With Effect from the Academic Year 2019 – 2020

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
AICTE MODEL CURRICULUM
B.E. (PRODUCTION ENGINEERING)

SEMESTER – III to SEMESTER - IV

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY
(Autonomous Institution under UGC, Affiliated to Osmania University)
Department of Electronics & Communication Engineering
Accredited by NBA and NAAC-UGC, Chaitanya Bharathi (Post), Gandipet,
Hyderabad – 500075

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
AICTE MODEL CURRICULUM
B.E. (PRODUCTION ENGINEERING)

SEMESTER – III

S. No.	Course Code	Title of the Course	Scheme of instruction			Scheme of examination			Credits
			Hours per week			Duration in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1	18MT C05	Mathematics - III	3	1	--	3	30	70	4
2	18MB C01	Engineering Economics and Accountancy	3	--	--	3	30	70	3
3	18ME C03	Material Science and Metallurgy	3	--	--	3	30	70	3
4	18ME C04	Mechanics of Materials	3	1	--	3	30	70	4
5	18ME C10	Fluid Principles and Hydraulic Machines	3	1	--	3	30	70	4
6	18EG M01	Indian Constitution and Fundamental Principles	2	--	--	2	--	50*	Non-Credit
7	18EE A01	Indian Traditional Knowledge	2	--	--	2	--	50*	Non-Credit
PRACTICALS									
8	18ME C05	Material Science and Metallurgy Lab	--	--	2	2	15	35	1
9	18ME C06	Mechanics of Materials Lab	--	--	2	2	15	35	1
10	18ME C11	Fluid Principles and Hydraulic Machines Lab	--	--	2	2	15	35	1
		TOTAL	**19**	**03**	**06**	--	**195**	**455**	**21**

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE – Semester End Examination
* Pass / Fail

18MT C05

MATHEMATICS – III

Instruction	3 Lecture + 1 Tutorial Hours per week
Duration of Semester End Examination	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	4

Objectives:

1. To form PDE and to find its solution.
2. To solve wave and heat equations.
3. To learn the Laplace and Inverse Laplace transforms for solving engineering problems.
4. To learn Fourier transform and Z-transforms for solving engineering problems.
5. Learning the basic concepts of probability and Statistical Analysis.

Outcomes: On successful completion of this course, the students shall be able to

1. Solve Linear and Non-Linear PDE's.
2. Solve One-Dimension Wave and Heat equations and Two Dimension Laplace equation.
3. Find Laplace transform and inverse Laplace transform and can solve Linear Differential equations.
4. Find the solutions ofvarious Transforms.
5. Find moments of discrete and continuous random variables as well as familiar with distribution.

UNIT - I

Partial Differential Equations: Formation of Partial Differential Equations, Solution of First Order Linear Partial Differential Equations by Lagrange's Method, Solution of First Order Non-linear Partial Differential Equationby Standard types and Charpits Method.

UNIT - II

Applications of Partial Differential Equation: Solution by Method of Separation of Variables, Solution of One dimensional Wave equation, One dimensional Heat equation, Two dimensional Laplace equation and its related problems.

UNIT - III

Laplace Transform: Laplace Transform of standard functions, Linearity property, change of scale property. Shifting theorems, Laplace Transform of Periodic Function, Unit step function and Unit impulse function. Transforms of

derivatives, Transforms of integrals, Multiplication by t^n and division by t. Inverse Laplace Transform properties, Inverse Laplace Transform by partial fractions and Convolution theorem, Applications of Laplace Transform (Solution of Linear Differential Equations).

UNIT - IV

Fourier Transforms and Z-Transforms:

Fourier Transforms: Fourier integral theorem (statement), Complex form of Fourier integrals. Fourier transforms, Inverse Fourier Transforms, Fourier Sine and Cosine transforms, Inverse Fourier Sine and Cosine Transforms. Properties of Fourier transforms: Linear property, change of scale property, shifting property and Modulation theorem.

Z-Transforms: Z-transforms of standard functions, linearity property, damping rule, shifting theorems, multiplication by 'n', initial and final value theorems. Inverse Z-Transform:Inverse Z-transform by Convolution theorem, partial fractions. Z-transform application to difference equations.

UNIT - V

Basic Statistics: Random variable, discrete probability distribution and continuous probability distribution. Expectation, Addition theorem and Multiplication theorem of expectation, properties of variance, Poisson distribution (Mean, variance, MGF& CGF), Normal distribution (Mean, variance, MGF& CGF), Properties of Normal distribution, Areas of under normal curve. Correlation and regression.

Textbooks:

1. Erwin kreyszig, "Advanced Engineering Mathematics", 9/e, John Wiley & Sons, 2006.
2. B.S. Grewal, "Higher Engineering Mathematics", 35/e, Khanna Publishers, 2000.
3. Sheldon Ross, "A First Course in Probability", 9/e, Pearson publications, 2014.

Suggested Reading:

1. S. J. Farlow, "Partial Differential Equations for Scientists and Engineers", Dover Publications, 1993.
2. Ian Snedon, "Elements of Partial Differential equations", McGraw Hill, 1964.
3. S.C.Gupta, V.K.Kappoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, 2014.

18MB C01

ENGINEERING ECONOMICS AND ACCOUNTANCY

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Objectives: The objectives of the course are

1. To demonstrate the importance of Managerial Economics in decision making.
2. To understand the importance of project evaluation in achieving a firm's objective.
3. To explain the concept of Accountancy and provided knowledge on preparation and analysis of Final accounts

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

1. Apply fundamental knowledge of Managerial economics concepts and tools.
2. Understand various aspects of demand analysis and forecasting.
3. Analyze production and cost relationships to make best use of resources available.
4. Analyze different opportunities and come out with best feasible capital investment decisions
5. Apply accountancy concepts and conventions and preparation of final accounts

UNIT - I

Introduction to Managerial Economics: Introduction to Economics and its evolution - Managerial Economics - its scope, importance, relationship with other subjects, its usefulness to engineers - Basic concepts of Managerial economics

UNIT - II

Demand and Supply Analysis: Demand Analysis - Concept of demand, determinants, Law of demand, its assumptions, Elasticity of demand, price, income and cross elasticity, Concept of supply, determinants of supply, law of supply, Demand Forecasting – simple numerical problems

UNIT - III

Production and Cost Analysis: Theory of Production, Production function - input-output relations - laws of returns - internal and external economies of scale.

Cost Analysis: Cost concepts - fixed and variable costs - explicit and implicit costs - out of pocket costs and imputed costs - Opportunity cost - Cost output relationship – Firm and industry, types of market structures, Break-even analysis, numerical problems.

