mohr's circle**(8hrs)**

Module-II

Beams and types transverse loading on beams-shear force and bending moment diagrams-Types of beam supports, simply supported and over hanging beams, cantilevers. Theory of bending of beam, bending stresses distribution and neutral axis, shear stress distribution, point and distributed loads**.(8hrs)**

Module-III

Moment of inertia about the axis and polar moment of inertia, deflection of beam using double integration method, computation of slopes and deflection in beams, Maxwell's reciprocal theorem**.(8hrs)**

Module-IV

Torsion, stresses and deformation in circular and hollow shafts,stepped shafts, deflection of shafts fixed at both ends, stresses and deflection of helical spring**.(8hrs)**

Module -V

Axial and hoop stresses in cylinders subjected to internal pressure, deformation of thick and thin cylinders, deformation in spherical shells subjected to internal pressure**.(8hrs)**

Course Outcomes:

- After completing this course, the students should able to recoginize various type of load applied on machine components of simple geometry and understand the nature of internal stresses that will develop within the components.
- The students will be able to evaluate the strains and deformation that will results due to the elastic stresses develop within the material for simple type of loading.

Test Books:

1. Egor P. Popov,Engineering Mechanics of solids,Prentice Hall of india,New Delhi,2001.
2. R.Subramanian, Strength of Materials,Oxford University Press,2007.

Ferdinand P.Been, Russel Johnson Jr and Jhon J.Dewole, Mechanism of materials, Tata McGrawHill Publication Co. Ltd., New Delhi 2005.

MATERIAL ENGINEERING
(ME , PROD)
Course code -MT 301

Course Objectives:

To increasing demand of the available materials, coupled with new applications and requirements has brought about many changes in the style of their uses.

To develop the basic knowledge of metals, polymers composites and ceramics other than conventional metals and alloys to apply them to advance engineering applications.

Module - I

Introduction – Crystalline and Non crystalline solids, Classification of Engineering materials and their selections, Bonding in solids: Ionic, Covalent and Metallic bonding. (5hrs)

Module – II

Crystal Structure- Space lattices, Bravais lattices, Crystal system, Unit Cell, Metallic crystal structures : SC, BCC, FCC, HCP structures, Miller notations of planes and directions, Imperfections in crystal: Point defects, Line surface defects. Dislocations: Edge and Screw dislocation, Burgers vectors. (12 hrs)

Module – III

Metallic Materials – Metals and alloys, ferrous materials- introduction to Iron carbon Diagram, steel and their Heat treatment , Properties and applications. Different types of heat treatment processes. Non-ferrous alloys:- Copper based alloys. Al based alloys, other important non ferrous alloys, properties and applications. (10hrs)

Module – IV

Polymers- Basic concepts of Polymers Science, polymer classifications. Crystallinity of polymers, Copolymers, Thermoplastic and Thermosetting polymers, Elastomers, Properties and Applications. (5hrs)

Module – V

Ceramics- Basic concepts of ceramics science, traditional and new ceramics. Oxide and Non-Oxide ceramics, Ceramics for high temperature applications. Glass, applications of ceramics, and glass. (5hrs)

Module -VI

Composite materials- Definition, general characteristics. Particles reinforced and fiber reinforced composite materials, MMC, CMC, PMC, properties and applications. (5hrs)

Text Books:

1. Elements of Material Science by Van Vlack
2. Material Science by O.P. Khanna
3. Material Science and Engineering by V. Raghavan
4. Material Science by R. K.Sharma and R.S. Sedha

Reference Books:

1. Material Science and Engineering by Wiliam D. Callister

Course Outcomes:

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

- Select different materials other than conventional metals and alloys for specific engineering applications.
- To solve the materials problems associated with the weight reduction through the appropriate choice of metals, polymers, ceramics and composites.
- Selection criterion for polymers and composites for various engineering applications.

ENVIRONMENTAL SCIENCE

Course code –BSC 302

L T P CR.

2 0 0 0

(COMMON FOR ALL BRANCH)

Module-1

Concept and scope of Environment science, components of environment, environmental segment and their importance. **(2 Hrs)**

Module-II

Ecology: Ecosystem and its characteristics features, structure and function of forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystem, ecological balance and consequences of imbalance. **(4 Hrs)**

Module-III

Atmosphere: Atmospheric composition, energy balance, climate, weather, depletion of ozone layer, green house effect, acid rain, particles, ions and radicals in the atmosphere, chemical and photochemical reactions in the atmosphere. **(4 Hrs)**

Module-IV

Air pollution and control: Air pollutants, sources and effect of air pollutants, primary and secondary pollutants, photochemical smog, fly ash, inorganic and organic particulate matter. Air quality standards, sampling, monitoring and control measures for pollutants. **(4 Hrs)**

Module-V

Water pollution and control: Aquatic environment, water pollution, sources and their effect, lake and ground water pollution, eutrophication, water quality standard and water pollution control measures, waste water treatment. **(4 Hrs)**

Module-VI

Land pollution; Lithosphere, composition of soil, acid base and ion exchange reactions in soil, soil erosion, landslides, desertification, pollutants (municipal, industrial, commercial, agricultural , hazardous solid wastes), origin and effects, collection and disposal of solid wastes, recovery and conversion methods. **(5 Hrs)**

Module-VII

Noise pollution; Noise classification and its sources, effects and measurement, noise pollution hazards, standards and noise pollution control. **(2 Hrs)**

Books and References:

1. Master, G.M Introduction to environment engineering and science, Pearson Education.
2. Nebel, B.J., Environment science, Prentice Hall Inc.
3. Odum, E.P. Ecology: The link between the natural and social sciences. IBH Publishing Company Delhi
4. De, A.K. Environmental Chemistry, Merrut.
5. Sharma B.K Envrionmental Chemistry, Krishna Prakashan Media Merrut.
6. Kaushik, A and Kaushik, C.P. Perspectives in Environmental studies, New Age International Publication.
7. Menon, S.E. Environmental Chemistry.

MATERIALS ENGINEERING LAB

MT301P

List of experiments

1. To study the Metallurgical Microscope.
2. To study the lattice structure of various types of unit cells, observe the mille indices for various planes & directions in unit cells.
3. To study the microstructure of cast iron, cold work forged, rolled condition.
4. To study the microstructure of mild steel.
5. To study the microstructure of brass solder underancaed.
6. To verify Hall effect.
7. To verify the fracture, characteristics of ductile & brittle materials.
8. To determine the chemical composition of a few common alloys.
9. To determine the percentage of carbon & sulphur contents in a alloy with Fe as main constituent.
10. Estimation of percentage carbon composition of mild steel.

FLUID MECHANICS LAB

Course Code-ME302P

1. To determine the coefficient of impact for vanes.
2. To determine coefficient of discharge of an orifice meter.
3. To determine the coefficient of discharge of Notch (V and Rectangular types).
4. To determine the friction factor for the pipes.
5. To determine the coefficient of discharge of venturi meter.
6. To determine the coefficient of discharge, contraction & velocity of an orifice.
7. To verify the Bernoulli's Theorem.
8. To find critical Reynolds number for a pipe flow.
9. To determine the meta-centric height of a floating body.
10. To determine the minor losses due to sudden enlargement, sudden contraction and bends.
11. To show the velocity and pressure variation with radius in a forced vertex flow.
12. Verification of momentum theory by impact of Jet
13 .To study the performance characteristics of a Pelton Turbine
14. Determine the operating characteristic of a reaction turbine
15. Determine the operating characteristic of a reciprocating pump
16. Verification of momentum theory by impact of Jet

Strength of Material Lab

ME303P

Name of the Experiment

1.Tensile test: To prepare the tensile test upon the given specimen (Mild Steel)
2.Compression test: To determine the compressive strength of the given specimen
3.Torsion test: To perform the Torsion test on the given specimen.
4.Impact test: To determine the Impact toughness of the given material
5.Brinell hardness test: To determine the hardness of the given specimen
6.Vicker,s Hardness test : To determine the hardness of the given specimen
7.Rockwell Hardness test: To determine the hardness of the given specimen.
8.To determine the shear strength of a mild steel specimen by Double Shear Test
9.To determine the modulus of rigidity of a solid circular rod by conducting Torsion Test.
10.To obtain tensile strength, modulus of elasticity, percentage elongation and percentage reduction in area. of cross-section.

COMMUNICATION SKILL LAB

Course code HS301

This lab paper involves interactive practice sessions in Language Lab along with some class lectures to enable the students to be confident enough in language and professional sphere of life.

Module I: Listening Comprehension

To comprehend spoken material in standard Indian English/ British English & American English

- Current situation in India regarding English
- American English Vs. British English

Module II: Phonetics & Phonology

- Introduction to Phonetics & Phonology
- Organs of Speech/ Speech Mechanism
- Pronunciation, Intonation**,** Stress and Rhythm, Syllable division
- Consonants/Vowels/Diphthongs Classification

Module III: Common Everyday Situations: Conversations and Dialogues

Module IV: Communication at Workplace

Module V: Telephonic Conversation

- Introduction
- Listening/Speaking
- Telephonic Skills Required
- Problems of Telephonic Conversation
- Intensive Listening

Module VI: Interviews

- The Interview Process
- Purpose/Planning/Two-way Interaction/Informality
- Pre-interview Preparation Techniques
- Projecting a Positive Image
- Answering strategies

Module VII: Formal Presentations

- Introduction
- Nature/Importance of Presentation
- Planning
- Objective with central idea, main ideas, role of supporting materials
- Handling Stage Fright

Module VIII: Forms of Technical Communication: Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; C.V./Resume writing; Technical Proposal: Types, Structure & Draft.

Module IX: Technical Presentation: Strategies & Techniques Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections.

Module X: Technical Communication Skills: Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances: Exposition narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means.

Jharkhand University of Technology

Jharkhand, Ranchi

Proposed Syllabus for B.Tech 3rd Semester

Electrical Engineering

&

Electrical and Electronics Engineering

Electrical Engineering

3rd semester course structure

Sl. No.	Course Code	Subject	L	T	P	Credit
01	EE301	Electrical Machine-I	3	1	0	3
02	EE302	Network Theory	3	1	0	3
03	EE303	Electromagnetic Field Theory	3	1	0	3
04	EC301	Basic Electronics	3	1	0	3
05	BSC301	Mathematics-III	3	1	0	4
06	BSC302	Environmental Science	2	0	0	0
01	EE301P	Electrical Machine-I Lab	0	0	3	1
02	EE302P	Network Theory Lab	0	0	3	1
03	EC301P	Basic Electronics Lab	0	0	3	1
04	EX301	Extra Activities (NSO/NSS/NCC/Yoga / Creative Arts/Mini Project)	0	0	2	1
05	HS301	Communication Skill Lab	0	0	2	1
Total credit						**21**

Electrical and Electronics Engineering

3rd semester course structure

Sl. No.	Course Code	Subject	L	T	P	Credit
01	EE301	Electrical Machine-I	3	1	0	3
02	EE302	Network Theory	3	1	0	3
03	EE303	Electromagnetic Field Theory	3	1	0	3
04	EC301	Basic Electronics	3	1	0	3
05	BSC301	Mathematics-III	3	1	0	4
06	BSC302	Environmental Science	2	0	0	0
01	EC301P	Basic Electronics Lab	0	0	3	1
02	EE301P	Electrical Machine-I Lab	0	0	3	1
03	EE302P	Network Theory Lab	0	0	3	1
04	EX301	Extra Activities (NSO/NSS/NCC/Yoga / Creative Arts/Mini Project)	0	0	2	1
05	HS301	Communication Skill Lab	0	0	2	1
Total credit						**21**

MATHEMATICS III

(COMMON FOR ALL BRANCH)

Course code –BSC- 301

L	T	P	CR.
3	1	0	4

Module I

Laplace Transformation: Laplace Transformation and its applications, Inverse Laplace Transformation, Convolution Theorem, Solution of ODE by Laplace Transformation.

Module II

Fourier Transform: Complex form of Fourier series, Fourier Transformation and inverse Fourier Transformation, sine,cosine Transformation, Inverse Transformations -simple illustration.

Module III

Z-Transform: Inverse Z-Transform- Properties – Initial and final value theorems- convolution theorem- Difference equations, Solution of Difference equations using Z-Transformation.

Module IV

Partial Differential Equations: Solution of Wave equation, Heat equation, Laplace's equation by the method of separation of variables and its applications. Solution of PDE by Laplace Transformation.

Module V

Numerical Method: Finite difference, Symbolic relations, Interpolation and Extrapolation, Newton – Gregory forward and backward formula, Gauss forward and backward formula, Lagrange's formula , Inverse Interpolation by Lagrange's formula , Numerical Differentiation and **N**umerical Integration : Trapezoidal rule , Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule ,Weddle quadrature formula.

Text Books

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons.
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- R. J. Beerends ,H. G. Ter Morsche ,J. C. Van Den Berg, E. M. Van De Vrie, Fourier and Laplace Transforms, Cambridge University Press.
- Sastry S.S, Introductory Methods of Numerical Analysis, PHI.

BASIC ELECTRONICS

(ECE, EEE, EE,CSE, IT)
Course code -EC 301

L	T	P	CR.
3	1	0	3

Module I: Basic Electronic Components

Active and Passive Components, Types of resistors and Colour coding, Capacitors, Inductors applications of Resistor, Capacitor and Inductor, Relay, LDR, Basic Integrated Circuits (IC 7805, 7809, 7812, 555 etc.).Measuring Instruments like CRO, Power supply, Multi-meters etc.

Module II: Semiconductors

Difference between Insulators, Semiconductors and Conductors, Mobility and Conductivity, Intrinsic and Extrinsic Semiconductors, Fermi Level, Energy band, Charge Densities in Semiconductors, Mass Action Law, Current Components in Semiconductors, Drift and Diffusion Current, The Continuity Equation, Injected Minority Charge Carrier, Hall Effect, P-N Junction Diode, construction, working, characteristics and diode equation Application of Diode, Rectifier: Half Wave, Full Wave and Bridge Rectifier, Zener Diode and its Applications, Varactor Diode, Schottky Diode, Regulated Power Supply using Zener Diode and Regulated ICs, LED, Photodetector.

Module III: Transistors

Construction, Working, Modes and Configuration of BJT, Input and Output Characteristics of all Configurations, Comparison of all Configuration & Modes, BJT as a Switch and as an Amplifier. JFET Construction, working and characteristics. MOSFET Construction, working and Characteristics, Types of MOSFET.

Module IV: Power electronic devices &Communication engineering

Construction, characteristics and working of SCR, DIAC, TRIAC and UJT. Introduction, Characteristics and applications of Operational Amplifier (Ic741). Modulation and its types.

Module V: Digital Logic and basic circuit Design

Number systems and conversion (DECIMAL, OCTAL, HEXADECIMAL,BINARY, BCD etc.),binary addition and subtraction, Logic Gates and their truth-table ,Boolean algebra .Design

of Single Stage Amplifier, LED Driver Circuit, Infrared Transmitter Receiver Circuit, LDR Driver Circuit, Relay Driver Circuit, Square Wave and Fix Frequency Generator using 555 IC.

Text Books

1. Basic Electronics and Linear Circuits by N. N. Bhargava, D. C. Kulshreshtha and S. C. Gupta, TMH Publications.

2. Op-Amps and Linear Integrated Circuits by Ramakant A. Gayakwad, PHI Publications.

3. Electronic Devices and Circuits by Godse and Bakshi Technical, Vol-1 Technical Publication Pune.

Reference Books

1. Integrated Devices & Circuits by Millman & Halkias, TMH Publications.

2. Electronics Devices and Circuit Theory by R. Boylestad & L. Nashelsky, Pearson Publication
3. Electronic Communication System by G. Kennedy, TMH Publications.

4. Basic Electronics by Sanjeev Kumar & Vandana Sachdeva, Paragaon International Publication

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ELECTRICAL MACHINES-I

(EEE, EE,)
Course code -EE 301

L	T	P	CR.
3	1	0	3

Module I: Review of Magnetic circuits and Electro-mechanical Energy Conversion

MMF, flux, reluctance, inductance; review of Ampere Law and Biot Savart Law; Visualization of magnetic fields produced by a bar magnet and a current carrying coil. Magnetic Materials, BH characteristics, Review of magnetic system, Energy in Magnetic system, Force and torque in magnetic field system, Energy balance equation, Energy conversion via electrical field, Energy in a singly excited system, Determination of the Force and Torque from energy and co-energy.

Module II: Single Phase Transformers and Autotransformers
Principle, construction and operation of single-phase transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency Testing - open circuit and short circuit tests,

polarity test, back-to-back test, Autotransformers - construction, principle, applications and comparison with two winding transformers.

Module III: Three Phase Transformers

Concept of Three-phase connections – Star/Delta. Construction of Three phase transformer, open delta connection, phasor groups, 3-phase to 2-phase and3-phase to 6-phase connections with their applications, Three winding transformers. parallel operation and load sharing of single phaseand three phase transformers.Tap-changing transformers, No-load and on-load tap-changing of transformers,three-winding transformers, Cooling of transformers.

Module IV: DC machines

Basic construction of a DC machine, magnetic structure - stator yoke, stator poles, pole-faces or shoes, air gap and armature core, visualization of magnetic field produced by the field winding excitation with armature winding open, air gap flux density distribution, flux per pole, induced EMF in an armature coil. Armature winding and commutation – Elementary armature coil and commutator, lap and wave windings, construction of commutator, linear commutation Derivation of back EMF equation, armature MMF wave, derivation of torque equation, armature reaction, air gap flux density distribution with armature reaction.

Module V: DC machine - motoring and generation

Armature circuit equation for motoring and generation, Types of field excitations – separately excited, shunt and series. Open circuit characteristic of separately excited DC generator, back EMF with armature reaction, voltage build-up in a shunt generator, critical field resistance and critical speed. V-I characteristics and torque-speed characteristics of separately excited, shunt and series motors. Speed control through armature voltage. Losses, load testing and back-to-back testing of DC machines.

Text Books:

1. IJ Nagrath & D.P. Kothari, "Electrical Machines", Tata McGraw Hill
2. Rajendra Prasad , "Electrical Machines", PHI
3. PS Bimbhra, "Electrical Machinery", Khanna Publisher
4. AE Fitggerald, C. Kingsley Jr and Umans, "Electric Machinery", McGraw Hill, International Student Edition.

Reference Books:

1. A. E. Clayton and N. N. Hancock, “Performance and design of DC machines”, CBSPublishers, 2004.
2. M. G. Say, “Performance and design of AC machines”, CBS Publishers, 2002.

NETWORK THEORY

(ECE, EEE, EE)
Course code -EE 302

L	T	P	CR.
3	1	0	3

Module I: Circuit Fundamentals
Voltage sources, Current sources, Conversion of voltage sources to current sources and vice a versa. Network terminology :- Node, Junction, Branch, Loop, Network solution by branch current method, Loop or Mesh current method, Node voltage method, Star delta connection and conversion. Node and Mesh Analysis, matrix approach of network containing voltage and current sources, and reactance's, source transformation and duality. Network theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC, circuits. Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation.

Module II: Resonance Circuits
Series resonance circuit, Frequency response of a series resonant circuit, Q factor, Bandwidth, selectivity, Effect of Q on bandwidth and selectivity, Relation between bandwidth and Q, Impedance of a series resonant circuit, Resonance by variation of L and C, Parallel resonant circuit and effect of resistance of a capacitance, Frequency response of parallel resonant circuit.

Module III: Two- Port Network
Two- port network parameters, r, y, z, h, A B C D relation between the parameters, Inter-conversion of two port networks, cascade connection series connection, series parallel connection, T and M network representation of a two port network.

Module IV: NETWORK FUNCTIONS
Laplace transform, Transform of a voltage and current, Transform of circuit elements, Network functions, Poles and zeros of the network functions, Pole zero plot, Physical significance of poles and zeroes, Stability, Two-port network parameters in the frequency domain Transient response: - step input response in RL circuit, step input response in R-C circuit, step input response in R-L-C circuit, ac transients.

Module V: FILTERS and ATTENUATORS
Definitions, classification and characteristics of different filters, filter fundamentals such as attenuation constant(alpha), phase shift (beta), propagation constant (gamma), characteristic impedance (Zo), decibel, neper. Design and analysis of constant K, M derived and composite filters (low pass, high pass, band pass, and band stop filters): T and PI sections. Definitions, classification, relation between neper and decibel, analysis and design of T type, PI type, alpha lattice, bridged –T and L types attenuators.

Text Books:

1. "A.Sudhakar, Shymmohan S. Palli, _Circuit and Network – Analysis and Synthesis‘, 3 rd Edition, Tata McGraw Hill Publication.
2. Van, Valkenburg; “Network analysis”; Prentice hall of India, 2000.
3. A. Chakrabarti, _Circuit theory (Analysis and Synthesis)‘, IIIrd edition, Dhanpat Rai and Co.

Reference Books:

1. D. Roy Choudhuri, _Networks and Systems‘, New Age International Publisher.
2. M.E.Van Valkenburg Network Analysis‘, IIIrd edition, Pearsons Education/PHI.
3.Josheph Edministrar, _Theory and Problems of Electronic Circuit (Schaum‘s Series) – Tata McGraw Hill Publication.
4. Soni Gupta, _Electrical Circuit Analysis‘, Dhanpat Rai and Co.
5. Boylestad, _Introductory Circuit Analysis‘, Universal Book Stall, New

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ELECTROMAGNETIC FIELD THEORY

(ECE, EEE, EE)
Course code -EE 303

L	T	P	CR.
3	1	0	3

Module I: Coordinate Systems and Transformation:
Basics of Vectors: Addition, subtraction and multiplications; Cartesian, Cylindrical, Spherical transformation. Vector calculus: Differential length, area and volume, line surface and volume integrals, Del operator, Gradient, Divergence of a vector, Divergence theorem, Curl of a vector, Stokes’s theorem, Laplacian of a scalar.

Module II: Electrostatic fields:
Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Gausses’ Law- Maxwell’s equation, Electric dipole and flux line, Energy density in electrostatic fields, Electric field in material space: Properties of materials, convection and conduction currents, conductors, polarization in dielectrics, Dielectric-constants, Continuity equation and relaxation time, boundary conditions, Electrostatic boundary value problems: Poisson’s and Laplace’s equations., Methods of Images.

Module III: Magneto Statics:
Magneto-static fields, Biot - Savart’s Law, Ampere’s circuit law, Maxwell’s equation, Application of ampere’s law, Magnetic flux density- Maxwell’s equation, Maxwell’s equation for static fields, magnetic scalar and vector potential.

Module IV: Magnetic Forces:

Materials and devices, Forces due to magnetic field, Magnetic torque and moment, a magnetic dipole. Magnetization in materials, Magnetic boundary conditions, Inductors and inductances, Magnetic energy.

Module V: Waves and Applications:
Maxwell's equation, Faraday's Law, transformer and motional electromotive forces, Displacement current, Maxwell's equation in final form Electromagnetic wave propagation: Wave propagation in loss dielectrics, Plane waves in lossless dielectrics Plane wave in free space. Plain waves in good conductors, Power and the pointing vector, Reflection of a plain wave in a normal incidence. Transmission Lines, and Smith Chart.

Text Book:
1. MNO Sadiku, "Elements of Electromagnetic', Oxford University Press.

Reference Books:
1. WH Hayt and JA Buck, "Engineering Electromagnetic", McGraw- Hill Education.
2. Antenna and wave propagation by k.d parsad satya prakashan.

ENVIRONMENTAL SCIENCE

Course code – BSC 302
L T P CR.
2 0 0 0
(COMMON FOR ALL BRANCH)

Module-1

Concept and scope of Environment science, components of environment, environmental segment and their importance. **(2 Hrs)**

Module-II

Ecology: Ecosystem and its characteristics features, structure and function of forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystem, ecological balance and consequences of imbalance. **(4 Hrs)**

Module-III

Atmosphere: Atmospheric composition, energy balance, climate, weather, depletion of ozone layer, green house effect, acid rain, particles, ions and radicals in the atmosphere, chemical and photochemical reactions in the atmosphere.

Module-IV **(4 Hrs)**

Air pollution and control: Air pollutants, sources and effect of air pollutants, primary and secondary pollutants, photochemical smog, fly ash, inorganic and organic particulate matter. Air quality standards, sampling, monitoring and control measures for pollutants. **(4 Hrs)**

Module-V

Water pollution and control: Aquatic environment, water pollution, sources and their effect, lake and ground water pollution, eutrophication, water quality standard and water pollution control measures, waste water treatment.

Module-VI **(4 Hrs)**

Land pollution; Lithosphere, composition of soil, acid base and ion exchange reactions in soil, soil erosion, landslides, desertification, pollutants (municipal, industrial, commercial, agricultural , hazardous solid wastes), origin and effects, collection and disposal of solid wastes, recovery and conversion methods. **(5 Hrs)**

Module-VII

Noise pollution; Noise classification and its sources, effects and measurement, noise pollution hazards, standards and noise pollution control. **(2 Hrs)**

Books and References:

1. Master, G.M Introduction to environment engineering and science, Pearson Education.
2. Nebel, B.J., Environment science, Prentice Hall Inc.
3. Odum, E.P. Ecology: The link between the natural and social sciences. IBH Publishing Company Delhi
4. De, A.K. Environmental Chemistry, Merrut.
5. Sharma B.K Envrionmental Chemistry, Krishna Prakashan Media Merrut.
6. Kaushik, A and Kaushik, C.P. Perspectives in Environmental studies, New Age International Publication.
7. Menon, S.E. Environmental Chemistry.

BASIC ELECTRONICS LAB

(ECE, EEE, EE)

Course code -ECE 301P

List of Experiments (Minimum 10)

1. Identification and testing of Resistors, Inductors, Capacitors, PN-Diode. Zener Diode, LED, LCD, LDR, BJT, Photo Diode, Photo Transistor,

2. Measurement of voltage and current using multimeter ,Measure the frequency and Amplitude of a signal with the help of CRO and function generator.

3. Study of p-n junction diode AND Zener Diode I-V characteristics

4. Assemble the single phase half wave and full wave bridge rectifier & the analyze effect of capacitor as a filter(only study of waveforms).

5. Study of Zener diode as voltage regulator.

6. Measurement & study of input characteristics of a BJT in CB configuration.

7. Measurement and study of characteristics of JFET and MOSFET

8. To design and simulate IR Transmitter and Receiver Circuit.

9. To design and simulate Motor Driver using Relay.

10. To design and simulate Light detector using LDR.

11. To design and simulate Constant frequency square wave generator using.

12. To design and simulate 5 volt DC power supply from 230 AC.

NOTE : At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

ELECTRICAL MACHINE LAB-I

List of Experiments (Minimum 10)

1. To obtain the speed characteristics of a D.C shunt motor as a function of armature voltage, field current, and externalresistance in the armature circuit.
2. To find the critical resistance (R_c) and critical speed (N_c) and O.C.C. of a dc shunt generator.
3. To conduct a load test on a dc shunt generator and obtain its internal and external characteristics.

4. To conduct load test on a dc series generator and to obtain its internal and external characteristics.
5. To perform Hopkinson's test on two similar DC shunt machines and obtain their efficiencies at various loads.
6. To separate the mechanical and iron losses (Retardation Test) of the given dc shunt machine.
7. To pre-determine the efficiency of a D.C shunt machine considering it as a motor by performing Swinburne's test on it.
8. To study about different types of DC motor starters.
9. To study power-sharing between two single-phase transformers operated in parallel.
10. To determine transformer winding polarity and explore the impact of connecting windings in series aiding and series opposing configurations.
11. To perform the short circuit and open circuit test of single-phase transformer and draw the equivalent circuit.

12.To determine Regulation and Efficiency of a single-phase transformer using direct loading test.

NOTE : At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

NETWORK THEORY LAB

(ECE, EEE, EE)
Course code -EE 302P

List of Experiments (Minimum 10)

1. Transient response of RC circuit.

2. Transient response of RL circuit.

3. To find the resonance frequency, Band width of RLC series circuit.

4. To study and verify effect of R on frequency response of parallel resonance circuit.

5. To calculate and verify "Z" parameters of a two port network.

6. To calculate and verify "Y" parameters of a two port network.

7. To determine equivalent parameter of parallel connections of two port network.

8. To plot the frequency response of low pass filter and determine half-power frequency.

9. To plot the frequency response of high pass filters and determines the half-power frequency.

10. To plot the frequency response of band-pass filters and determines the band-width.

11. To calculate and verify "ABCD" parameters of a two port network.

12. To synthesize a network of a given network function and verify its response.

13. Introduction of P-Spice or other simulation software

COMMUNICATION SKILL LAB

Course code HS301

This lab paper involves interactive practice sessions in Language Lab along with some class lectures to enable the students to be confident enough in language and professional sphere of life.