UNIT - IV

Accountancy: Book-keeping, principles and significance of double entry book keeping, Journalization, Subsidiary books, Ledger accounts, Trial Balance concept and preparation of Final Accounts with simple adjustments

UNIT - V

Capital Budgeting: Introduction to capital budgeting, Methods: traditional and discounted cash flow methods, Introduction to working capital management, Numerical problems

Text Books:

1. Mehta P.L., "Managerial Economics – Analysis, Problems and Cases", Sultan Chand and Son's Educational publishers, 2016.
2. Maheswari S.N., "Introduction to Accountancy", 11/e, Vikas Publishing House, 2013.
3. Panday I.M., "Financial Management", 11/e, Vikas Publishing House, 2015

Suggested Reading:

1. Varshney and KL Maheswari, "Managerial Economics", Sultan Chand, 2014.
2. M.Kasi Reddy and S.Saraswathi, "Managerial Economics and Financial Accounting", PHI Pvt Ltd, 2007.
3. A.R.Aryasri, "Managerial Economics and Financial Analysis", McGraw-Hill, 2013.

18ME C03

MATERIAL SCIENCE AND METALLURGY

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Objectives: Student will understand

1. Structure property relations, analyze the failures of metals and their prevention.
2. Fatigue, creep and diffusion mechanisms.
3. Classification of steels and their application .
4. Working principle of various heat treatment operations
5. Principles of extractive metallurgy.

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

1. Understand the imperfections of crystals.
2. Understand crack propagation by fatigue, creep deformation and diffusion theory.
3. Understand the importance of steel in engineering applications.
4. Understand to the methods of improvement of mechanical properties by various heat treatment operations
5. Understand the methods of production of various metals by extractive metallurgy

UNIT - I

Plastic deformation: Imperfections in crystals, dislocation in crystals, types of dislocations, effect of slip and twinning on the plastic deformation, cold and hot working, strain hardening and Bauchinger effect, recovery, recrystallization, grain growth and its effect on mechanical properties of metals.

Fracture: Types of fracture in metals, modes of fracture, Griffith theory of brittle fracture, crack propagation, ductile fracture, fracture under combined stress.

UNIT - II

Fatigue: S–N curve, Structure of fatigue fracture specimen. Fatigue crack propagation, effect of metallurgical variables on fatigue of metal, low cycle fatigue, experimental determination of fatigue strength (RR–Moore Test).

Creep: Creep strength, creep curve, creep deformation mechanisms, creep test.
Diffusion: Fick's law of diffusion, application of diffusion theory in mechanical engineering.

UNIT - III

Structure of Alloys: study of eutectic, eutectoid, peritectic and peritectoid reactions, Iron–Iron Carbide equilibrium diagram, construction and interpretation. Types of plain carbon steels, cast irons and their properties and characteristics.

UNIT - IV

Heat Treatment: Annealing, normalising, hardening, tempering, Construction and interpretation of T–T–T diagram, austempering and martempering, case hardening, carburizing, nitriding, carbo–nitriding, flame hardening, induction hardening.

UNIT - V

Introduction to Extractive Metallurgy: Method of production of pig iron by blast furnace, cast iron by cupola furnace, Method of production of steel by Bessemer convertor, L.D process and electric arc process.
Alloy Steels: Effects of alloying elements like nickel, chromium, manganese, silicon tungsten, and titanium, Study about stainless steels, HSS, brass, bronze; their composition and properties.
Polymers and Ceramics: Polymerization, thermoplastics and thermosetting plastics, elastomers, resins. Types and applications of ceramics

Text Books:

1. V. Raghavan, "Materials Science and Engineering", 4/e, Prentice Hall of India Ltd., 2005.
2. S.H. Avner, "Introduction to Physical Metallurgy", 2/e, Tata McGraw Hill Publishers, 2005.

Suggested Reading:

1. S.P. Nayak, "Engineering Metallurgy and Material Science", 6/e, Charoter Publishing House, 2005.
2. E. Dieter, "Mechanical Metallurgy", 3/e,Metric Edition, Tata McGraw Hill, 2005.
3. K.L. Kakani, "Material Science", New Age Publications (P) Ltd., 2008.

18ME C04

MECHANICS OF MATERIALS

Instruction	3 Lecture + 1 Tutorial Hours per week
Duration of Semester End Examination	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	4

Objectives:

1. Student is exposed to the concept of different types of loads, stresses, strains and analysis of members for axial loads.
2. Student will acquire knowledge in drawing bending and shear force diagrams of beams of various loads and configurations.
3. Student becomes familiar with methods of evaluation of deflection of beams of various configurations and stresses that arise due to simple bending.
4. Student is exposed to the concept of shear stresses in beams, principal stresses, strains and phenomenon of torsion.
5. Student will acquire knowledge in estimating stresses for thin, thick cylindrical shells and buckling of columns.

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

1. Determine stresses and strains in members subjected to axial loads and temperature changes.
2. Draw shear force, bending moment diagrams for different types of beams and calculate stresses and strains due to simple bending.
3. Determine slope and deflection for various configurations of beams using different methods. analyze stress, strain and deflection due to torsion in circular members.
4. Analyze shear stress distribution in different sections of beams and find out principal stresses and strains.
5. Find out stresses and strains in thin, thick cylindrical shells and also able to calculate critical buckling loads in columns and struts.

UNIT - I

Stresses and Strains: Definitions, types of stresses and strains, elasticity and plasticity. Hooke's law, stress-strain diagrams for engineering materials, modulus of elasticity. Poisson's ratio, relationship between elastic constants, linear and volumetric strains, bars of uniform strength, temperature stresses, compound bars.

UNIT - II

Beams: Definition of bending moment and shear force; relationship between intensity of loading, shear force and bending moment; bending moment and shear force diagrams for cantilever, simply supported and overhanging beams; simple theory of bending, moment of resistance, modulus of section.

UNIT - III

Slopes and Deflections: Slope and deflection calculations of cantilever, simply supported beams subjected to point loads and uniformly distributed loads with Macaulay's and double integration methods.

Torsion: Derivation of torsion formula for circular sections, power transmission, effect of combined bending and torsion.

UNIT - IV

Shear Stresses in beams: Distribution of shear stresses in rectangular, I-section, T-section, solid and hollow circular sections.

Compound stresses: principal stresses and strains. Mohr's circle of stress.

UNIT - V

Cylinders: Stresses in thin and thick cylinders with internal and external pressures. Stresses in compound cylinders. **Columns and struts**: Euler's and Rankine's formulae for axial load applications. Secant and Perry formulae for eccentrically loaded columns.

Text Books:

1. S.S.Rattan, "Strength of Materials", 3/e, Tata Mc-Graw Hill, 2016.
2. S. Ramamrutham, "Strength of Materials", Dhanpatrai and Sons, 1993.
3. G.H.Ryder, "Strength of Materials", 3/e, Macmillan India Limited, Delhi 2002.