Module I: Listening Comprehension

To comprehend spoken material in standard Indian English/ British English & American English

- Current situation in India regarding English
- American English Vs. British English

Module II: Phonetics & Phonology

- Introduction to Phonetics & Phonology
- Organs of Speech/ Speech Mechanism
- Pronunciation, Intonation**,** Stress and Rhythm, Syllable division
- Consonants/Vowels/Diphthongs Classification

Module III: Common Everyday Situations: Conversations and Dialogues

Module IV: Communication at Workplace

Module V: Telephonic Conversation

- Introduction
- Listening/Speaking

- Telephonic Skills Required
- Problems of Telephonic Conversation
- Intensive Listening

Module VI: Interviews

- The Interview Process
- Purpose/Planning/Two-way Interaction/Informality
- Pre-interview Preparation Techniques
- Projecting a Positive Image
- Answering strategies

Module VII: Formal Presentations

- Introduction
- Nature/Importance of Presentation
- Planning
- Objective with central idea, main ideas, role of supporting materials
- Handling Stage Fright

Module VIII: Forms of Technical Communication: Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; C.V./Resume writing; Technical Proposal: Types, Structure & Draft.

Module IX: Technical Presentation: Strategies & Techniques Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections.

Module X: Technical Communication Skills: Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances: Exposition narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means.

JHARKHAND UNIVERSITY OF TECHNOLOGY

METALLURGICAL ENGINEERING DEPARTMENT

3rd SEMESTER COURSE STRUCTURE

Sl. No	Course No.	Subject	L	T	P	Credit
1		Mathematics-III	3	1	0	4
2		Materials Engineering	3	0	0	3
3		Materials Thermodynamics and Kinetics (PCC)	3	0	0	3
4		Fuels, Refractories and Furnaces (PCC)	3	0	0	3
5		Metallurgical Analysis (PCC)	3	0	0	3
6		Biology/Environmental Science	3	0	0	0
1		Communication Skill Laboratory	0	0	2	1
2		Fuels, Refractories and Furnaces Laboratory	0	0	3	1
3		Metallurgical Thermodymics and Analysis Laboratory	0	0	3	1
4		Extra activity -III (NSO/NSS/NCC/YOGA/CA)	0	0	(3)	1
5		Internship				2
Total Credit						**22**

Metallurgical Engineering Department

SUBJECT: – MATERIAL ENGINEERING

Course objective:
To increasing demand of the available materials, coupled with new applications and requirements has brought about many changes in the style of their uses.
To develop the basic knowledge of metals, polymers composites and ceramics other than conventional metals and alloys to apply them to advance engineering applications.

1. Introduction- Crystalline and Non crystalline solids. Classification of Engineering materials and their selections, bonding in Solids: Ionic, Covalent and Metallic bonding. (5hrs.)

2. Crystal Structure -Space lattices, Bravais lattices, Crystal system, Unit Cell, Metallic crystal structures: SC, BCC,FCC,HCP structures, Miller notations of planes and directions, Imperfections in crystals: Point defects, Line, surface defects, Dislocations: Edge and Screw dislocation, Burgers vectors. (12hrs.)

3. Metallic Materials- Metals and alloys, ferrous materials- introduction to Iron -carbon Diagram, Steel and their Heat treatment, properties and applications. Different types of heat treatment processes. Non-ferrous alloys:-Copper based alloys, Al based alloys, other important non ferrous alloys , properties and applications. (10)
4. Polymers- Basic concepts of Polymer Science, polymer classifications, Crystallinity of polymers, Copolymers, Thermoplastic and Thermosetting polymers, Elastomers, Properties and Applications. (5hrs)
5. Ceramics-Basic concepts of ceramics science, traditional and new ceramics, Oxide and Non-Oxide ceramics, Ceramics for high temperature applications, Glass, applications of ceramics, and glass. (5 hrs.)

6. Composite materials-Definition, general characteristics, Particles reinforced and fiber reinforced composite materials, MMC, CMC, PMC, properties and applications. (5hrs.)

Text Books:
1. Elements of Material Science by Van Vlack
2. Material Science by O.P. Khanna
3. Material Science and Engineering by V. Raghavan

4. Material Science by R.S.Khurmi and R.S. Sedha

Reference Books:

1. Material Science and Engineering by William D. Callister

Course outcomes:

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

- Select different materials other than conventional metals and alloys for specific engineering applications.
- To Solve the materials problems associated with the weight reduction through the appropriate choice of metals, polymers, ceramics and composites.
- Selection criterion for polymers and composites for various engineering applications.

MATERIALS THERMODYNAMICS AND KINETICS (PCC)

OBJECTIVES OF THE COURSE:

To highlight the fundamental role of thermodynamics in describing metallurgical and materials processes.

To learn and use thermodynamics functions, rules and relations and interpret thermodynamics plots and diagrams.

1. History of Thermodynamics, Ideal Gas, Energy and Work, Extensive and Intensive properties. (2 hrs).

2. First Law of Thermodynamics, Internal Energy, Enthalpy, Heat Capacity, Reversible Processes (3 hrs.)

3. Second Law of Thermodynamics, entropy and equilibrium, Reversibility, Heat Engines (3 hrs.)

4. Statistical Interpretation of Entropy, Boltzmann Equation (3 hrs.)

5. Auxiliary functions Enthalpy, free Energy, Chemical potential, Maxwell's Equations, Gibbs-Helmholtz Equation (3hrs.).

6. Enthalpy as a function of temperature and composition, Third law of Thermodynamics (3 hrs.)

7. Phase Equilibrium in a one -component system, Equilibrium between Vapor and Condensed phase, and between condensed phases (3 hrs.)

8. Gases: Ideal, Real, Van dar waal's (3 hrs.)

9. Raoult's Law and Henry's Law ,Activity, Gibbs-Duhem Equation, Properties of Ideal and Non- ideal solutions, regular solutions (3 hrs.)

10. Effect of Temperature and Pressure on the Equilibrium constant for a gas mixtures (3 hrs.)

11. Ellingham Diagram of Metal oxides and Sulphide systems. (2 hrs.)

12. The Gibbs Phase rule (3 hrs).

13. Electrochemistry, Concentration and EMF, standard Reduction potentials, Pourbaix diagrams (3 hrs.)

14. Kinetic reactions, Activated complex theory, Homogeneous reaction and importance of rate controlling steps, Adsorption and reaction on surfaces, Reaction Rule, Thermodynamics of electrolytes and Concentration cells. (6 hrs.)

Reference Books:

1. Thermodynamics in Materials science, Robert Dehoff, CRC Press, 2006.
2. Introduction to Metallurgical Thermodynamics-Darken's and Gurry, MGH publication.
3. Introduction to the Thermodynamics of Materials-Gaskel

Course Outcomes:

1. Use the various thermodynamics functions appropriately under different experimental situations involving gases, liquids and solids.

2. Utilize Pourbaix diagrams.

3. Utilize Ellingham Diagrams.

4. Explain the Gibbs phase rule.

FUELS REFRACTORIE AND FURNACES (PCC)

1**. FUELS** : Classification of fuels, Indian Resources.

2. SOLID FUELS :Coal preparation, Proximate and Ultimate analysis of coal, Coal washing, Carbonization of Coal, Brief description of the manufacture of Coke and recovery of products, Testing of coal and Coke. Indian standard specifications of Metallurgical Coke to be used in blast furnace.

3. **LIQUID FUELS** : Advantages of liquids fuels , liquid fuels furnaces, storage and handling of liquid fuels.

4. **GASEOUS FUELS** : Advantages of gaseous fuels, Manufacture of Producer Gas , water Gas, By products of gaseous fuels-Blast furnace gas, Coke oven Gas.

5. **FURNACES**: Classification of furnaces, Principles of working and applications in Industries., Principles of Regenerators and Recuperators.

6. **REFRACTORIES** : Definition, Classification of Refractories, Properties of a good refractory materials and factors affecting selection of Refractories . Types of Clay, Use of Grog and its advantages. Manufacture, Properties and Application of Fireclay Refractories, high Alumina Refractories, Silica ,Chromite, Graphite, Magnesite, Dolomite, Silicon carbide, silimanite and Kyanite Refractories, Carbon Refractories : Characteristics of carbon as refractories material, manufacture, properties and applications.

Reading:

1. J.D. Gilchrist -Fuels, Furnaces and refractories, Pergamon,1977.

2. O.P.Gupta -Elements of Fuels, Furnaces and Refractories, khanna Publications,1998

3. W.Trinks, M.H. mawhinney- Industrial Furnaces, John Wiley and Sons,2003.

4. Samir Sarkar- Fuels and Combustion, Orient Longman Ltd.

COURSE OUTCOMES:

1. Select fuels, refractories and furnces to minimize the overall cost production for a given application

2. Classification of furnaces and Refractories and their operation conditions.

3. Understand the production of solid, liquid and gaseous fuels.

4. Illustrate the production, composition, properties, testing and applications of refractories.

METALLURGICAL ANALYSIS (PCC)

1. Important of Metallurgical Analysis in Metallurgical Industries, Important Methods for the preparation of standard samples. qualitative analysis of metallurgical samples, Elementary discussion on the basic principles involved in metallurgical analysis.

2. Colorimetry and Adsorptimetry: Theory of Adsorptiometry and Colorimetry, Application of Beer's Law, Colorimetric methods, Adsorptiometric method.

3. Emission Spectroscopy and its use in Metallurgical Analysis. Atomic Absorption Spectro electro photometric method of analysis. Conductimetric, Potentiometric titration, Polaroghraphic and Electro- Gravitric methods of analysis.

4. Quantitative Estimation of Important Constituents of the following items: Iron ore, Iron and steel, Lime stone and dolomite and Blast Furnace slag.

Reading:

1. B.C. Aggrawal and S.P.Jain-A text book of Metallurgical Analysis

CHEMICAL ENGINEERING

SEMESTER III

Course Structure

S. No.	Subject Code	Subject	L	T	P	Cr.
		Theory				
1.		Math III	3	1	0	4
2.		Material Engineering	3	0	0	3
3.		Fluid Particle Operations	3	0	0	3
4.		Fluid Mechanics	3	0	0	3
5.		Heat Transfer	3	0	0	3
6.		Environmental Science	3	0	0	0
Total						**16**
		Practical				
1.		Communication skills Lab	0	0	2	1
2.		Fluid Mechanics Lab	0	0	2	1
3.		Heat Transfer Lab	0	0	2	1
4.		Fluid Particle Operations Lab	0	0	2	1
5.		Extra Activities (NSO/NSS/NCC/YOGA/CRATIV ARTS/MINI PROJECT)	0	0	2	1
Total						**5**
Grand Total Credits			**16 + 5**			**21**

31.05.19

(Dr. S. P. Singh)
Prof. & Head
Deptt. of Chemical Engineering
SIT, Sindri, Dhanbad, Jharkhand
PIN-828123

FLUID MECHANICS FOR CHEMICAL ENGINEERING (CL 3102) (CL 3102)

Lectures: 4 Periods/week — *Sessional Marks: 30*

University Examination: 3 hours. — *University Examination Marks: 70*

Semester III

Syllabus

UNIT I

Lectures 9

1. Introduction: Fluid continuum, density specific gravity, viscosity, Newtonian and non-Newtonian Fluids, kinematic viscosity, variation of viscosity with temperature and pressure, surface tension, capillary action, vapour pressure, thermodynamic property of gases, isothermal process, isentropic, adiabatic process, incompressible and compressible fluids
2. Fluid statics: pressure at a point, variation of static pressure, piezometric head, absolute and gauge pressure.

UNIT II

Lectures 6

1. Pressure measurements: mechanical pressure gauge, simple manometer, differential, micro and inclined manometer.
2. Kinematic of fluid motion: classification of flow, steady and non-steady flow, one two and three dimension flow, laminar and turbulent flow, stream line, path line and streak line, introduction to stream function and velocity potential.

UNIT III

Lectures 6

Dynamics of fluid flow: concept of system and control volume, the equation of continuity and motion, Euler equation of motion, Bernoulli equation for a real fluid, practical application of Bernoulli equation – pitot tube, venturimeter, entrance cone, coefficient of discharge, factors influencing coefficient of discharge, water flow through an opening, air anemometer, rotameter and flow meter.

UNIT IV

Lectures 6

Dimensional analysis: use of Rayleigh method, Buckingham π- theorem, dynamic similarity, geometric similarity and kinematic similarity, dimensional groups and their physical significance. Reynold number, Froude number, Euler number, Mach number, Weber number etc.

Velocity distribution in a laminar flow for parallel plates and circular tubes, Hagen-Poiseuille equation.

UNIT V

Lectures 9

Interphase transport in isothermal system; definition of friction factor, friction factor for flow in tubes, pressure drop required for a given flow rate. Flow rate for a pressure drop.

31.05.19

f-Re plot, definition for drag coefficient for flow around sphere, C vs R.D.P. plot. Determination of diameter of a falling sphere, friction factor for packed bed- Ergun equation.

Lectures 6

UNIT V

Pumps: centrifugal pumps- classification, single and multistage pumps, pumps in series and parallel, suction and delivery pipes, basic equation applied in centrifugal pumps, velocity diagram at outlet, loss of head due to changed discharge and cavitations in pumps, operating characteristics of centrifugal pumps

Reciprocating pumps: introduction, working of Reciprocating pumps, double acting pumps, instantaneous rate of discharge, effects of friction and inertial pressure

Text Books/Reference Books:

- Fluid mechanics, Victor L. Streeter, Wylie, 9th Edition, Tata Mc- Graw Hill, 2010
- Fluid mechanics and hydraulic machine, Dr. R. K. Bansal, 9th Edition, Laxmi Publication, 2005.

31.05.19

HEAT TRANSFER OPERATIONS (CL 3103)

Lectures: 4 Periods/week
University Examination: 3 hours.

Sessional Marks: 30
University Examination Marks: 70

Semester III

Prerequisite: None

Syllabus

Course Plan

Unit I **Lecture 10**

Introduction (1L)

Conduction convection & radiation. General laws of heat transfer.

Steady-State Heat conduction-1 dimension (7L)

Fourier's law, Thermal Conductivity – its variation with temperature & Pressure and its relationship with electrical conductivity. Heat transfer through composite walls and cylinders. insulation and R value, Overall Heat –Transfer coefficient, Critical thickness of insulation. conduction-convection system, Fins, Thermal contact resistance

Un-steady state Conduction (2L)

Introduction, Lumped system

Unit II **Lecture 9**

Principles of Convection (5L)

Introduction, viscous, Inviscid Flow, Laminar boundary layer on flat plate, Energy equation of the boundary layer, Thermal boundary layer, Turbulent boundary layer, Relation between fluid friction and Heat Transfer

Natural convection (4L)

Introduction, Free-convection heat transfer on Vertical planes, cylinders, sphere, combined free and forced convection.

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Lecture 9

Unit III

Empirical and Practical Relations for forced convection (4L)

Introduction, Empirical relations for pipe and tube flow, Flow across cylinder and sphere, liquid metal heat transfer-brief

Radiation Heat Transfer (4L)

Physical Mechanism, Properties, radiation shape factor and relation, nonblack bodies, infinite *parallel surface*, shield. Absorbing and transmitting medium, radiation exchange with seculars *surfaces*, radiation heat transfer coefficient.

Unit IV **Lecture 12**

Condensation and boiling (4L)

Condensation heat transfer phenomena, film condensation inside horizontal and vertical tube, boiling heat transfer, the heat pipe.

Heat exchanger (8L)

Overall- heat transfer coefficient, Fouling factor, Types of heat exchanger, LMTD, Effectiveness-NTU method, Heat exchanger design considerations,

Suggested text book

1. "Heat Transfer", J. P. Holman, McGraw Hill, ninth Edition

Suggested reference book

1. "Heat Transmission", W. H. McAdams, McGraw Hill, 3rd Edition.
2. "Process Heat Transfer", D. Q. Kern. McGraw Hill

31.05.19

Chemical Engineering Thermodynamics ~~II~~ (CL 3101)

Lectures: 4 Periods/week *Sessional Marks: 30*
University Examination: 3 hours. *University Examination Marks: 70*

Semester ~~III~~

Prerequisite: None

Detailed Syllabus

Unit I **Lectures 12**

Fundamentals of thermodynamics:
Review of laws of thermodynamics & their applications, thermodynamic system, thermodynamic state and state function, heat, internal energy and work, thermodynamic equilibrium, reversible and irreversible processes, phase rule, thermodynamic analysis of the process, terminologies of thermodynamics, variables and quantities of thermodynamics, equations of state.

Unit II **Lectures 12**

Thermodynamic properties of fluids and their inter-relations

Thermodynamic relations: phase rule, Clapeyron equation, Maxwell equation, Joule Thomson coefficient, Kirchhoff Equation, specific heat relations, Helmholtz potential

Unit III **Lectures 8**

Heat Engine cycles: Power plant cycles, Rankine cycle, the Otto Engine, the Diesel Engine, the combustion gas cycle.

Unit IV **Lectures**
8

Refrigeration Cycles: The Carnot Cycle, The Air Refrigeration Cycle. The Vapor Compression cycle, Absorption Refrigeration machine and Heat pump.

TEXTBOOK

1. Introduction to Chemical Engineering Thermodynamics, Smith, J.M., Van Ness, H.C., and Abbott, M.M., 7th Edition, McGraw Hill.

Reference Books:

1. Chemical Engineering Thermodynamics, Y.V. C. Rao, Universities press.
2. A Textbook of Chemical Engineering Thermodynamics, K. V. Narayanan. Publisher PHI Learning Pvt. Ltd., 2004.

31.05.19

Jharkhand University of Technology Jharkhand, Ranchi

Proposed Syllabus for B.Tech 3rd Semester

Civil Engineering

Civil Engineering

3rd semester course structure

Sl. No.	Course Code	Subject	L	T	P	Credit
01	CE301	Civil Engineering Materials And Construction	3	1	0	3
02	CE302	Surveying & Geomatics -I	3	1	0	3
03	ME303	Strength Of Materials	3	1	0	3
04	BSC301	Mathematics-III	3	1	0	4
05	BSC303	Engineering Geology	3	1	0	3
06	BSC302	Environmental Science	2	0	0	0
01	CE301P	Civil Engg Material Testing Lab.	0	0	3	1
02	CE302P	Field Surveying Lab	0	0	3	1
03	CE303P	Engineering Geology Lab And Strength Of Materials Lab	0	0	3	1
04	EX301	Extra Activities (NSO/NSS/NCC/Yoga / Creative Arts/Mini Project)	0	0	2	1
05	HS301	Communication Skill Lab	0	0	2	1
Total credit						**21**

MATHEMATICS III

(COMMON FOR ALL BRANCH)

Course code –BSC- 301

L	T	P	CR.
3	1	0	4

Module I

Laplace Transformation: Laplace Transformation and its applications, Inverse Laplace Transformation, Convolution Theorem, Solution of ODE by Laplace Transformation.

Module II

Fourier Transform: Complex form of Fourier series, Fourier Transformation and inverse Fourier Transformation, sine,cosine Transformation, Inverse Transformations -simple illustration.

Module III

Z-Transform: Inverse Z-Transform- Properties – Initial and final value theorems-convolution theorem- Difference equations, Solution of Difference equations using Z-Transformation.

Module IV

Partial Differential Equations: Solution of Wave equation, Heat equation, Laplace's equation by the method of separation of variables and its applications. Solution of PDE by Laplace Transformation.

Module V

Numerical Method: Finite difference, Symbolic relations, Interpolation and Extrapolation, Newton – Gregory forward and backward formula, Gauss forward and backward formula, Lagrange's formula , Inverse Interpolation by Lagrange's formula , Numerical Differentiation and **N**umerical Integration : Trapezoidal rule , Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule ,Weddle quadrature formula.

Text Books

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons.
- Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition.

Reference Books

- R. J. Beerends ,H. G. Ter Morsche ,J. C. Van Den Berg, E. M. Van De Vrie, Fourier and Laplace Transforms, Cambridge University Press.
- Sastry S.S, Introductory Methods of Numerical Analysis, PHI.

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CIVIL ENGINEERING MATERIALS AND CONSTRUCTIONS

Course code –CE 301

Module 1: Introduction to Engineering Materials covering, Cements, M-Sand, Concrete (plain, reinforced and steel fiber/glass fiber-reinforced, light-weight concrete, High Performance Concrete, Polymer Concrete) Ceramics, and Refractories, Bitumen and asphaltic materials, Timbers, Glass and Plastics Structural Steel and other Metals, Paints and Varnishes, Acoustical material and geo-textiles, rubber and asbestos, laminates and adhesives, Graphene, Carbon composites and other engineering materials including properties and uses of these **(8 Hours)**

Module II: Introduction to Material Testing covering, What is the "Material Engineering"?; Mechanical behavior and mechanical characteristics; Electricity-principle and characteristics; Plastic deformation of metals; Tensile test-standards for different material(brittle, quasi-brittle, elastic and so on) True stress-strain interpretation of tensile test; hardness tests; Bending and torsion test; strength of ceramic; Internal friction, creep-fundamentals and characteristics; Brittle fracture of steel- temperature transition approach; Background of fracture mechanics; Discussion of fracture toughness testing-different materials; concepts of fatigue of materials; Structural integrity assessment procedure and fracture mechanics **(8Hours).**

Module III: Standard Testing & Evaluation Procedures covering, Laboratory for mechanical testing; Discussion about mechanical testing; Naming systems for various irons, steels and nonferrous metals; Discussion about elastic deformation; Plastic deformation; Impact test and transition temperatures; Fracture mechanics- background; Fracture toughness- different materials; Fatigue of material; Creep. **(8 Hours)**

Module IV: Constructions: Brick Masonry; Types of bond, construction of walls, partition wall, cavity wall, advantages, disadvantages and construction procedure. D.P.C.: Purpose, types, materials and procedures, Foundation: Function, types, their stability and foundation in black cotton soil, proportioning of footings, plastering and composition, method of plastering, types of plastering, pointing construction procedure, Washing: White washing, color washing, distemper and snowcem, Roof: Flat roof, inclined roof, shells and domes, various types of roof covering materials. Floor: Types i.e. wooden, IPS, Terrazzo, marbles, tiles, synthetic mats. Construction of IPS and Terrazzo floor. Door and Windows types and fixtures including ventilators and lintel. Door and windows from PVS material and MDF. Stairs: Types and proportioning, Lifts and escalators **(16 Hours).**

Suggested Readings

1. Chudley,R.,Greeno(2006),'Building Construction Handbook'(6^{th} ed.),R.Butterworth Heinemann
2. Building Materials, S.Bhavikutti.
3. Building Materials,M.L.Gambhir.
4. Civil Engineering Materials, S.C.Rangwala, Charotar Publishing House. Various related updated & recent standards of BIS, IRC, ASTM, RILEM, AASHTO,etc. corresponding to materials used for Civil Engineering applications
5. Kyriakos Komvopolous (2011), Mechanical Testing of Engineering Materials, Cognella
6. E.N.Dowling(1993), Mechanical Behaviour of Materials, PHI
7. American Society for Testing and Materials (ASTM),Annual Books of ASTM Standards (post 2000)

8. Civil Engineering Materials and Construction Practices, R.K.Gupta, Jain Brothers,New Delhi.

SURVEYING AND GEOMATICS I

Course code –CE 302

Module I

Introduction: Importance of Surveying, Types of Surveying, Principle, Scales, Plan and Map, Shrinkage of Maps, Mapping Concepts, Map Projections, Total Station uses and application,Chain Surveying: Purpose, Chaining, accessories, Ranging and its types, Error, Chaining on uneven ground, Tape corrections, Survey stations and lines, Well conditioned triangle, basic problems, obstacles in chaining, field book. **[7 Hrs]**

Module II:

Compass Surveying: Introduction and Purpose, True Meridian, Magnetic Meridian Geographical Meridian, True Bearing, Magnetic Bearing, Whole circle &Quadrantal Bearing, Prismatic Compass and Surveyors Compass, Magnetic Declination, Isogonic and Agonic Lines, Local Attraction and its adjustments. **[4 Hrs]**

Module III:

Plane Table Surveying: Equipment and uses, principle, methods of plane tabling, closing error and its adjustment, two point problem and three point problem. **[5 Hrs]**

Module IV

Levelling: Types of levelling: Temporary Adjustment of Dumpy level, Methods of levelling, Level book and computation, missing data, curvature and refraction corrections, reciprocal levelling.Contouring: Definition, Methods of Contouring and plotting of contour.**[6 Hrs]**

Module V

Theodolite traversing: Scope, Types, temporary adjustment of transit theodolite, measurement of horizontal& Vertical angles, Method of repeatation&Direction, errors and its elimination, method of traversing, calculation of latitude and departure, balancing of traverse **[6 Hrs]**

Module VI

Tacheometric Survey: Instruments used, Principle, determination of tacheometric constant, Methods of Tacheometry: Stadia Method and Tangential Method. **[4 Hrs]**

Module VII

Classification of Curves: Simple curve, Combined curve, Compound curve, reverse curve, transition curve, Methods of layout, offsets from chord produced, Rankine's Method, Transition Curve, super-elevation, length of transition curve, characteristics, equation, shift, tangent length, and curve length of combined curve, setting out of simple and transition curve. **[12Hrs]**

Text Books:

1. Duggal, S.K. Surveying Vol. I and II, Tata McGraw Hill, 2004.

2. Punmia, B.C. Surveying Vol.I and II, Standard Publishers, 1994.

3. Arora, K. R. Surveying Vol. I and II, Standard Book House, 1996

4 N.N Basak.. Surveying and levelling

STRENGTH OF MATERIALS

(ME , PROD,CE)
Course code -ME 303

Objectives:

- To understand the nature of stresses developed in simple geometries such as bars, cantilevers, beams,shafts cylinders and spheres for various types of simple loads.
- To calculate the elastic deformation occurring in various simple geometries for different types of loading.

Contents:

Module-I

Deformation in solids-Hooks law, stress and strain-tension, compression and shear stresses – elastic constants and their relations-volumetric, linear and shear strains-principal stresses and principal planes-mohr's circle **(8 Hrs)**

Module-II

Beams and types transverse loading on beams-shear force and bending moment diagrams-Types of beam supports, simply supported and over hanging beams, cantilevers. Theory of bending of beam, bending stresses distribution and neutral axis, shear stress distribution, point and distributed loads**.(8Hrs)**

Module-III

Moment of inertia about the axis and polar moment of inertia, deflection of beam using double integration method, computation of slopes and deflection in beams, Maxwell's reciprocal theorem**.(8Hrs)**

Module-IV

Torsion, stresses and deformation in circular and hollow shafts,stepped shafts, deflection of shafts fixed at both ends, stresses and deflection of helical spring**.(8Hrs)**

Module -V

Axial and hoop stresses in cylinders subjected to internal pressure, deformation of thick and thin cylinders, deformation in spherical shells subjected to internal pressure**.(8Hrs)**

Course Outcomes:

- After completing this course, the students should able to recoginize various type of load applied on machine components of simple geometry and understand the nature of internal stresses that will develop within the components.
- The students will be able to evaluate the strains and deformation that will results due to the elastic stresses develop within the material for simple type of loading.

Test Books:

1. Egor P. Popov,Engineering Mechanics of solids,Prentice Hall of india,New Delhi,2001.
2. R.Subramanian, Strength of Materials,Oxford University Press,2007.

Ferdinand P.Been, Russel Johnson Jr and Jhon J.Dewole, Mechanism of materials, Tata McGrawHill Publication Co. Ltd., New Delhi 2005.

ENGINEERING GEOLOGY

Course code –BSC 303

Module 1: Introduction-Branches of geology useful to civil engineering , scope of geological studies in various civil engineering projects. Department dealing with his subject in India and their scope of work- GSI, Granite Dimension Stone Cell, NIRM. Mineralogy- Mineral, Origin and composition. Physical properties of minerals, susceptibility of minerals to alteration, basic of optical mineralogy,(**6 hours**)

Module II: Strength Behavior of Rocks- Stress and Strain in rocks. Concept of Rock Deformation & Tectonics. Dip and Strike. Outcrop and width of outcrop. Inliers and Outliers. Main types of discontinuities according to size. Fold –Types and nomenclature, Criteria for their recognition in field . Faults: Classification, recognition in field, effects on outcrops. Joints & Uncormity; Types, Stresses responsible, geotechnical importance. Importance of structural elements in engineering operations. Consequences of failure as land sliding, Earthquake and Subsidence, Strength of Igneous rock structures(**6 hours**)

Module III: Geological Hazards- Rock Instability and Slope movement:
Concept of sliding blocks. Different controlling factors. Instability in vertical rock structures and measures to prevent collapse..Types of landslide. Prevention by surface drainage, slope reinforcement by Rock bolting and Rock Anchoring, retaining wall, Slope treatment. Case study on black clay. Ground water: Factors controlling water bearing capacity of rock. Previous & impervious rocks and ground water. Lowering of water table and Subsidence. Earthquake: Magnitude and intensity of earthquake. Seismic sea waves. Revelation from Seismic Records of structure of earth. Case Study on Elevation and Subsidence in Himalayan region in India. Seismic Zone in India.(**6 hours**)

Module IV: Geology of dam and reservoir site- Required geological consideration for selecting dam and reservoir site. Failure of Reservoir. Favorable and unfavorable conditions in different types of rocks in presence of various structural features, precautions to be taken to counteract unsuitable conditions , significance of discontinuities on the dam site and treatment giving to such structures.(**4 hours)**

Module V: Introduction and nature of soils: Soil problems in Civil Engineering, Types of soil, formation, structure and mineralogical and composition, Physical and Engineering Properties of soil, Atterberg Limit, Grain size analysis, by sieving and sedimentation, Activity of clay, All type of Classification of soil, Engineering properties of soil.**(6 hours)**

Module VI: Soil hydraulic and seepage analysis : Darcy's law, Measurement of Permeability, Factors affecting permeability and neutral pressure and effective pressure.(**4 hours**)
Seepage analysis: Laplace's equation, methods of obtaining flow nets, flow net for isotropic and anisotropic soil and their applications.(**3 hours**)
Consolidation and compaction: Definition, measurement, mechanism and analysis of data.(**4 hours)**
Shear strength of soil: Shear strength parameters of soil and laboratory methods for their determination. Liquefaction of soil.(**4 hours)**

Suggested Readings:

1. Engineering and General Geology, Prabin Singh, 8th ed.(2010),S K Kataria and sons.
2. Text Books of Engineering Geology, N.Cheena Kesavulu,2nd Edition(2009)
3. Geology for Geotechnical Engineers, J.C.Harvey, Cambridge University Press(1982)
4. Soil Mechanics and Foundation Engineering, B.C.Punmia, Laxmi Publication

5. Basic and Applied Soil Mechanics, Gopal Ranjan, A.S.R. Rao, New Age Publisher
6. Advanced Soil Mechanics, B.M.Das,Taylor and Francis.