Suggested Reading:

1. S.S. Bhavakatti, "Strength of Materials", Vikas Publication, 2003.
2. James M Gere, "Mechanics of materials", 8/e, cengage learning, 2013.
3. R.C. Hibbeler, "Mechanics of Materials", 9/e, Pearson, 2018

18ME C10

FLUID PRINCIPLES AND HYDRAULIC MACHINES

Instruction	3 Lecture + 1 Tutorial Hours per week
Duration of Semester End Examination	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	4

Objectives: Students will

1. Learn properties of fluids, laws related to fluid flow and their applications.
2. Understand the principles and problems associated with impact force of jet on the vanes
3. Understand various principles and performance characteristics related to Reciprocating pumps.
4. Come to know the working principles and performance characteristics of Centrifugal pumps.
5. Learn the working principle and efficiencies of hydraulic turbines.

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

1. Determine the various properties of fluid and their applications
2. Understand the methodology in calculation of impact force exerted by the jet on the vanes
3. Acquire the knowledge of the functionality and performance of Reciprocating pumps.
4. Understand the working, estimate the performance and testing of Centrifugal pumps.
5. Acquire knowledge in the functionality, performance and testing of hydraulic turbines.

UNIT - I

Properties and Laws of Fluid Flow: Fluids- Fluid properties- Pressure, Density, Specific weight, Specific volume, Dynamic and Kinematic viscosity -Laws of fluid flow-Continuity theorem-Bernoulli's theorem- Venturimeter-Notches-Pitot tube– Darcy's equation - Impulse-momentum equation and applications

UNIT - II

Hydraulic Machines: Classification- Lay-out of hydraulic power plant- working principle- Impact force exerted by a jet striking (i) a fixed flat vertical vane held normal to the jet flow (ii) at the centre of a fixed symmetrical curved vane (iii) at

one end of fixed symmetrical and unsymmetrical curved vanes (iv) flat vertical vane moving in the direction of jet (v) a series of flat vertical moving vanes (vi) at the centre of symmetrical moving curved vanes (vii) symmetrical curved vanes moving in the same direction as that of jet at inlet (viii) at one end of a series of un-symmetrical moving curved vanes. (Numerical problems for above cases only)

UNIT - III

Reciprocating Pumps: Classification- working principle- single and double acting pumps- discharge, work done and power required to drive the pumps- slip, % slip and negative slip- Variation of pressure head in the suction and delivery pipes due to acceleration of piston- Variation of pressure head due to friction in the suction and delivery pipes- Indicator diagrams- Ideal and actual diagrams- Effect of piston acceleration and pipe friction on indicator diagram- Maximum speed at which the pump must run to avoid separation during suction and delivery strokes- Air vessels-Function of air vessels- Work saved by fitting air vessels to single and double acting pumps- Discharge of liquid into and out of air vessels-Performance characteristic curves.

UNIT - IV

Centrifugal Pumps: Classification- Working principle- Comparison over reciprocating pumps-Velocity triangles- Manometric head- work done per second- Head equivalent of work done- Manometric, mechanical and overall efficiencies- Pressure rise in the impeller- Minimum starting speed- Specific speed- Physical significance of specific speed- Model testing- Conditions of similarity of CF pumps- Priming- Performance characteristic curves.

UNIT - V

Hydraulic Turbines: Classification- Impulse and reaction turbines-Construction and working of Pelton wheel, Francis turbine and Kaplan turbine- Velocity triangles- Work done (power developed)- Hydraulic, Mechanical and Overall efficiencies- Maximum efficiency- Specific speed- Physical significance of specific speed-Unit testing -Unit quantities- Model testing of turbines- Conditions for similarity of turbines- Performance characteristic curves.

Text Books:

1. R.K. Bansal, "A Text Book of Fluid Mechanics and Hydraulic Machines", Laxmi Publication (P) Ltd., New Delhi, 2004.
2. R.S. Khurmi and N. Khurmi, "Hydraulics, Fluid Mechanics and Hydraulic Machines", 20/e, S. Chand publishing, 2014

Suggested Reading:

1. P.N. Modi, and. S.M.Seth, "Hydraulics and Fluid Machines", Standard Book House, New Delhi, 2004.
2. S.Ramamrutham, "Hydraulics, Fluid Mechanics and Fluid Machines", Dhanpat Rai and Sons, New Delhi, 2004.
3. Madan Mohan Das., "Fluid Mechanics and Turbomachines", PHI Learning Private Limited, New Delhi, 2009.

18EG M01

INDIAN CONSTITUTION AND FUNDAMENTAL PRINCIPLES

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
SEE	50 Marks
CIE	———
Credits	0

Objectives: The course will introduce the students to

1. The history of Indian Constitution and how it reflects the social, political and economic perspectives of the Indian society.
2. Address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. Have knowledge of the various Organs of Governance and Local Administration.

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

1. Understand the making of the Indian Constitution and its features.
2. Have an insight into various Organs of Governance - composition and functions.
3. Understand powers and functions of Municipalities, Panchayats and Co-operative Societies.
4. Be aware of the Emergency Provisions in India.
5. Understand the Right To equality, the Right To freedom and the Right To Liberty.

UNIT - I

Constitution of India: Introduction and salient features, Constitutional history, Directive principles of state policy - Its importance and implementation.

UNIT - II

Union Government and its Administration: Structure of the Indian Union: Federalism, distribution of legislative and financial powers between the Union and the States, Parliamentary form of government in India. **President**: role, power and position.

UNIT - III

Emergency Provisions in India: National emergency, President rule, Financial emergency

UNIT – IV

Local Self Government: District's Administration Head: Role and Importance. Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.

Panchayati Raj: Introduction, Zilla Panchayat, Elected officials and their roles, CEO Zilla Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments). Village level: Role of Elected and officials.

UNIT – V

Scheme Of The Fundamental Rights & Duties: Fundamental Duties - the legal status.

Scheme of the Fundamental Rights: To Equality, to certain Freedom under Article 19, to Life and Personal Liberty under Article 21.

Text Books:

1. "The Constitution of India", 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar, "Framing of Indian Constitution", 1/e, 2015.

Suggested Reading:

1. M. P. Jain, "Indian Constitution Law", 7/e, Lexis Nexis, 2014.
2. D.D. Basu, "Introduction to the Constitution of India", Lexis Nexis, 2015.

Online Resources:

1. http://www.nptel.ac.in/courses/103107084/Script.pdf

18EE A01

INDIAN TRADITIONAL KNOWLEDGE

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
SEE	50 Marks
CIE	———
Credits	0

Objectives: The course will introduce the students to

1. To get a knowledge in Indian Culture
2. To Know Indian Languages and Literature and the fine arts in India
3. To explore the Science and Scientists of Medieval and Modern India

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

1. Understand philosophy of Indian culture.
2. Distinguish the Indian languages and literature.
3. Learn the philosophy of ancient, medieval and modern India.
4. Acquire the information about the fine arts in India.
5. Know the contribution of scientists of different eras.