ENVIRONMENTAL SCIENCE

Course code –BSC 302

L T P CR.

2 0 0 0

(COMMON FOR ALL BRANCH)

Module-1

Concept and scope of Environment science, components of environment, environmental segment and their importance. **(2 Hrs)**

Module-II

Ecology: Ecosystem and its characteristics features, structure and function of forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystem, ecological balance and consequences of imbalance. **(4 Hrs)**

Module-III

Atmosphere: Atmospheric composition, energy balance, climate, weather, depletion of ozone layer, green house effect, acid rain, particles, ions and radicals in the atmosphere, chemical and photochemical reactions in the atmosphere.

Module-IV **(4 Hrs)**

Air pollution and control: Air pollutants, sources and effect of air pollutants, primary and secondary pollutants, photochemical smog, fly ash, inorganic and organic particulate matter. Air quality standards, sampling, monitoring and control measures for pollutants. **(4 Hrs)**

Module-V

Water pollution and control: Aquatic environment, water pollution, sources and their effect, lake and ground water pollution, eutrophication, water quality standard and water pollution control measures, waste water treatment.

Module-VI **(4 Hrs)**

Land pollution; Lithosphere, composition of soil, acid base and ion exchange reactions in soil, soil erosion, landslides, desertification, pollutants (municipal, industrial, commercial, agricultural , hazardous solid wastes), origin and effects, collection and disposal of solid wastes, recovery and conversion methods. **(5 Hrs)**

Module-VII

Noise pollution; Noise classification and its sources, effects and measurement, noise pollution hazards, standards and noise pollution control. **(2 Hrs)**

Books and References:

1. Master, G.M Introduction to environment engineering and science, Pearson Education.
2. Nebel, B.J., Environment science, Prentice Hall Inc.
3. Odum, E.P. Ecology: The link between the natural and social sciences. IBH Publishing Company Delhi
4. De, A.K. Environmental Chemistry, Merrut.

5. Sharma B.K Envrionmental Chemistry, Krishna Prakashan Media Merrut.
6. Kaushik, A and Kaushik, C.P. Perspectives in Environmental studies, New Age International Publication.
7. Menon, S.E. Environmental Chemistry.

CIVIL ENGINEERING MATERIAL TESTING LAB

Course code CE301P

List of Experiments

1. Test on Bricks: Shape and size of supplied brick, Water absorption of brick, Compressive strength of bricks.
2. Test on Fine Aggregates: Moisture Content, Specific Gravity, Bulk Density, Sieve Analysis
3. Test on Course Aggregates: Fineness modulus, Crushing Values
4. Test on Cement: Fineness of cement, Soundness of given cement, Specific gravity of cement, Standard consistency of cement, Initial and final setting time of cement.
5. Test on Soil: Sieve Analysis, Specific Gravity, Liquid & Plastic Limits

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FIELD SURVEYING LAB

Course code CE 302P

List of Experiments

1. Study of different Levels and Leveling staff. Practice for temporary adjustment. To find out the reduced levels of given points using Dumpy level. (Reduction by Height of Collimation method)
2. Study of a Tilting (LOP.) Level and to find out the levels of given points (Reduction of data by Rise and Fall method).
3. Visit to Lab, For the study of:-
   (a) Map in the making p Survey of India publication
   (b) Conventional Symbol charts and different types of maps
4. To establish a Benchmark by Check Leveling with a LOP. level and 'closing the work at the staring Bench mark.
5. To perform Fly Leveling with a LO.P. Level.
6. To draw the longitudinal rid cross- sections profiles along a given route.
7. Practice for Temporary adjustments of a Vernier Theodolite and taking Horizontal the work at the starting measurements. By Reiteration method.

8. To plot the coordinates at a given scale on Plane Table and their field checking.
9. To solve two Point and Three Point Problems in Plane Tabling.
10. To carry out Triangulation and Trilateration of a given area (2-3 turns are needed).

ENGINEERING GEOLOGY LAB & STRENGTH OF MATERIAL LAB

Course code CE 303P

ENGINEERING GEOLOGY LAB

List of Experiments

1. Study of rock forming and Economic minerals, study of different rocks
2. Methods of completing the outrop of rocks on a map
3. Drawing the geological sections of geological maps
4. Inter-relation of geological maps rind sections with respect to subsurface Structure.
5. Problems of locating sites of projects like Dams, Tunnels Highways et. In the geological sections.

STRENGTH OF MATERIAL LAB

List of Experiments

1. Tensile Test: To prepare the tensile test upon the given specimen (Mild Steel).
2. Compression Test To determine the compressive strength of the given specimen.
3. Torsion Test: To perform the Torsion test on given specimen.
4. Impact Test: To determine the impact toughness of. The given material.
5. Brinell hardness Test: To determine the hardness of the given specimen. -
6. Vicker's Hardness Test: To determine, the hardness of the given specimen.
7. Rockwell Hardness Test: To determine the hardness of the given specimen.

COMMUNICATION SKILL LAB

Course code HS301

This lab paper involves interactive practice sessions in Language Lab along with some class lectures to enable the students to be confident enough in language and professional sphere of life.

Module I: Listening Comprehension

To comprehend spoken material in standard Indian English/ British English & American English

- Current situation in India regarding English
- American English Vs. British English

Module II: Phonetics & Phonology

- Introduction to Phonetics & Phonology
- Organs of Speech/ Speech Mechanism
- Pronunciation, Intonation**,** Stress and Rhythm, Syllable division
- Consonants/Vowels/Diphthongs Classification

Module III: Common Everyday Situations: Conversations and Dialogues

Module IV: Communication at Workplace

Module V: Telephonic Conversation

- Introduction
- Listening/Speaking
- Telephonic Skills Required
- Problems of Telephonic Conversation
- Intensive Listening

Module VI: Interviews

- The Interview Process
- Purpose/Planning/Two-way Interaction/Informality
- Pre-interview Preparation Techniques
- Projecting a Positive Image
- Answering strategies

Module VII: Formal Presentations

- Introduction
- Nature/Importance of Presentation
- Planning
- Objective with central idea, main ideas, role of supporting materials
- Handling Stage Fright

Module VIII: Forms of Technical Communication: Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; C.V./Resume writing; Technical Proposal: Types, Structure & Draft.

Module IX: Technical Presentation: Strategies & Techniques Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections.

Module X: Technical Communication Skills: Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances: Exposition narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means.

NOTE : At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus

Jharkhand University of Technology Jharkhand, Ranchi

Proposed Syllabus for B.Tech 3rd Semester

Electronics and Communication Engineering

Electronics and Communication Engineering

3rd semester course structure

Sl. No.	Course Code	Subject	L	T	P	Credit
01	EC301	Basic Electronics	3	1	0	3
02	EC302	Digital Electronics And Logic Design	3	1	0	3
03	EE302	Network Theory	3	1	0	3
04	EE303	Electromagnetic Field Theory	3	1	0	3
05	BSC301	Mathematics-III	3	1	0	4
06	BSC302	Environmental Science	2	0	0	0
01	EC301P	Basic Electronics Lab	0	0	3	1
02	EC302P	Digital Electronics And Logic Design Lab	0	0	3	1
03	EE302P	Network Theory Lab	0	0	3	1
04	EX301	Extra Activities (NSO/NSS/NCC/Yoga / Creative Arts/Mini Project)	0	0	2	1
05	HS301	Communication Skill Lab	0	0	2	1
Total credit						**21**

MATHEMATICS III

COMMON FOR ALL BRANCH) (

Course code –BSC- 301

L	T	P	CR.
3	1	0	4

Module I

Laplace Transformation: Laplace Transformation and its applications, Inverse Laplace Transformation, Convolution Theorem, Solution of ODE by Laplace Transformation.

Module II

Fourier Transform: Complex form of Fourier series, Fourier Transformation and inverse Fourier Transformation, sine,cosine Transformation, Inverse Transformations -simple illustration.

Module III

Z-Transform: Inverse Z-Transform- Properties – Initial and final value theorems-convolution theorem- Difference equations, Solution of Difference equations using Z-Transformation.

Module IV

Partial Differential Equations: Solution of Wave equation, Heat equation, Laplace's equation by the method of separation of variables and its applications. Solution of PDE by Laplace Transformation.

Module V

Numerical Method: Finite difference, Symbolic relations, Interpolation and Extrapolation, Newton – Gregory forward and backward formula, Gauss forward and backward formula, Lagrange's formula , Inverse Interpolation by Lagrange's formula , Numerical Differentiation and **N**umerical Integration : Trapezoidal rule , Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule ,Weddle quadrature formula.

Text Books

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons.
- Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition.

Reference Books

- R. J. Beerends ,H. G. Ter Morsche ,J. C. Van Den Berg, E. M. Van De Vrie, Fourier and Laplace Transforms, Cambridge University Press.
- Sastry S.S, Introductory Methods of Numerical Analysis, PHI.

BASIC ELECTRONICS

(ECE, EEE, EE,CSE, IT)
Course code -EC 301

L	T	P	CR.
3	1	0	3

Module I: Basic Electronic Components

Active and Passive Components, Types of resistors and Colour coding, Capacitors, Inductors applications of Resistor, Capacitor and Inductor, Relay, LDR, Basic Integrated Circuits (IC 7805, 7809, 7812, 555 etc.).Measuring Instruments like CRO, Power supply, Multi-meters etc.

Module II: Semiconductors

Difference between Insulators, Semiconductors and Conductors, Mobility and Conductivity, Intrinsic and Extrinsic Semiconductors, Fermi Level, Energy band, Charge Densities in Semiconductors, Mass Action Law, Current Components in Semiconductors, Drift and Diffusion Current, The Continuity Equation, Injected Minority Charge Carrier, Hall Effect, P-N Junction Diode, construction, working, characteristics and diode equation Application of Diode, Rectifier: Half Wave, Full Wave and Bridge Rectifier, Zener Diode and its Applications, Varactor Diode, Schottky Diode, Regulated Power Supply using Zener Diode and Regulated ICs, LED, Photodetector.

Module III: Transistors

Construction, Working, Modes and Configuration of BJT, Input and Output Characteristics of all Configurations, Comparison of all Configuration & Modes, BJT as a Switch and as an Amplifier..h –parameter, JFET Construction, working and characteristics. MOSFET Construction, working and Characteristics, Types of MOSFET.

Module IV: Power electronic devices & Communication engineering

Construction, characteristics and working of SCR, DIAC, TRIAC and UJT. Introduction, Characteristics and applications of Operational Amplifier (IC741). Modulation and its types.

Module V: Digital Logic and basic circuit Design

Number systems and conversion (DECIMAL, OCTAL, HEXADECIMAL,BINARY, BCD etc.),binary addition and subtraction, Logic Gates and their truth-table ,Boolean algebra .Design of Single Stage Amplifier,

LED Driver Circuit, Infrared Transmitter Receiver Circuit, LDR Driver Circuit, Relay Driver Circuit, Square Wave and Fix Frequency Generator using 555 IC.

Text Books

1. Basic Electronics and Linear Circuits by N. N. Bhargava, D. C. Kulshreshtha and S. C. Gupta, TMH Publications.
2. Op-Amps and Linear Integrated Circuits by Ramakant A. Gayakwad, PHI Publications.
3. Electronic Devices and Circuits by Godse and Bakshi Technical, Vol-1 Technical Publication Pune.

Reference Books

1. Integrated Devices & Circuits by Millman & Halkias, TMH Publications.
2. Electronics Devices and Circuit Theory by R. Boylestad & L. Nashelsky, Pearson Publication
3. Electronic Communication System by G. Kennedy, TMH Publications.
4. Basic Electronics by Sanjeev Kumar & Vandana Sachdeva, Paragaon International Publication

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DIGITAL ELECTRONICS AND LOGIC DESIGN

(ECE, CSE, IT)
Course code -EC 302

L	T	P	CR.
3	1	0	3

Module I: Binary Codes and Boolean algebra

Analog and Digital, Binary Number System. Addition, Subtraction, Multiplication, Division of binary numbers, Subtraction using 2's complement method. Binary codes: weighted and non weighted codes, self complementary codes, BCD, Excess-3, Gray codes, Alphanumeric codes, ASCII Codes. *Boolean algebra*: Boolean Laws and Expression using Logic Gates, Realization of different gates using Universal gates, DeMorgan's Theorem, Duality Theorems.

Module II: Boolean function minimization Techniques

Standard forms: SOP, POS, Simplification of Switching function & representation (Maxterm & Minterm), Boolean expression & representation using logic gates, Propagation delay in logic gate. *Karnaugh map*: K-map(up to 5 variables), mapping and minimization of SOP and POS expression, Don't care condition, conversion from SOP to POS and POS to SOP form using K-map, Minimization of multiple output circuits, Quine Mc-cluskey method minimization technique, prime implicant table, Don't care condition.

Module III: Combinational Circuits Design

Adder & Subs tractor (Half and Full), Parallel Binary adder, BCD Adder, Binary

multipliers, Code Converters, parity bit generator, Comparators, Decoder, BCD to 7-segment Decoder, Encoders, Priority Encoders, Multiplexers, De Multiplexers.

Module IV: Sequential Circuits Elements

Introduction to sequential circuit, Flip-flop & Timing Circuits: SR latch, Gated latch, Tri state logic, Edge triggered flip-plop: - D, JK, T Flip-flop, flip-flop asynchronous inputs ,characteristic table of Flip-flop, excitation table of Flip-flop, master slave JK flip flop, inter conversion of Flip-flop. Study of timing parameters of flip-flop. Shift registers: buffer register, controlled buffer register. Data transmission in shift resistor SISO, SIPO, PISO, PIPO, Bidirectional shift register, universal shift registers. *Counter*: Classification, Ripple or asynchronous counter, Effect of propagation delay in ripple counters, up-down counter, Design of Mod-n counter, synchronous counter, Ring counter, Johnson counter. Introduction to FSM. Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator.

Module V: Logic Families and VLSI Design flow

Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices like FPGA, Logic implementation using Programmable Devices VLSI Design flow: Design entry, Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits

***Text Books* :**

1. Kharate "Digital Electronics" OXFORD Publication
2. A. Anand Kumar 'Fundamentals of Digital Circuits'. PHI Publications
3. R.P. Jain-'Modern Digital Electronics' IIIrd Edition- Tata Mc Graw Hill, Publication
4. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
5. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition
6. Bhaskar VHDL BASED DESIGN ,PEARSON EDUCATION

Reference Books:

1. Rajkamal 'Digital Systems Principals and Design' Pearson Education
2. A.P. Malvino, D.P. Leach 'Digital Principles & Applicatios' -VIth Edition-TMH publication.
3. M. Morris Mano 'Digital Design' (Third Edition). PHI Publications

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NETWORK THEORY

(ECE, EEE, EE)
Course code -EE 302

L	T	P	CR.
3	1	0	3

Module I: Circuit Fundamentals

Voltage sources, Current sources, Conversion of voltage sources to current sources and vice a versa. Network terminology :- Node, Junction, Branch, Loop, Network solution by branch current method, Loop or Mesh current method, Node voltage method, Star delta connection and conversion. Node and Mesh Analysis, matrix approach of network containing voltage and current sources, and reactance's, source transformation and duality. Network theorems: Superposition, reciprocity, Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC, circuits. Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation.

Module II: Resonance Circuits

Series resonance circuit, Frequency response of a series resonant circuit, Q factor, Bandwidth, selectivity, Effect of Q on bandwidth and selectivity, Relation between bandwidth and Q, Impedance of a series resonant circuit, Resonance by variation of L and C, Parallel resonant circuit and effect of resistance of a capacitance, Frequency response of parallel resonant circuit.

Module III: Two- Port Network

Two- port network parameters, r, y, z, h, A B C D relation between the parameters, Inter-conversion of two port networks, cascade connection series connection, series parallel connection, T and M network representation of a two port network.

Module IV: Network Functions

Laplace transform, Transform of a voltage and current, Transform of circuit elements, Network functions, Poles and zeros of the network functions, Pole zero plot,Physical significance of poles and zeroes, Stability, Two-port network parameters in the frequency domain Transient response: - step input response in RL circuit, step input response in R-C circuit, step input response in R-L-C circuit, ac transients.

Module V: filters and attenuators

Definitions, classification and characteristics of different filters, filter fundamentals such as attenuation constant(alpha), phase shift (beta), propagation constant (gamma), characteristic impedance (Zo), decibel, neper. Design and analysis of constant K, M derived and composite filters (low pass, high pass, band pass, and band stop filters): T and PI sections. Definitions, classification, relation between neper and decibel, analysis and design of T type, PI type, alpha lattice, bridged –T and L types attenuators.

Text Books:

1. "A.Sudhakar, Shymmohan S. Palli, _Circuit and Network – Analysis and Synthesis‘, 3 rd Edition, Tata McGraw Hill Publication.
2. Van, Valkenburg; “Network analysis”; Prentice hall of India, 2000.
3. A. Chakrabarti, _Circuit theory (Analysis and Synthesis)‘, IIIrd edition, Dhanpat Rai and Co.

Reference Books:

1. D. Roy Choudhuri, _Networks and Systems‘, New Age International Publisher.
2. M.E.Van Valkenburg Network Analysis‘, IIIrd edition, Pearsons Education/PHI.
3.Josheph Edministrar, _Theory and Problems of Electronic Circuit (Schaum‘s Series) – Tata McGraw Hill Publication.
4. Soni Gupta, _Electrical Circuit Analysis‘, Dhanpat Rai and Co.
5. Boylestad, _Introductory Circuit Analysis‘, Universal Book Stall, New

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ELECTROMAGNETIC FIELD THEORY

(ECE, EEE, EE)
Course code -EE 303

L	T	P	CR.
3	1	0	3

Module I: Coordinate Systems and Transformation:

Basics of Vectors: Addition, subtraction and multiplications; Cartesian, Cylindrical, Spherical transformation. Vector calculus: Differential length, area and volume, line surface and volume integrals, Del operator, Gradient, Divergence of a vector, Divergence theorem, Curl of a vector, Stokes’s theorem, Laplacian of a scalar.

Module II: Electrostatic fields:

Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Gausses' Law- Maxwell's equation, Electric dipole and flux line, Energy density in electrostatic fields, Electric field in material space: Properties of materials, convection and conduction currents, conductors, polarization in dielectrics, Dielectric-constants, Continuity equation and relaxation time, boundary conditions, Electrostatic boundary value problems: Poisson's and Laplace's equations., Methods of Images.

Module III: Magneto Statics:

Magneto-static fields, Biot - Savart's Law, Ampere's circuit law, Maxwell's equation, Application of ampere's law, Magnetic flux density- Maxwell's equation, Maxwell's equation for static fields, magnetic scalar and vector potential.

Module IV: Magnetic Forces:

Materials and devices, Forces due to magnetic field, Magnetic torque and moment, a magnetic dipole. Magnetization in materials, Magnetic boundary conditions, Inductors and inductances, Magnetic energy.

Module V: Waves and Applications:

Maxwell's equation, Faraday's Law, transformer and motional electromotive forces, Displacement current, Maxwell's equation in final form Electromagnetic wave propagation: Wave propagation in loss dielectrics, Plane waves in lossless dielectrics Plane wave in free space. Plain waves in good conductors, Power and the pointing vector, Reflection of a plain wave in a normal incidence. Transmission Lines, and Smith Chart.

Text Book:

1. MNO Sadiku, "Elements of Electromagnetic', Oxford University Press.

Reference Books:

1. WH Hayt and JA Buck, "Engineering Electromagnetic", McGraw- Hill Education.
2. Antenna and wave propagation by k.d parsad satya prakashan.

ENVIRONMENTAL SCIENCE

Course code –BSC 302

L T P CR.

2 0 0 0

(COMMON FOR ALL BRANCH)

Module-1

Concept and scope of Environment science, components of environment, environmental segment and their importance. **(2 Hrs)**

Module-II

Ecology: Ecosystem and its characteristics features, structure and function of forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystem, ecological balance and consequences of imbalance. **(4 Hrs)**

Module-III

Atmosphere: Atmospheric composition, energy balance, climate, weather, depletion of ozone layer, green house effect, acid rain, particles, ions and radicals in the atmosphere, chemical and photochemical reactions in the atmosphere.

Module-IV **(4 Hrs)**

Air pollution and control: Air pollutants, sources and effect of air pollutants, primary and secondary pollutants, photochemical smog, fly ash, inorganic and organic particulate matter. Air quality standards, sampling, monitoring and control measures for pollutants. **(4 Hrs)**

Module-V

Water pollution and control: Aquatic environment, water pollution, sources and their effect, lake and ground water pollution, eutrophication, water quality standard and water pollution control measures, waste water treatment.

Module-VI **(4 Hrs)**

Land pollution; Lithosphere, composition of soil, acid base and ion exchange reactions in soil, soil erosion, landslides, desertification, pollutants (municipal, industrial, commercial, agricultural , hazardous solid wastes), origin and effects, collection and disposal of solid wastes, recovery and conversion methods. **(5 Hrs)**

Module-VII

Noise pollution; Noise classification and its sources, effects and measurement, noise pollution hazards, standards and noise pollution control. **(2 Hrs)**

Books and References:

1. Master, G.M Introduction to environment engineering and science, Pearson Education.
2. Nebel, B.J., Environment science, Prentice Hall Inc.
3. Odum, E.P. Ecology: The link between the natural and social sciences. IBH Publishing Company Delhi
4. De, A.K. Environmental Chemistry, Merrut.
5. Sharma B.K Envrionmental Chemistry, Krishna Prakashan Media Merrut.

6. Kaushik, A and Kaushik, C.P. Perspectives in Environmental studies, New Age International Publication.
7. Menon, S.E. Environmental Chemistry.

BASIC ELECTRONICS LAB

(ECE, EEE, EE)
Course code -EC 301P

List of Experiments (Minimum 10)

1. Identification and testing of Resistors, Inductors, Capacitors, PN-Diode. Zener Diode, LED, LCD, LDR, BJT, Photo Diode, Photo Transistor,
2. Measurement of voltage and current using multimeter ,Measure the frequency and Amplitude of a signal with the help of CRO and function generator.
3. Study of p-n junction diode AND Zener Diode I-V characteristics
4. Assemble the single phase half wave and full wave bridge rectifier & the analyze effect of capacitor as a filter(only study of waveforms).
5. Study of Zener diode as voltage regulator.
6. Measurement & study of input characteristics of a BJT in CB configuration.
7. Measurement and study of characteristics of JFET and MOSFET
8. To design and simulate IR Transmitter and Receiver Circuit.
9. To design and simulate Motor Driver using Relay.
10. To design and simulate Light detector using LDR.
11. To design and simulate Constant frequency square wave generator using.
12. To design and simulate 5 volt DC power supply from 230 AC.

NOTE : At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

DIGITAL ELECTRONICS AND LOGIC DESIGN LAB

(ECE, CSE, IT)
Course code EC 302P

List of Experiments (Minimum 10)

1. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
2. Design & realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer & Demultiplexer.

4. To verify the operation of comparator.
5. To verify the truth tables of S-R, J-K, T & D type flip flops.
6. To verify the operation of bi-directional shift register.
7. To design & verify the operation of 3-bit synchronous counter.
8. Design all gates using VHDL.
9. Design a multiplexer using VHDL
10. Design a decoder using VHDL
11. Write VHDL programs for the following circuits, check the wave forms and the hardware generated a. half adder b. full adder
12. Write VHDL programs for the following circuits, check the wave forms and the hardware generated a. multiplexer b. demultiplexer

NOTE : At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus. For VHDL Xilinx software may be used.

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NETWORK THEORY LAB

(ECE, EEE, EE)
Course code -EE 302P

List of Experiments (Minimum 10)

1. Transient response of RC circuit.
2. Transient response of RL circuit.
3. To find the resonance frequency, Band width of RLC series circuit.
4. To study and verify effect of R on frequency response of parallel resonance circuit.
5. To calculate and verify "Z" parameters of a two port network.
6. To calculate and verify "Y" parameters of a two port network.
7. To determine equivalent parameter of parallel connections of two port network.
8. To plot the frequency response of low pass filter and determine half-power frequency.
9. To plot the frequency response of high pass filters and determines the half-power frequency.
10. To plot the frequency response of band-pass filters and determines the band-width.
11. To calculate and verify "ABCD" parameters of a two port network.
12. To synthesize a network of a given network function and verify its response.
13. Introduction of P-Spice or other simulation software

COMMUNICATION SKILL LAB

Course code HS301

This lab paper involves interactive practice sessions in Language Lab along with some class lectures to enable the students to be confident enough in language and professional sphere of life.

Module I: Listening Comprehension

To comprehend spoken material in standard Indian English/ British English & American English

- Current situation in India regarding English
- American English Vs. British English

Module II: Phonetics & Phonology

- Introduction to Phonetics & Phonology
- Organs of Speech/ Speech Mechanism
- Pronunciation, Intonation**,** Stress and Rhythm, Syllable division
- Consonants/Vowels/Diphthongs Classification

Module III: Common Everyday Situations: Conversations and Dialogues

Module IV: Communication at Workplace

Module V: Telephonic Conversation

- Introduction
- Listening/Speaking
- Telephonic Skills Required
- Problems of Telephonic Conversation
- Intensive Listening

Module VI: Interviews

- The Interview Process
- Purpose/Planning/Two-way Interaction/Informality
- Pre-interview Preparation Techniques
- Projecting a Positive Image
- Answering strategies

Module VII: Formal Presentations

- Introduction
- Nature/Importance of Presentation
- Planning
- Objective with central idea, main ideas, role of supporting materials
- Handling Stage Fright

Module VIII: Forms of Technical Communication: Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper

writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; C.V./Resume writing; Technical Proposal: Types, Structure & Draft.

Module IX: Technical Presentation: Strategies & Techniques Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections.

Module X: Technical Communication Skills: Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances: Exposition narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means.

JHARKHAND UNIVERSITY OF TECHNOLOGY, RANCHI

MINING ENGINEERING
B. Tech, Semester III (Second year]
Course Structure

3rd Semester Course Structure

Sl. No.	Course Code	Course Title	Hours per week			Credits
			L	T	P	
THEORY						
1.		Mathematics-III	3	1	0	4
2.		Mining Geology	3	1	0	3
3.		Materials Engineering	3	1	0	3
4.		Surveying and Geometrics - I	3	1	0	3
5.	MN301	Introduction to Mining Technology	3	1	0	3
6.		Environmental Science	2	0	0	0
PRACTICAL						
7.		Mining Geology Lab	0	0	3	1
8.		Field Surveying Lab	0	0	3	1
9.		Communication Skill Lab	0	0	2	1
10.	MN301P	Introduction to Mining Technology - Lab	0	0	3	1
11.		Extra-Curricular Activity – III (NSO/NSS/NCC/YOGA/CREATIVE ARTS / Mini Project etc.)	0	0	2	1
		Total	**17**	**5**	**13**	**21**

MN301	INTRODUCTION TO MINING TECHNOLOGY	3L:1T:0P	3 Credits

Course Objective

When the students enter the college to pursue a degree in Mining Engineering and as well pursue a career in Mining Engineering after graduation, they need to understand the breadth and depth available in this field for possible engagement. When many alternative disciplines of engineering appear to offer apparently more glamorous avenues for advancement, the Mining Engineering student should realize the potentials available in this engineering discipline. The students should understand the enormous possibilities available for creative and innovative works in this all-pervasive field of engineering.

This course is designed to address the following:

- to give an understanding to the students of the vast breadth and numerous areas of engagement available in the overall field of Mining Engineering
- to motivate the student to pursue a career in one of the many areas of Mining Engineering with deep interest and keenness.
- To expose the students to the various avenues available for doing creative and innovative work in this field by showcasing the many monuments and inspiring projects of public utility.

Proposed Syllabus

Definition and scope of mining: Mining as a basic industry, definition of mining terms. Economic importance of mining, Social and environmental impact of mining.

Principle of boring and purpose of boreholes; methods of boring; rotary and percussive boring methods borehole deflection and deviation.

Explosives and Blasting: Definition, Classification, Basic ideas about coal and rock drilling, basic ideas about the use of explosives in rock breaking concerning shaft sinking, drifting and drivages of adit.

Opening of mineral deposits: Types of mine opening, selection, location, shape and size of different types of opening, drivage methods for adits and incline drifts and cycle of operation, support of incline drift and their mouth.