UNIT - I

Introduction to Culture: Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India

UNIT - II

Indian Languages, Culture and Literature: Indian Languages and Literature-I: the role of Sanskrit, significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of south India

Indian Languages and Literature-II: Northern Indian languages & literature

UNIT - III

Religion and Philosophy: Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (selected movements only)

UNIT – IV

Fine Arts in India (Art, Technology& Engineering): Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music,

Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India

UNIT – V

Education System in India: Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

Text Books:

1. Kapil Kapoor, "Text and Interpretation: The India Tradition", ISBN: 81246033375, 2005.
2. "Science in Samskrit", Samskrita Bharti Publisher, ISBN-13: 978-8187276333, 2007.
3. NCERT, "Position paper on Arts, Music, Dance and Theatre", ISBN 81-7450-494-X, 2006.
4. S. Narain, "Examinations in ancient India", Arya Book Depot, 1993.
5. Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, 1989.
6. M. Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsidass Publishers, ISBN-13: 978-8120810990, 2014.

Suggested Reading:

1. Kapil Kapoor, "Language, Linguistics and Literature: The Indian Perspective", ISBN-10: 8171880649, 1994.
2. Karan Singh, "A Treasury of Indian Wisdom: An Anthology of Spiritual Learn", ISBN: 978-0143426158, 2016.

18ME C05

MATERIAL SCIENCE AND METALLURGY LAB

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
SEE	35 Marks
CIE	15 Marks
Credits	1

Objectives: Students will

1. Acquire basic knowledge by understanding iron-carbide diagram and its application in engineering.
2. Expose to Metallographic study and analysis of various metals.
3. Acquire knowledge in determining the hardness of metals before and after various Heattreatment operations.
4. Understand differences between different heat treatment methods.
5. Understand the relation between micro structure and properties.

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

1. Identify crystal structure of various metals.
2. Measure hardness and can correlate with microstructure.
3. Perform a suitable heat treatment operation based on desired properties.
4. Underlines the importance of grain size in evaluating the desired mechanical properties.
5. Correlate the heat treatment methods and the mechanical properties obtained.

List of the Experiments

1. Study of: Metallurgical Microscope, Allotropes of Iron, Iron-Iron carbide diagram, Procedure for specimen preparation.
2. Observations for the following specimens - i) Low carbon steels,
   ii) Medium carbon steels, iii) Eutectoid steels, iv) High Carbon steels, v) Stainless steels, vi) Case carburized, vii) HSS, viii) White cast iron, ix) Gray cast iron, x) alleable iron, xi) Spheroidal iron,
   xii) Al–Si alloy and determination of grain size using Image Analyzer.
3. Preparations of the following specimens : i) á " â Brass, ii) Normalised steel iii) Medium carbon steel iv) Nodular cast iron v) Grey cast iron.

4. Heat Treatment Processes
   i) Annealing
   ii) Normalizing
   iii) Hardening.

Text Books:

1. V. Raghavan, "Materials Science and Engineering", 4/e, Prentice Hall of India Ltd., 2005.
2. S.H. Avner, "Introduction to Physical Metallurgy", 2/e, Tata McGraw Hill Publishers, 2005.

Suggested Reading:

1. S.P. Nayak, "Engineering Metallurgy and Material Science", 6/e, Charoter Publishing House, 2005.
2. E. Dieter, "Mechanical Metallurgy", 3/e, Metric Edition, Tata McGraw Hill, 2005.
3. K.L. Kakani, "Material Science", New Age Publications (P) Ltd., 2008.

18ME C06

MECHANICS OF MATERIALS LAB

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
SEE	35 Marks
CIE	15 Marks
Credits	1

Objectives: Students will

1. Demonstrate an understanding of tension, and the relationship between stress, strain and application of Hooke's law.
2. Demonstrate an understanding of types of beams, deflections and measurement of material property through deflections.
3. Demonstrate an understanding of torsion and deformations resulting from torsion.
4. Demonstrate the understanding of hardness and its measurement using different scales like Brinnel and Rockwell.
5. Demonstrate an understanding of measurement of shear modulus and young's modulus for machine members like helical and leaf springs through loading respectively.

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

1. Draw stress-strain curve for an isotropic material and understand the salient features of it.
2. Determine the Young's modulus of various beam materials by conducting load-deflection test and. rigidity modulus of a given shaft specimen by torsion test.
3. Able to find out Young's modulus and shear modulus for mechanical components like leaf spring and closely coiled helical spring through load-deflection test respectively.
4. Evaluate hardness of different materials using different scales
5. Find the compressive and crushing strengths of concrete cubes and bricks.

List of the Experiments

1. Uni-axial tension test using UTM.
2. Brinell's and Rockwell's hardness tests.
3. Load-deflection test on a leaf spring to find out the young's modulus of leaf material.
4. Deflection test on a helical spring to determine the rigidity modulus.

5. Torsion of shaft to determine the rigidity modulus of shaft material.
6. Defection test on a cantilever beam to determine the Young's modulus.
7. Deflection test on a simply supported beam to determine the Young's modulus.
8. Deflection test on propped cantilever to determine the Young's modulus.
9. Deflection test on continuous beam to determine the Young's modulus.
10. Crushing and compression test on bricks and concrete cubes.
11. Measuring mechanical strain in a cantilever beam using strain gages and to compare the results with theoretical strain values calculated from an equation derived from solid mechanics.
12. To measure load (tensile/compressive) using load cell on tutor.

Text Books:

1. S.S.Rattan, "Strength of Materials", 3/e, Tata Mc-Graw Hill, 2016.
2. S. Ramamrutham, "Strength of Materials", Dhanpatrai and Sons, 1993.
3. G.H.Ryder, "Strength of Materials", 3/e, Macmillan India Limited, Delhi 2002.

Suggested Reading:

1. S.S. Bhavakatti, "Strength of Materials", Vikas Publication, 2003.
2. James M Gere, "Mechanics of materials", 8/e, cengage learning, 2013.
3. R.C. Hibbeler, "Mechanics of Materials", 9/e, Pearson, 2018

18ME C11

FLUID PRINCIPLES AND HYDRAULIC MACHINES LAB

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
SEE	35 Marks
CIE	15 Marks
Credits	1

Objectives: Students will

1. Determine discharge of fluid flow.
2. Verify fluid laws like Bernoulli's equation and determine losses through pipes.
3. Determine impact force of jet on the vanes
4. Demonstrate knowledge in evaluating performance characteristics of pumps.
5. Evaluate the performance characteristics of turbines.

Outcomes: On completion of the course, the students will be able to

1. Carry out discharge measurements
2. Determine the energy loss in conduits.
3. Calculate forces and work done by a jet on fixed or moving, flat and curved blades.
4. Evaluate the performance characteristics of pumps.
5. Demonstrate the characteristics curves of turbines.

List of the Experiments:

1. Verification of Bernoulli's equation.
2. Determination of Darcy's friction factor and nature of water flow through pipes.
3. Determination of Cd for V- notch.
4. Determination of Cd for rectangular notch.
5. Determination of Cd for Venturimeter.
6. Determination of Cd for Orifice meter.
7. Determination of impact force of jet on fixed flat and fixed curved vanes.
8. Performance and characteristic curves of Reciprocating pump.
9. Performance and characteristic curves of Centrifugal pump.
10. Performance and characteristic curves of Self-priming pump.
11. Performance and characteristic curves of Gear pump.

12. Performance and characteristic curves of Pelton wheel.
13. Performance and characteristic curves of Francis Turbine under constant speed and variable speed conditions.
14. Performance and characteristic curves of Kaplan turbine under constant speed and variable speed conditions.

Note: A minimum 12 Experiments need to be conducted.

Text Books:

1. R.K. Bansal, "A Text Book of Fluid Mechanics and Hydraulic Machines", Laxmi Publication (P) Ltd., New Delhi, 2004.
2. R.S. Khurmi and N. Khurmi, "Hydraulics, Fluid Mechanics and Hydraulic Machines", 20/e, S. Chand publishing, 2014

Suggested Reading:

1. P.N. Modi, and. S.M.Seth, "Hydraulics and Fluid Machines", Standard Book House, New Delhi, 2004.
2. S.Ramamrutham, "Hydraulics, Fluid Mechanics and Fluid Machines", Dhanpat Rai and Sons, New Delhi, 2004.
3. Madan Mohan Das., "Fluid Mechanics and Turbomachines", PHI Learning Private Limited, New Delhi, 2009.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
AICTE MODEL CURRICULUM
B.E. (PRODUCTION ENGINEERING)

SEMESTER – IV

S. No.	Course Code	Title of the Course	Scheme of instruction			Scheme of examination			Credits
			Hours per week			Duration in Hours	Maximum Marks		
			L	T	P/D		CIE	SEE	
THEORY									
1	18CS C05	Basics of Data Structures	2	--	--	2	20	50	2
2	18ME C07	Kinematics of Machines	3	1	--	3	30	70	4
3	18ME C08	Thermodynamics	3	1	--	3	30	70	4
4	18ME C09	Principles of Management	3	--	--	3	30	70	3
5	18PE C03	Metal Casting and Welding	3	--	--	3	30	70	3
6	18CE M01	Environmental Science	2	--	--	2	--	50*	Non-Credit
PRACTICALS									
7	18CS C08	Basics of Data Structures Lab	--	--	2	2	15	35	1
8	18EG C03	Soft Skills Lab	--	--	2	2	15	35	1
9	18PE C04	Metal Casting and Welding Lab	--	--	2	2	15	35	1
		TOTAL	**16**	**02**	**06**	--	**185**	**435**	**19**

L: Lecture T: Tutorial D: Drawing P: Practical
CIE - Continuous Internal Evaluation SEE – Semester End Examination
* Pass / Fail

18CS C05

BASICS OF DATA STRUCTURES

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
SEE	50 Marks
CIE	20 Marks
Credits	2

Objectives: To introduce
1. Basic linear and non-linear data structures.
2. Analyzing the performance of operations on data structures.
3. Different sorting and searching techniques and their complexities.

Outcomes: The Student will be able to
1. Understand the basic concepts of data structures.
2. Understand the notations used to analyze the performance of algorithms.
3. Choose and apply an appropriate data structure for a specified application.
4. Understand the concepts of recursion and its applications in problem solving.
5. Demonstrate a thorough understanding of searching and sorting algorithms.

UNIT - I
Introduction: Data Types, Data structures, Types of Data Structures, Operations, ADTs, Algorithms, Comparison of Algorithms, Complexity, Time- space tradeoff.
Recursion: Introduction, format of recursive functions, recursion Vs. Iteration, examples.

UNIT - II
Linked Lists: Introduction, Linked lists and types, Representation of linked list, operations on linked list, Comparison of Linked Lists with Arrays and Dynamic Arrays.

UNIT - III
Stacks and Queues: Introduction to stacks, applications of stacks, implementation and comparison of stack implementations. Introduction to queues, applications of queues and implementations, Priority Queues and applications.

UNIT - IV

Trees: Definitions and Concepts, Operations on Binary Trees, Representation of binary tree, Conversion of General Trees to Binary Trees, Representations of Trees, Tree Traversals, Binary search Tree.

UNIT - V

Graphs: Introduction, Applications of graphs, Graph representations, graph traversals, Minimal Spanning Trees.

Searching and Sorting: Linear searching, binary Searching, sorting algorithms-bubble sort, selection sort, quick sort, heap sort.

Text Books:

1. Narasimhaarumanchi, Data Structures and Algorithms Made Easy, CareerMonk Publications, 2017
2. S. Sahni and Susan Anderson-Freed, Fundamentals of Data structures in C,E.Horowitz, Universities Press, 2nd Edition.
3. ReemaThareja, Data Structures using C, Oxford University Press.

Suggested Reading:

1. D.S.Kushwaha and A.K.Misra, Data structures A Programming Approach with C, PHI.
2. Seymour Lipschutz, Data Structures with C, Schaums Outlines, Kindle Edition

Online Resources:

1. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
2. https://www.edx.org/course/foundations-of-data-structures
3. https://sites.google.com/site/merasemester/data-structures/data-structures-1#DS

18ME C07

KINEMATICS OF MACHINES

Instruction	3 Lecture + 1 Tutorial Hours per week
Duration of Semester End Examination	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	4

Objectives: Students will acquire knowledge in

1. Fundamental definitions of kinematics of mechanism.
2. Drawing velocity and acceleration diagrams for various mechanisms
3. Working principles of brake and dynamometers
4. Drawing displacement diagrams for various types of followers with various types of motions.
5. Estimation of transmission of power by belts and application of various gears and gear trains.

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

1. Basic elements of mechanisms and their motion characteristics.
2. Designing a suitable mechanism depending on application.
3. Principles involved in functioning of brake and dynamometer
4. Drawing displacement diagrams and cam profile diagram for followers executing different types of motions and various configurations of followers.
5. Selecting gear and gear train depending on application.

UNIT - I

Introduction: Definition of link, element, pair, kinematic chain, mechanism and machine, Grubler's criterion, single and double slider chains, inversions of quadratic chain, inversions of single and double slider crank chains. Mechanism with lower pairs and straight line motion mechanism, Pantograph and Geneva mechanisms. Ackerman and Davis steering gear mechanisms and Hooke's Joint. Peaucellier, Hart, Scott-Russel, Watt and Tchebicheff mechanisms.

UNIT - II

Analysis of mechanisms: Graphical methods to find velocities of mechanisms, instantaneous centre, body centre and space centre, Kennedy's theorem, graphical determination of acceleration of different mechanisms including Coriolis component of acceleration, analytical method to find the velocity and

acceleration, analysis of four bar mechanism with turning pairs, Freudenstein's method for synthesis of four bar linkage.