Shaft sinking: Conventional methods of shaft sinking, shaft lining (temporary and permanent), surface arrangements, ventilation, pumping and illumination arrangement during shaft sinking, shaft fittings. Pit top and Pit bottom layouts Opening and development of mineral deposits, method of working, ventilation, transportation, hoisting and dispatch.

Introduction to common extraction method of underground mineral deposit: Coal: Bord and Pillar method, Longwall method Metal: Various stoping methods like open stoping, cut and fill stoping, shrinkage stoping, sub level stoping, block caving etc.

Overview of Surface Mining: Types of surface mine, unit operation, basic bench geometry, applicability and limitation, advantages and disadvantages.

Modules

Module 1: **Definition and scope of mining:**
Mining as a basic industry, definition of mining terms. Economic importance of mining, Social and environmental impact of mining.

Module 2: **Boring:**
Principle of boring and purpose of boreholes; methods of boring; rotary and percussive boring methods borehole deflection and deviation.

Module 3: **Explosivesand Blasting:**
Definition, Classification, Basic ideas about coal and rock drilling, basic ideas about the use of explosives in rock breaking concerning shaft sinking, drifting and drivages of adit.

Module 4: **Opening of mineral deposits:**
Types of mine opening, selection, location, shape and size of different types of opening, drivage methods for adits and incline drifts and cycle of operation, support of incline drift and their mouth.

Module 5: **Shaft sinking**: Conventional methods of shaft sinking, shaft lining (temporary and permanent), surface arrangements, ventilation, pumping and illumination arrangement during shaft sinking, shaft fittings. Pit top and Pit bottom layouts
Opening and development of mineral deposits, method of working, ventilation, transportation, hoisting and dispatch.

Module 6: **Overview of Underground Mining:**
Coal: Bord and Pillar method, Longwall method
Metal: Various stoping methods like open stoping, cut and fill stoping, shrinkage stoping, sub level stoping, block caving etc.

Module 7: **Overview of Surface Mining:**
Types of surface mine, unit operation, basic bench geometry, applicability and limitation, advantages and disadvantages.

Text/Reference Books:

1. Introductory mining engineering-, Howard L.Hartman, Jan M.Mutmansky/ Wiley India (P) Ltd
2. Elements of mining technology Vol.-I - D.J. Deshmukh /Denett& Company
3. Roy Pijush Pal, Blasting in ground excavations and mines, Oxford and IBH, 1st Ed. 1993
4. C.P. Chugh, Drilling technology handbook, Oxford and IBH, 1sted, 1977.

Goals & Outcomes:

- Introduction to what constitutes Mining Engineering
- Identifying the various areas available to pursue and specialize within the overall field of Mining Engineering
- Exploration of the various possibilities of a career in this field
- Providing inspiration for doing creative and innovative work
- Highlighting possibilities for taking up entrepreneurial activities in this field
- Providing a foundation for the student to launch off upon an inspired academic pursuit into this branch of engineering

GE 302	MINING GEOLOGY	3L:1T:0P	3 Credits

Proposed Syllabus:

Module 1: Physical Geology:

Geology in mining engineering, scope and application, earth structure and composition, weathering processes and grade, physiographical division of India, geological work of river, wind and glacier.

Module 2: Stratigraphy:

Principle of stratigraphy, geological time scale, mineral resource distributions and economic importance of Archean, Cuddapah, Vindhyan, Gondwana, Tertiary deposit of India.

Module 3: Minerology:

Classification of minerals, physical properties of minerals, properties of silica, feldspar, pyroxene, amphibole, mica, olivine, group of minerals and calcite.

Module 4: Petrology:

Classification of rocks,

igneous rock: composition and diversification of magma, texture and structure of igneous rock, tabular classification of igneous rocks, study of importance igneous rock,

sedimentary rock: lithification and diagenesis, texture and structure of sedimentary rock, study of important sedimentary rock,

metamorphic rock: metamorphism, agents and types, study of important metamorphic rocks,

Module 5: Structural Geology:

Introduction to geological structure, faults, folds, joints and unconformities classification, criteria for recognition in the field and significance in mineral exploration, determination of strata thickness, dip and strike calculation,

Module 6: Economic Geology

Ore, Gauge, tenors of ore, grade, assay value cut – off grade, processes of formation of mineral deposit, magmatic concentration, hydrothermal processes, placer deposit and supergene sulphide enrichment deposit, iron, copper, Manganese, lead & zinc, mica etc.

Coal Geology: Introduction, Coal petrography, origin, classification, structural features of coal seam

Oil & Natural Gas: Introdution, origiin, classification, accumulation, migration, cap rocks, traps.

Module 7: Mineral Exaploration

Geological, Geophysical and Geochemical prospecting- principle and methodology

Module 8: Hydrogeology

Introduction, Hydrological cycle, vertical distribution of groundwater, aquifers, Darcy's law, hydrological properties of rocks and groundwater quality

GE 302P	MININING GEOLOGY LAB	0L:0T:3P	1 Credits

SL. NO	NAME OF EXPERIMENT/EXERCISE	
A. Study of Mineral samples (Identification of minerals on the basis of colour, streak, luster, hardness, cleavage, fracture)		
1.	Rock Forming minerals	Quartz, Orthoclase, Biotite, Muscovite, Calcite, Plagioclase,
2.	Economic minerals	Galena, pyrolusite, Hematite, Magnetite, Bauxite, Chromite, Chalcopyrite, Pyrite
B. Megascopic study of hand specimens (Identification of rock on the basis of colour, mineral composition, texture, structure)		
3.	Igneous rocks	Granite, Basalt, Rhyolite, Obsidian, Dolerite, Syenite,
4.	Sedimentary rocks	Sandstone. Shale, Limestone, Conglomerate, Breccia
5.	Metamorphic rocks	Gneiss, Schist, Quarzite, Marble, Slate,
C. Study of external morphology of crystal models (Determination of axial relationship, symmetry elements and forms present in model)		
6.	Isometric System& Tetragonal System	
7.	Orthorhombic System& Hexagonal System	
8.	Monoclinic System& Triclinic System	
D.Numerical Problems related to Structural Geology		
9.	Three-point problems and its application	
10.	Borehole problems and its analysis	
11.	Structural analysis using stereonets	
12.	Lithologinterpretaion and correlation	

MN301P	INTRODUCTION TO MINING TECHNOLOGY - LAB	0L:0T:3P	1 Credits

SL. NO	NAME OF EXPERIMENT
13.	Study and sketch of Boring and various methods of Boring.
14.	Study and sketch of Explosive and its types.
15.	Study and sketch of Blasting Accessories.
16.	Study and sketch of Priming, Charging, Stemming and Shot – firing.
17.	Solid Blasting Practices in Undergroundmines.
18.	Study of Blasting Pattern in underground and surface mines.
19.	Study and sketch of incline mouth support.
20.	Study and sketch of Temporary lining of shaft during sinking.
21.	Study and sketch of Concrete lining of Shaft.
22.	Study and sketch of special methods of shaft sinking by cementation process.

Jharkhand University of Technology Jharkhand, Ranchi

Proposed Syllabus for B.Tech 3rd Semester

Computer Science & Engineering
&
Information Technology

Computer Science & Engineering

3rd semester course structure

Sl. No.	Course Code	Subject	L	T	P	Credit
01	CS301	Data Structures And Algorithms	3	1	0	3
02	IT301	Object Oriented Programming	3	1	0	3
03	EC301	Basic Electronics	3	1	0	3
04	EC302	Digital Electronics And Logic Design	3	1	0	3
05	BSC301	Mathematics-III	3	1	0	4
06	BSC302	Environmental Science	2	0	0	0
01	CS301P	Data Structures And Algorithms Lab	0	0	3	1
02	IT301P	Object Oriented Programming Lab	0	0	3	1
03	EC302P	Digital Electronics & Logic Design Lab	0	0	3	1
04	EX301	Extra Activities (NSO/NSS/NCC/Yoga / Creative Arts/Mini Project)	0	0	2	1
05	HS301	Communication Skill Lab	0	0	2	1
Total credit						**21**

Information Technology

3rd semester course structure

Sl. No.	Course Code	Subject	L	T	P	Credit
01	IT301	Object Oriented Programming	3	1	0	3
02	CS301	Data Structures And Algorithms	3	1	0	3
03	EC301	Basic Electronics	3	1	0	3
04	EC302	Digital Electronics And Logic Design	3	1	0	3
05	BSC301	Mathematics-III	3	1	0	4
06	BSC302	Environmental Science	2	0	0	0
01	IT301P	Object Oriented Programming Lab	0	0	3	1
02	CS301P	Data Structures And Algorithms Lab	0	0	3	1
03	EC302P	Digital Electronics & Logic Design Lab	0	0	3	1
04	EX301	Extra Activities (NSO/NSS/NCC/Yoga / Creative Arts/Mini Project)	0	0	2	1
05	HS301	Communication Skill Lab	0	0	2	1
Total credit						**21**

MATHEMATICS III

(COMMON FOR ALL BRANCH)

Course code –BSC- 301

L	T	P	CR.
3	1	0	4

Module I

Laplace Transformation: Laplace Transformation and its applications, Inverse Laplace Transformation, Convolution Theorem, Solution of ODE by Laplace Transformation.

Module II

Fourier Transform: Complex form of Fourier series, Fourier Transformation and inverse Fourier Transformation, sine,cosine Transformation, Inverse Transformations - simple illustration.

Module III

Z-Transform: Inverse Z-Transform- Properties – Initial and final value theorems-convolution theorem- Difference equations, Solution of Difference equations using Z-Transformation.

Module IV

Partial Differential Equations: Solution of Wave equation, Heat equation, Laplace's equation by the method of separation of variables and its applications. Solution of PDE by Laplace Transformation.

Module V

Numerical Method: Finite difference, Symbolic relations, Interpolation and Extrapolation, Newton – Gregory forward and backward formula, Gauss forward and backward formula, Lagrange's formula , Inverse Interpolation by Lagrange's formula , Numerical Differentiation and **N**umerical Integration : Trapezoidal rule , Simpson's $1/3^{rd}$ rule , Simpson's $3/8^{th}$ rule ,Weddle quadrature formula.

Text Books

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons.
- Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,2010.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition.

Reference Books

- R. J. Beerends ,H. G. Ter Morsche ,J. C. Van Den Berg, E. M. Van De Vrie, Fourier and Laplace Transforms, Cambridge University Press.
- Sastry S.S, Introductory Methods of Numerical Analysis, PHI.

BASIC ELECTRONICS

(ECE, EEE, EE,CSE, IT)
Course code -EC 301

L	T	P	CR.
3	1	0	3

Module I

Basic Electronic Components

Active and Passive Components, Types of resistors and Colour coding, Capacitors, Inductors applications of Resistor, Capacitor and Inductor, Relay, LDR, Basic Integrated Circuits (IC 7805, 7809, 7812, 555 etc.).Measuring Instruments like CRO, Power supply, Multi-meters etc.

Module II

Semiconductors

Difference between Insulators, Semiconductors and Conductors, Mobility and Conductivity, Intrinsic and Extrinsic Semiconductors, Fermi Level, Energy band, Charge Densities in Semiconductors, Mass Action Law, Current Components in Semiconductors, Drift and Diffusion Current, The Continuity Equation, Injected Minority Charge Carrier, Hall Effect, P-N Junction Diode, construction, working, characteristics and diode equation Application of Diode, Rectifier: Half Wave, Full Wave and Bridge Rectifier, Zener Diode and its Applications, Varactor Diode, Schottky Diode, Regulated Power Supply using Zener Diode and Regulated ICs, LED, Photodetector.

Module III:

Transistors

Construction, Working, Modes and Configuration of BJT, Input and Output Characteristics of all Configurations, Comparison of all Configuration & Modes, BJT as a Switch and as an Amplifier. JFET Construction, working and characteristics. MOSFET Construction, working and Characteristics, Types of MOSFET.

Module IV: Power electronic devices &Communication engineering

Construction, characteristics and working of SCR, DIAC, TRIAC and UJT. Introduction, Characteristics and applications of Operational Amplifier (Ic741). Modulation and its types.

Module V: Digital Logic and basic circuit Design

Number systems and conversion (DECIMAL, OCTAL, HEXADECIMAL,BINARY, BCD etc.),binary addition and subtraction, Logic Gates and their truth-table ,Boolean algebra .Design of Single Stage Amplifier, LED Driver Circuit, Infrared Transmitter Receiver Circuit, LDR Driver Circuit, Relay Driver Circuit, Square Wave and Fix Frequency Generator using 555 IC.

Text Books

1. Basic Electronics and Linear Circuits by N. N. Bhargava, D. C. Kulshreshtha and S. C. Gupta, TMH Publications.
2. Op-Amps and Linear Integrated Circuits by Ramakant A. Gayakwad, PHI Publications.
3. Electronic Devices and Circuits by Godse and Bakshi Technical, Vol-1 Technical Publication Pune.

Reference Books

1. Integrated Devices & Circuits by Millman & Halkias, TMH Publications.
2. Electronics Devices and Circuit Theory by R. Boylestad & L. Nashelsky, Pearson Publication 3. Electronic Communication System by G. Kennedy, TMH Publications.
4. Basic Electronics by Sanjeev Kumar & Vandana Sachdeva, Paragaon International Publication

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DATA STRUCTURES AND ALGORITHMS

(CSE, IT)

Course code -CS 301

(3-CREDIT) (L-T-P/3-0-0)

Module I

Basic concepts and notations: Data structures and data structure operations, Complexity Analysis: Mathematical notation and functions, algorithmic complexity and time space trade off, Big O Notation, The best, average & worst cases analysis of various algorithms. Arrays: Linear & Multidimensional Arrays, Representation & traversal. Sorting algorithms: Bubble sort, Selection sort, Insertion sort, Merge sort and Quick sort, Counting Sort. Linear search and Binary search on sorted arrays.