UNIT - III

Laws of Friction: Friction in screw threads, pivots, collars, Clutches - Single and Multi plate, Cone and centrifugal clutches. Friction circle and friction axis of a link.

Brakes and Dynamometers: Block or shoe, band and block, internal expanding shoe brake, Prony, rope brake, belt transmission, torsion dynamometers.

UNIT - IV

Cams: Types of cams and followers, displacement diagrams for followers, uniform motion, parabolic motion, simple harmonic motion, cycloidal motion, drawing cam profile with knife edge follower, translating roller follower and translating flat follower. Cams of specified contours, tangent cam with roller follower, circular arc (convex) cam with roller follower.

UNIT - V

Gears: Classification of gears, spur gears, nomenclature, law of gear tooth action, involute as gear tooth profile, interference of involute gears, minimum number of teeth to avoid interference, contact ratio, cycloidal tooth profile, comparison of involute and cycliodal tooth profile. **Helical Gears**: Helical gear tooth relations, contact of helical gear teeth,

Gear trains: Gear trains–simple and compound, reverted and epicyclic gear trains. Differential of an Automobile.

Text Books:

1. Thomas Bevan, "Theory of Machines", CBS Publishers, 2009.
2. S.S. Rattan, "Theory of Machines", 4/e, Tata McGraw Hill Publishers, 2013.
3. J.E.Shigley, "Theory of Machines", 3/e, Tata Mc.Graw Hill Publishers, New Delhi, 2005.

Suggested Reading:

1. C.S. Sharma and Kamlesh Purohit, "Theory of Mechanisms and Machines", PHI Learning Pvt. Limited, 2006.
2. Amitabh Ghosh and A.K.Mallik, "Theory of Machines", 3/e, East West Publications, 2009.

18ME C08

THERMO DYNAMICS

Instruction	3 Lecture + 1 Tutorial Hours per week
Duration of Semester End Examination	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	4

Objectives: Students will understand

1. Basic definitions of thermodynamics and significance of Zeroth law of thermodynamics.
2. The importance and application of first law of thermodynamics.
3. The principles associated with second law of thermodynamics.
4. Properties of pure substances and use of Mollier diagram.
5. Various air standard cycles, vapour power cycles and their importance.

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

1. Estimate the temperature of different scales of thermometers.
2. Apply the first law of thermodynamics to various thermodynamic processes.
3. Understand the meaning of perpetual motion of machine of second kind and its significance.
4. Read data from steam tables, Mollier diagram and its applications.
5. Distinguish working principles of various air standard cycles, vapour power cycles and determine air–fuel ratios required for combustion of fuels

UNIT - I

Introduction: Thermodynamics, Macroscopic and Microscopic approaches, thermodynamic systems, properties, processes and cycles, thermodynamic equilibrium, quasi – static process, measurement of pressure, Zeroth law of thermodynamics and its significance, measurement of temperature, reference points, ideal gas equation.

UNIT - II

First Law of Thermodynamics: Concept of heat and work, first law of thermodynamics for closed system, energy- a property of the system, application of first law to various thermodynamic processes like isobaric, isochoric, isothermal, adiabatic and polytropic, definition of enthalpy, PMM1, first law

applied to flow processes, application of SFEE to nozzle and diffuser, throttling device, turbine and compressor.

UNIT - III

Second Law of Thermodynamics: Limitations of first law of thermodynamics, Kelvin–Planck and Clausius statements of second law of thermodynamics, PMM2, equivalence of Kelvin-Planck and Clausius statement, reversible and irreversible processes, Carnot theorem, Clausius inequality, calculation of entropy change during various thermodynamic processes, principle of entropy increase, T–S diagrams, application of entropy principle for mixing of two fluids. Helmholtz and Gibb's functions.

UNIT - IV

Thermodynamic Properties of Fluids: Properties of pure substances, p– v diagram, p–T diagram, p–v–T surface, T–s diagram, h–s diagram, dryness fraction, use of steam tables, Maxwell relations.

UNIT - V

Air Standard Cycles: Air standard cycles - Otto, Diesel, Dual Combustion Cycles, working principle, derivation of expression for air standard efficiency, comparison of otto, diesel and dual cycles-for the same compression ratio, for the same maximum pressure and temperature.

Vapour Power Cycles: Vapour power cycles - Carnot cycle, Simple Rankine cycle.

Fuels and Combustion: Characteristics of an ideal fuel, classification of fuels, Stoichiometric air-fuel ratio, equivalence ratio, relation between volumetric and gravimetric analysis.

Text Books:

1. P.K. Nag, "Engineering Thermodynamics", 5/e, Tata McGraw Hill Publishers, 2013.
2. D.S. Kumar, "Thermal science and Engineering", 4/e, S. K.Kataria and Sons, 2013.
3. D.P.Mishra, "Engineering Thermodynamics", Cengage Learning, 2012.
4. Y.A. Cengel and M.A. Boles, "Thermodynamics: An Engineering Approach", 7/e, Tata McGraw Hill Publishers, 2014.

Suggested Reading:

1. R.K. Rajput, "Thermal Engineering", 8/e, Laxmi Publications (P) Ltd, 2011.
2. Mahesh M Rathore, "Thermal Engineering", Tata McGraw Hill Publishers, 2013.

18ME C09

PRINCIPLES OF MANAGEMENT

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Objectives: To make the students to

1. Understand basic fundamentals and insights of management
2. Understand the nature and purpose of planning
3. Gain the knowledge about the frame work of organizing
4. Understand the essence and significance of directing
5. Recognize the importance of controlling and its outcomes

.

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

1. Identify and evaluate the principles of management
2. Demonstrate the ability to have an effective and realistic planning
3. Identify the nature and the type of organization
4. Apply the tools and techniques of directing
5. Explain and evaluate the necessity for controlling and further refinement of an organization.

UNIT - I

Management: Definition of management**,** science or art, manager vs entrepreneur; managerial roles and skills;. Evolution of management, Basic management theories by FW Taylor, Henry Fayol, Types of Business Organizations, sole proprietorship, partnership, company, public and private enterprises; Organization culture and environment; Current trends and issues in management

UNIT - II

Planning: Nature and purpose of Planning, types of Planning, objectives, setting objectives, policies, Strategic Management, Planning Tools and Techniques, Planning plant location and layout, Decision making steps & processes.

UNIT - III

Organizing: Nature and purpose of Organizing, formal and informal organization, organization structure, types, line and staff authority, departmentalization, delegation of authority, centralization and decentralization, job design, human

resource management, HR planning, Recruitment selection, Training & Development, Performance Management, Career planning and Management

UNIT - IV

Directing: Individual and group behavior, motivation, motivation theories, motivational techniques, job satisfaction, job enrichment, leadership, types & theories of leadership, effective communication.

UNIT - V

Controlling: system and process of controlling, budgetary and non-budgetary control techniques, use of computers and IT in management control, productivity problems and management, control and performance, direct and preventive control, reporting.

Text Books:

1. S.P. Robins and M. Couiter, "Management", 10/e., Prentice Hall India, 2009.
2. JAF Stoner, RE Freeman and DR Gilbert, "Management", 6/e., Pearson Education, 2004.

Suggested Reading:

1. P.C. Tripathy & P.N. Reddy, "Principles of Management", Tata McGraw Hill, 1999
2. Harold Koontz and Cyril O'Donnell "Principles of Management'', Tata McGraw Hill, 2017.

18PE C03

METAL CASTING AND WELDING

Instruction	3 Hours per week
Duration of Semester End Examination	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Objectives: To enable the students to

1. Impart knowledge about principles/methods of casting with detail design of gating/riser system needed for casting
2. Provide adequate knowledge of molding sand properties, melting furnaces , defects and quality test methods conducted on casted components
3. Provide knowledge of various special casting processes
4. Impart knowledge of various arc welding processes
5. Provide knowledge about other welding processes, weldability and defects in welding

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

1. Design the pattern, gating system and riser for a simple casting.
2. Understand various properties of molding sand, furnaces used in foundry, and defects in casting
3. Describe various special casting processes
4. Describe various arc welding processes.
5. Compare various arc, resistance, solid state and other welding processes.

UNIT - I

Pattern design and Methoding: Introduction, classification, pattern design: types of patterns, pattern materials, pattern allowances, gating system, purpose, elements, requirements, types of gates, choke, gating ratio, types of gating systems, gating system design, Risering: purpose, requirements, chvorinov's rule, optimum shape and dimensions of riser, riser design by Caine's method, modulus method and NRL method.

UNIT - II

Moulding, Melting, Defect Analysis and Inspection Techniques: Moulding sand: ingredients, types of sand clays, additives, moulding sand preparation, required properties, Core: purpose, core prints, core sand preparation, core preparation,

chaplets, types of cores, net force on the core Melting furnaces: Cupola, Induction and Arc furnace, casting defects and remedies, inspection and testing of castings

UNIT - III

Special Casting Processes: Gravity die casting pressure die casting, centrifugal casting, shell moulding, investment casing, continuous casting, slush casting, lost foam process, squeeze casting, vacuum moulding ,CO_2 moulding and ceramic moulding

UNIT - IV

Arc Welding: Introduction, classification of welding processes, physics of arc, DCSP, DCRP, AC, arc initiation, arc stability, parts of arc, arc length characteristics, static V-I characteristics of power sources, duty cycle, shielded metal arc welding, submerged arc welding, Gas tungsten arc welding, Plasma arc welding, Atomic Hydrogen welding.

UNIT - V

Other Welding Processes: Resistance welding: spot, projection, seam, butt and percussion welding, Oxy-Acetylene welding, Thermit welding, laser beam welding, electron beam welding, Soldering and Brazing, weld defects, solid state welding, forge welding, friction welding, ultrasonic welding, explosive welding, weldability, effect of various parameters on weldability and weld defects

Text Books:

1. P.N. Rao, "Manufacturing Technology", 3/e, Vol. 1, Tata McGraw Hill Publishers, 2011.
2. Amitabh Ghosh and Mallick, "Manufacturing science", 4/e, Assoc. East West Press Pvt. Ltd., 2011.
3. Schey, "Introduction to Manufacturing Processes", 2/e, McGraw Hill Education.

Suggested Reading:

1. Roy A. Lindberg, "Materials and Process of Manufacturing", 5/e, Prentice Hall of India, 1992.
2. Serope Kalpak Jian, "Manufacturing Engineering and Technology", Addition, Wesley Publishing company, 2006.
3. Mikeli P. Grover, "Fundamentals of Modern Manufacturing Materials", 3/e, Processes and Systems, Wiley A.

18CE M01

ENVIRONMENTAL SCIENCE

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
SEE	50 Marks
CIE	———
Credits	0

Objectives: To enable the student

1. Identify environmental problems arising due to engineering and technological activities and the science behind those problems.
2. Become aware about the importance of eco system and biodiversity for maintaining ecological balance
3. To identify the importance of interlinking of food chain
4. Learn about various attributes of pollution management and waste management practices.
5. To make the students contribute for capacity building of nation for arresting and/or managing environmental

Outcomes: At the end of the course, the student should have learnt

1. To define environment, identify the natural resources and ecosystems and contribute for the conservation of bio-diversity.
2. To suggest suitable remedial measure for the problems of environmental pollution and contribute for the framing of legislation for protection of environment.
3. To relate the social issues and the environment and contribute for the sustainable development.
4. To follow the environmental ethics.
5. To contribute for the mitigation and management of environmental disasters.

UNIT - I

Environmental Studies: Definition, Scope and importance, need for public awareness.

Natural Resources: Use and over utilization of Natural Resources - Water resources, Food resources, Forest resources, Mineral resources, Energy resources, Land resources.

UNIT - II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem, role of producers, consumers and decomposers, energy flow in an ecosystem, food chains, food webs, ecological pyramids, Nutrient cycling, Bio-geo chemical cycles, Terrestrial and Aquatic ecosystems

UNIT - III

Biodiversity: Genetic, species and ecosystem biodiversity, Bio-geographical classification of India, India as a Mega diversity nation. Values of biodiversity, hot-spots of biodiversity, threats to biodiversity, endangered and endemic species of India, methods of conservation of biodiversity.

UNIT – IV

Environmental Pollution: Cause, effects and control measures of air pollution, water pollution, marine pollution, soil pollution, noise pollution and Solid waste management, nuclear hazards

Environmental Legislations: Environment protection Act, Air, Water, Forest & Wild life Acts, issues involved in enforcement of environmental legislation, responsibilities of state and central pollution control boards

UNIT – V

Social Issues and the Environment: Water conservation methods: Rain water harvesting and watershed management, Environmental ethics, Sustainable development and Climate change: Global warming, Ozone layer depletion, forest fires, and Contemporary issues.

Text Books:

1. Y. Anjaneyulu,"Introduction to Environmental Science", B S Publications, 2004.
2. Suresh K. Dhameja, "Environmental Studies", S. K. Kataria & Sons, 2009.

Suggested Reading:

1. C. S. Rao," Environmental Pollution Control Engineering", Wiley, 1991.
2. S. S. Dara, "A Text Book of Environmental Chemistry &Pollution Control", S. Chand Limited, 2006.

18CS C08

BASICS OF DATA STRUCTURES LAB

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
SEE	35 Marks
CIE	15 Marks
Credits	1

Objectives:

1. Design and construct simple programs by using the concepts of data structures as abstract data type.
2. To have a broad idea about how efficiently pointers can be used in the implement of data structures.
3. To enhance programming skills while improving their practical knowledge in data structures.
4. To strengthen the practical ability to apply suitable data structure for real time applications.