Module II

Abstract Data Types (ADTs) Stack: Push; Pop, stack representation using array and linked list, Applications of Stack, Recursion. Queue: Representation using array and linked list, Insertion and deletion operations, circular queue, Dequeue, priority queue. Linked Lists & their types (Single, Double, Circular linked lists), Operations on Varieties of Linked Lists (Search and Update) with applications

Module III

Introduction to Trees, Binary tree - definitions and properties; binary tree traversal algorithms with and without recursion., Binary Search Tree - creation, insertion and deletion operations, Threaded tree (One way and Two way). AVL tree balancing; B-tree

Module IV

Graph Algorithms: Graphs and their Representations, Graph Traversal Techniques: Breadth First Search (BFS) and Depth First Search (DFS), Applications of BFS and DFS, Minimum Spanning Trees (MST), Prim's and Kruskal's algorithms for MST, Connected Components, Dijkstra's Algorithm for Single Source Shortest Paths,, Floydd's Algorithm for All-Pairs Shortest Paths Problem

Module V

Hashing techniques, Hash function, Address calculation techniques- common hashing functions Collision resolution, Linear probing, quadratic probing, double hashing, Bucket addressing. Rehashing

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

- Understand the concept of ADT
- Identify data structures suitable to solve problems
- Develop and analyze algorithms for stacks, queues
- Develop algorithms for binary trees and graphs
- Implement sorting and searching algorithms
- Implement symbol table using hashing techniques

Text Books:

1. Data Structures Using C – A.M. Tenenbaum (PHI)
2. Introduction to Data Structures with Applications by J. Tremblay and P. G. Sorenson (TMH)
3.Data Structures, Algorithms and Application in C, 2nd Edition, Sartaj Sahni
4. Data Structures and Algorithms in C, M.T. Goodrich, R. Tamassia and D. Mount, Wiley India.

REFERENCE BOOKS:

1. Data Structure and Program Design in C by C.L. Tondo.
2. Data Structures with C++, J. Hubbard, Schaum's Outlines, TMH.
3. Data Structures and Algorithms in C, M.T. Goodrich, R. Tamassia and D. Mount, Wiley India.
4. Data Structures and Algorithm Analysis in C, 3rd Edition, M.A. Weiss, Pearson.
5. Classic Data Structures, D. Samanta, 2nd Edition, PHI.
6. Data Structure Using C by Pankaj Kumar Pandey.
7. Data Structure with C, Tata McGraw Hill Education Private Limited by Seymour Lipschutz.
8. Data Structure through C in Depth, BPB Publication, by S.K. Srivastava.
9. Data Structure and algorithm Analysis in C 2nd Edition, PEARSON Publishing House, Mark Allen Weiss

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OBJECT ORIENTED PROGRAMMING

(CSE, IT)

Course code -IT 301

(3-CREDIT) (L-T-P/3-0-0)

Course Outcome:

1. To be able to apply an object-oriented approach to programming and identify potential benefits of object-oriented programming over the approaches.
2. To be able to reuse the code and write the classes which work like built in types.
3. To be able to design applications which are easier to debug, maintain and extend.
4. To be able to apply object-oriented concepts in real world applications.
5. To be able to develop applications using multi-threading.
6. To be able to handle exceptions in any applications.

Module-I 12 Hrs

Introduction to Java and Java Programming Environment, Object Oriented Programming, Fundamental Programming Structure: Data Types, Variable, Typecasting Arrays, Operators and their Precedence. Control Flow: Java's Selection Statements (if, Switch, Iteration, Statement, While, Do While, for, Nested Loop). Concept of Objects and Classes, Using Exiting Classes Building your own Classes, Constructor Overloading, Static, Final this Keyword, Inheritance: Using Super to Call Super Class Constructor, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using Final with Inheritance. The Object Class Packages & Interfaces: Packages, Access Protection, Importing Package, Interface, Implementing Interfaces, Variables in Interfaces, Interfaces can be Extended. Exception Handling: Fundamentals, Types Checked, Unchecked Exceptions, Using Try & Catch, Multiple Catch, Throw, Throws, Finally Java's Built in Exceptions, User Defined Exception.

Module-II 12 Hrs

Multi-Threading: Java Thread Model, Thread Priorities, Synchronization, creating a Thread, Creating Multiple Threads, Using is Alive () and Join () Wait () & Notify (). String Handling: String Constructors, String Length, Character Extraction, String Comparison, Modifying a String. Java I/O: Classes & Interfaces, Stream Classes, Byte Streams, Character Streams, Serialization, JDBC: Fundamentals, Type I, Type II, Type III, Type IV Drivers. Networking: Basics, Socket Overview, Networking Classes, & Interfaces, TCP/IP Client Sockets, Whois, URL Format, URL Connection, TCP/IP Server Sockets.

Module-III 12 Hrs

Applets: Basics, Architecture, Skeleton, The HTML APPLET Tag, Passing Parameters to Applets, Applet Context and Show Documents (). Event Handing: Delegation Event Model, Event Classes, Event Listener Interfaces, Adapter Classes. AWT: AWT Classes Window Fundamentals, Component, Container, Panel Window, Frame, Canvas, Creating a Frame Window in an Applet, Working with Graphics, Control Fundamentals, Layout Managers, Handling Events by Extending AWT Components. Core Java API package, reflection, remote method invocation (RMI) swing applet, icons & labels, text fields, Buttons, combo boxes, tabbed panes, scroll panes, trees, tables exploring Java-language: Simple type wrappers, runtime memory management, object fusing clone () and the cloneable interface, thread, thread group, runnable.

TEXT BOOK:

1. Introduction to Java Programming: Liang, Pearson Education, 7th Edition.
2. Java the Complete Reference: Herbert Schildt, TMH, 5th Edition.

REFERENCE BOOKS:

1. Balguruswamy, Programming with Java, TMH.
2. Programming with Java: Bhave&Patekar, Person Eduction.
3. Big Java: Horstman, Willey India, 2nd Edition.
4. Java Programming Advanced Topics: Wigglesworth, Cengage Learning.

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DIGITAL ELECTRONICS AND LOGIC DESIGN

(ECE, CSE, IT)
Course code -EC 302

L	T	P	CR.
3	1	0	3

Module I: Binary Codes and Boolean algebra

Analog and Digital, Binary Number System. Addition, Subtraction, Multiplication, Division of binary numbers, Subtraction using 2's complement method. Binary codes: weighted and non weighted codes, self complementary codes, BCD, Excess-3, Gray codes, Alphanumeric codes, ASCII Codes. *Boolean algebra*: Boolean Laws and Expression using Logic Gates, Realization of different gates using Universal gates, DeMorgan's Theorem, Duality Theorems.

Module II: Boolean function minimization Techniques

Standard forms: SOP, POS, Simplification of Switching function & representation (Maxterm & Minterm), Boolean expression & representation using logic gates, Propagation delay in logic gate. *Karnaugh map*: K-map(up to 5 variables), mapping and minimization of SOP and POS expression, Don't care condition, conversion from SOP to POS and POS to SOP form using K-map, Minimization of multiple output circuits, Quine Mc-cluskey method minimization technique, prime implicant table, Don't care condition.

Module III: Combinational Circuits Design

Adder & Subtractor (Half and Full), Parallel Binary adder, BCD Adder, Binary multipliers, Code Converters, parity bit generator, Comparators, Decoder, BCD to 7-segment Decoder, Encoders, Priority Encoders, Multiplexers, De Multiplexers.

Module IV: Sequential Circuits Elements

Introduction to sequential circuit, Flip-flop & Timing Circuits: SR latch, Gated latch, Tri state logic, Edge triggered flip-plop: - D, JK, T Flip-flop, flip-flop asynchronous inputs ,characteristic table of Flip-flop, excitation table of Flip-flop, master slave JK flip flop, inter conversion of Flip-flop. Study of timing parameters of flip-flop. Shift registers: buffer register, controlled buffer register. Data transmission in shift resistor SISO, SIPO, PISO, PIPO, Bidirectional shift register, universal shift registers. *Counter*: Classification, Ripple or asynchronous counter, Effect of propagation delay in ripple counters, up-down counter, Design of Mod-n counter, synchronous counter, Ring counter, Johnson counter. Introduction to FSM. Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator.

Module V: Logic Families and VLSI Design flow

Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices like FPGA, Logic implementation using Programmable Devices VLSI Design flow: Design entry, Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits

***Text Books* :**

1. Kharate "Digital Electronics" OXFORD Publication
2. A. Anand Kumar 'Fundamentals of Digital Circuits'. PHI Publications

3. R.P. Jain-'Modern Digital Electronics' IIIrd Edition- Tata Mc Graw Hill, Publication
4. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
5. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition
6. Bhaskar VHDL BASED DESIGN ,PEARSON EDUCATION

Reference Books:

1. Rajkamal 'Digital Systems Principals and Design' Pearson Education
2. A.P. Malvino, D.P. Leach 'Digital Principles & Applicatios' -VIth Edition-TMH publication.
3. M. Morris Mano 'Digital Design' (Third Edition). PHI Publications

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ENVIRONMENTAL SCIENCE

Course code – BSC 302

L T P CR.

2 0 0 0

(COMMON FOR ALL BRANCH)

Module-1

Concept and scope of Environment science, components of environment, environmental segment and their importance. **(2 Hrs)**

Module-II

Ecology: Ecosystem and its characteristics features, structure and function of forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystem, ecological balance and consequences of imbalance. **(4 Hrs)**

Module-III

Atmosphere: Atmospheric composition, energy balance, climate, weather, depletion of ozone layer, green house effect, acid rain, particles, ions and radicals in the atmosphere, chemical and photochemical reactions in the atmosphere.

Module-IV **(4 Hrs)**

Air pollution and control: Air pollutants, sources and effect of air pollutants, primary and secondary pollutants, photochemical smog, fly ash, inorganic and organic particulate matter. Air quality standards, sampling, monitoring and control measures for pollutants. **(4 Hrs)**

Module-V

Water pollution and control: Aquatic environment, water pollution, sources and their effect, lake and ground water pollution, eutrophication, water quality standard and water pollution control measures, waste water treatment.

Module-VI **(4 Hrs)**

Land pollution; Lithosphere, composition of soil, acid base and ion exchange reactions in soil, soil erosion, landslides, desertification, pollutants (municipal, industrial, commercial, agricultural ,

hazardous solid wastes), origin and effects, collection and disposal of solid wastes, recovery and conversion methods. **(5 Hrs)**

Module-VII

Noise pollution; Noise classification and its sources, effects and measurement, noise pollution hazards, standards and noise pollution control. **(2 Hrs)**

Books and References:

1. Master, G.M Introduction to environment engineering and science, Pearson Education.
2. Nebel, B.J., Environment science, Prentice Hall Inc.
3. Odum, E.P. Ecology: The link between the natural and social sciences. IBH Publishing Company Delhi
4. De, A.K. Environmental Chemistry, Merrut.
5. Sharma B.K Envrionmental Chemistry, Krishna Prakashan Media Merrut.
6. Kaushik, A and Kaushik, C.P. Perspectives in Environmental studies, New Age International Publication.
7. Menon, S.E. Environmental Chemistry.

DATA STRUCTURE LAB

(CSE, IT)

Course code -CS 301P

Course Objective: The objective is to develop linear and non-linear data structure, express different operation on AVL tree, evaluate infix to postfix expression, and apply searching and sorting algorithms in real life applications.

1. C Programs on :
   - Bubble sort
   - Selection sort
   - Insertion sort,
   - Quick sort
   - Heap sort, Merge Sort
2. C Programs on :
   - Sequential Search
   - Binary Search
3. Write a C Program to create a stack using an array and perform
   - Push operation , Pop operation
4. Write a C Program that uses Stack Operations to perform the following:-
   - Converting an infix expression into postfix expression
   - Evaluating the postfix expression

5. Write a C Program to create a queue and perform
   - Push, Pop, Traversal
6. Write a C Program that uses functions to perform the following operations on a single linked list : i)Creation, ii) Insertion, iii) Deletion, iv) Traversal
7. Write a C Program that uses functions to perform the following operations on a double linked list: i)Creation, ii) Insertion, iii) Deletion
8. Write a C Program that uses functions to perform the following operations on a Binary Tree :i) Creation, ii) Insertion, iii) Deletion
9. Write a C Program for Single Source Shortest Paths using Dijkstra's Algorithm
10. Write a C Program for All-Pairs Shortest Paths using Floydd's Algorithm

NOTE : At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

OBJECT ORIENTED PROGRAMMING LAB

(CSE, IT)
Course code -IT 301P

Course Outcome:

1. Able to do program in object-oriented concept.
2. Able to create user defined exception.
3. Able to create GUI.
4. Able to understand JDBC and ODBC concept.

To do various Java Programs on:

1. Introduction, compiling & executing a Java program.
2. Data types & variables, decision control structures: if, nested if etc.
3. Loop control structures: do while, for etc.
4. Classes and objects.
5. Data abstraction & data biding, inheritance, polymorphism.
6. Using concept of package.
7. Threads, exception handlings and applet programs.
8. Interfaces and inner classes, wrapper classes, generics.
9. Programs on JDBC.
10. Creating GUI.

NOTE : At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus

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DIGITAL ELECTRONICS AND LOGIC DESIGN LAB

(ECE, EEE,EE,CSE, IT)
Course code EC 302P

List of Experiments (Minimum 10)

1. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
2. Design & realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer & Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R, J-K, T & D type flip flops.
6. To verify the operation of bi-directional shift register.
7. To design & verify the operation of 3-bit synchronous counter.
8. Design all gates using VHDL.
9. Design a multiplexer using VHDL
10. Design a decoder using VHDL
11. Write VHDL programs for the following circuits, check the wave forms and the hardware generated a. half adder b. full adder
12. Write VHDL programs for the following circuits, check the wave forms and the hardware generated a. multiplexer b. demultiplexer

NOTE : At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus. For VHDL Xilinx software may be used.

COMMUNICATION SKILL LAB

Course code HS301

This lab paper involves interactive practice sessions in Language Lab along with some class lectures to enable the students to be confident enough in language and professional sphere of life.

Module I: Listening Comprehension

To comprehend spoken material in standard Indian English/ British English & American English

- Current situation in India regarding English
- American English Vs. British English

Module II: Phonetics & Phonology

- Introduction to Phonetics & Phonology
- Organs of Speech/ Speech Mechanism
- Pronunciation, Intonation**,** Stress and Rhythm, Syllable division
- Consonants/Vowels/Diphthongs Classification

Module III: Common Everyday Situations: Conversations and Dialogues
Module IV: Communication at Workplace
Module V: Telephonic Conversation

- Introduction
- Listening/Speaking
- Telephonic Skills Required
- Problems of Telephonic Conversation
- Intensive Listening

Module VI: Interviews

- The Interview Process
- Purpose/Planning/Two-way Interaction/Informality
- Pre-interview Preparation Techniques
- Projecting a Positive Image
- Answering strategies

Module VII: Formal Presentations

- Introduction
- Nature/Importance of Presentation
- Planning
- Objective with central idea, main ideas, role of supporting materials
- Handling Stage Fright

Module VIII: Forms of Technical Communication: Technical Report: Definition & importance; Thesis/Project writing: structure & importance; synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; C.V./Resume writing; Technical Proposal: Types, Structure & Draft.

Module IX: Technical Presentation: Strategies & Techniques Presentation: Forms; interpersonal Communication; Class room presentation; style; method; Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion; Humour; Modes of Presentation; Overcoming Stage Fear; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation: Quizzes & Interjections.

Module X: Technical Communication Skills: Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances: Exposition narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and non verbal means.