Outcomes: The Student will be able to

1. Implement the abstract data type.
2. Implement linear data structures such as stacks, queues using array and linked list.
3. Understand and implement non-linear data structures such as trees, graphs.
4. Implement various kinds of searching, sorting and traversal techniques.
5. Identify the suitable data structure for real world problem.

List of Experiments for Non-CSE/IT:

1. Implementation of operations on arrays
2. Implementation of Stack.
3. Implementation of Queue.
4. Implementation of basic operations on Single Linked List .
5. Implementation of Searching techniques.
6. Implementation of Sorting Techniques
7. Case study like Banking System, Students Marks Management, Canteen Management etc

Text Books

1. Brian W Kernighan, Dennis Ritchie, "C Programming Language", 2/e, PH PTR.
2. Richard M Reese, "Understanding and Using C Pointers O`Reily", 2013.

WebLinks

https://nptel.ac.in/courses/106102064/

18EG C03

SOFT SKILLS LAB

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
SEE	35 Marks
CIE	15 Marks
Credits	1

Objectives: The course will introduce the students to

1. Imbibe an impressive personality, etiquette, professional ethics & values, effective time management & goal setting.
2. Understand the elements of professional update & upgrade through industry exposure in a mini-live project. Understand confidence building strategies and thereby to make effective presentations through PPTs.
3. Learn what constitutes proper grooming and etiquette in a professional environment. Acquire the necessary skills to make a smooth the practical ability to apply suitable data structure for real time applications.

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

1. Be assertive and set short term and long term goals. Also learn to manage time effectively and deal with stress.
2. Win in professional communication situations and participate in group discussions with confidence. Write abstracts.
3. Write effective resumes. Plan, prepare and face interviews confidently.
4. Adapt to corporate culture by being sensitive - personally and sensible - professionally. Draft an SOP.
5. Apply the soft skills learnt in the mini-live project, by collecting and analyzing data and making oral and written presentations on the same.

Exercise 1:
Main Topics: Thinking Skills, Personality Development – Effective Time Management, setting realistic goals, self confidence and assertiveness, stress management, moral values.
Flipped Sessions: Personal Sensitivity & Professional Sensibility (Reading & Discussion)

Writing Input: Writing to Express - Drafting & Delivering a Speech (Free Writing Exercise)
Exercise 2:
Main Topics: Advanced Group Discussion with Case studies : Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
Flipped Sessions: Importance of Professional Updating & Upgrading (Reading & Discussions)
Writing Input: Writing with Precision - Writing Abstracts

Exercise 3:
Main Topics: Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, mock interviews. Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skills.
Flipped Sessions: Mock Interviews (Video Sessions & Practice)
Writing Input: Writing to Reflect - Resume Writing

Exercise 4:
Main Topic: Corporate Culture – Grooming and etiquette, communication media, academic ethics and integrity
Flipped Sessions: Corporate Culture, Etiquette & Grooming (Video Sessions & Practice through Role-play)
Writing Input: Writing to Define - Writing an effective SOP.

Exercise 5:
Main Topic: Mini Project – General/Technical. Research, developing a questionnaire, data collection, analysis, written report and project seminar. Elements & Structure of effective presentation. Presentation tools – Body language, Eye-contact, Props & PPT.
Flipped Sessions: Effective Presentations (Video & Writing Sessions, Practice through Emulation)
Writing Input: Writing to Record - Writing minutes of meeting.

Suggested Reading:

1. Madhavi Apte , "A Course in English communication", Prentice-Hall of India, 2007.
2. Dr. Shalini Verma, "Body Language- Your Success Mantra", S Chand, 2006.

3. Ramesh, Gopalswamy, and Mahadevan Ramesh, "The ACE of Soft Skills", New Delhi: Pearson, 2010.
4. Van Emden, Joan, and Lucinda Becker, "Presentation Skills for Students", New York: Palgrave Macmillan, 2004.

* Flipped Class-room: Students explore the concept first and then trainer explains it, students work on their own.

Web Resources:

1. https://www.goskills.com/Soft-Skills
2. https://www.trainerbubble.com
3. https://www.skillsconverged.com

18PE C04

METAL CASTING AND WELDING LAB

Instruction	2 Hours per week
Duration of Semester End Examination	2 Hours
SEE	35 Marks
CIE	15 Marks
Credits	1

Objectives: To enable the students to

1. Deploy the knowledge to prepare the mould for a single piece and split patterns.
2. Impart the knowledge of properties of the moulding sand and analyze the same.
3. Develop knowledge of the bead geometry and study effect of the input parameters.
4. Identify and distinguish the types of the flame in gas welding and applications
5. Develop knowledge to use TIG, MIG and Spot welding machines and experiment with them.

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Outcomes: Students will be able to

1. Prepare the mould for a single piece and split patterns.
2. Test the moulding sand and analyze the same.
3. Test the bead geometry and correlate the results to the input parameters.
4. Distinguish the type of the flame and recommend for different materials.
5. Use TIG, MIG and Spot welding machines and experiment with them.

.

List of the Experiments:

Casting

1. Design and manufacturing of a simple pattern with various allowances.
2. Green sand moulding practice for a single piece pattern.
3. Green sand moulding practice for a split pattern with a horizontal core.
4. Moulding sand testing: GCS, GSS, DCS and DSS Permeability and shatter index.
5. Finding out the GFN, Moisture content and clay content for a given sand sample.
6. Melting and Pouring of Aluminum.

7. Dimensional inspection and visual inspection of the casting and analysis of dimensional variation and defects.

Welding

1. Study of gas welding equipment and process. Identification of flames, making Butt joint with gas welding.
2. Study of Arc welding process, comparison of the bead geometry with DCSP, DCRP and A.C.
3. Study of resistance welding process and plot the variation of spot area with time and current variation.
4. Study of TIG welding process and plotting cooling curve in TIG welding process.
5. Study of SAW Welding process and finding out deposition efficiency of the process.
6. Study of MIG welding process and testing of weld bead formed by MIG welding.

Note: Minimum 10 Experiments need to be conducted by choosing any 5 from each section.

Text Books:

1. P.N.Rao, "Manufacturing Technology", 3/e, Vol.1, Tata McGraw Hill Publ., 2011.
2. Amitabh Ghosh and Mallick, "Manufacturing Science", 4/e, Assoc. East West Press Pvt. Ltd., 2011.

Suggested Reading:

1. Schey, "Introduction To Manufacturing Processes" , 2/e, McGraw - Hill Education.
2. Serope Kalpakjian, "Manufacturing Engineering and Technology", Addition, Wesley Publishing Company, 2006.
3. Mikell P.Grover, "Fundamentals of Modern Manufacturing Materials", 3/e, Processes and Systems, Willey A.