For the academic batch 2021-2025
Effective from A.Y. 2022-23

SCHEME OF INSTRUCTION AND EXAMINATION

B.E. (Civil Engineering) - III SEMESTER

S. No.	Course Category	Course Title	Scheme of Instruction				Scheme of Examination		Credits
			L	T	Pr/Drg	Total Hours	CIE	SEE	
Theory Courses									
1	2BS303HS	Mathematics – III	3	1	-	4	40	60	4
2	2HS302HS	Managerial Economics & Financial Accountancy	3	-	-	3	40	60	3
3	2ES301CS	Programming for Problem Solving (C)	3	-	-	3	40	60	3
4	2PC301CE	Building Materials and Concrete Technology	3	-	-	3	40	60	3
5	2PC302CE	Solid Mechanics	3	-	-	3	40	60	3
6	2PC303CE	Surveying	3	-	-	3	40	60	3
7	2MC302HS	Essence of Indian Traditional Knowledge	2	-	-	2	40	60	-
Practical Courses									
8	2ES351CS	Programming for Problem Solving Laboratory (C)	-	-	2	2	40	60	1
9	2PC351CE	Surveying Laboratory	-	-	2	2	40	60	1
10	2PC352CE	Concrete Technology Laboratory	-	-	2	2	40	60	1
		Total	**20**	**1**	**6**	**27**			**22**

ENGINEERING MATHEMATICS –III

(Common to CE & MECH)

Semester III	**L**	**T**	**P**	**Credits**
Subject code: 2BS303HS	**3**	**1**	**0**	**4**

Prerequisites: Basic Differentiation, Integration and Trigonometric results.

Course Objectives:	**Course Outcomes**:
The objective of this course is to make the student ➢ To learn an alternative methods and analytical methods in mathematical concepts. ➢ To apply numerical techniques in solving ordinary differential equations. ➢ To study Interpolation and numerical methods to fit a curve ➢ To formulate and solve partial differential equations. ➢ To study physical applications of partial differential equations	After completion of the course, the student will be able to **CO1**. Find the solution of algebraic and transcendental equations using numerical methods. **CO2.** Apply numerical techniques to solve ordinary differential equations and definite integrals. **CO3.** Apply numerical methods to interpolate values and fit different curves from given data. **CO4** Find solutions of first order linear and nonlinear partial differential equations. **CO5** Apply the solution of partial differential equations to physical problems.

UNIT 1: (10 Lecture Hours)

Numerical Solutions of Algebraic and Transcendental Equations: Introduction, Bisection Method, Regula-False method, Iteration method and Newton Raphson method. Solving linear system of equations by Gauss-Jacobi and Gauss-Seidel method.

UNIT 2: (10 Lecture Hours)

Numerical integration: Trapezoidal Rule, Simpson‟s 1/3rd and 3/8th Rule.

Numerical solutions of Ordinary Differential Equations: Solution of ordinary differential equations by Taylor's Series, Picard‟s method of Successive approximations, Euler‟s and Modified Euler‟s methods, Fourth Order Runge-Kutta Method.

UNIT 3: (10 Lecture Hours)

Interpolation: Newton's Forward and Backward difference interpolations, Lagrange's interpolation, Newton's divided difference interpolation. Curve Fitting: Fitting a linear, second degree, exponential curve by method of least squares for the discrete data.

UNIT 4: (10 Lecture Hours)

Partial Differential Equations: Formation of first and second order partial differential equations, solution of first order equations, Lagrange's equation, Nonlinear first order equations, Charpit's method, higher order linear equations with constant coefficients

UNIT 5: (10 Lecture Hours)

Applications to Partial Differential Equations: Classification of linear second order partial differential equations, Separation of variables method, solution of one-dimensional heat and wave equations, Laplace's equation.

TEXTBOOKS:

T1. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publications, 44th Edition, 2018.
T2. M. K. Jain, S. R. K. Iyengar and R. K. Jain, "Numerical Methods for Science and Engineering Computation", 6th Edition, New Age International Publishers. 2020

REFERENCES/ SUGGESTED READING:

R1. B.V. Ramana, "Higher Engineering Mathematics", 3rd Edition, McGraw Hill Publishers, 2015.
R2. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley, 9th Edition, 2012.
R3. S. S. Sastry, "Introductory Methods of Numerical Analysis", 5th Edition, PHI Learning Pvt. Ltd. 2018

Course code	Course Title	Core/Elective					
2HS302HS	MANAGERIAL ECONOMICS & ACCOUNTING	Core					
		L	T	P/D	Credits	SEE	CIE
		3	-	-	3	40	60

Prerequisites: Basic Mathematics and Economics

Course Objectives:	Course Outcomes:
The objective of this course is to impart knowledge of the ➢ To understand responsibilities of a manager of a business undertaking. ➢ To analyze various determinants influencing demand and price ➢ To understand the principles of accounting and prepare Journal, Ledger, Trial Balance & Final accounts ➢ To understand financial statement Analysis ➢ To evaluate & analyze the long-term investments	After completion of the course, the student will be able to **CO1.** Determine the responsibilities & decision making in the organization **CO2.** Describe various factors influencing demand & price in market **CO3.** Explain the principles of accounting and shall be able to prepare & solve problems in journal, ledger, trial balance & final accounts **CO4.** Analyse the financial statement and performance of the company **CO5.** Explain the capital structure & to take decision on selection of projects and long-term investment

UNIT-I

Introduction to Managerial Economics its Scope, Importance and relation to other sciences, its usefulness to Engineers-Basic concepts of Managerial Economics - Theory of firm.

UNIT-II

Demand Analysis: Introduction to demand, determinants, law of demand, its assumptions, Elasticity of demand-price, income and cross elasticity, demand forecasting, Market competitive structure, price & output determination under perfect competition and Monopoly.

UNIT-III

Basics of Accounting: Financial Accounting–Definition- Accounting Cycle - Journal - Ledger and Cash book - Trial Balance Book- Preparation of final accounts with simple adjustments (including Problems)

UNIT-IV

Financial statement Analysis**:** - Importance-Users-Ratio Analysis-liquidity, solvency, turnover and profitability ratios.

UNIT-V

Capital management: Significance, determinates and estimation of fixed and working capital requirements, sources of capital. Introduction to capital budgeting, Time Value of money - Methods: Non-Discounted cash flow methods (pay back, ARR), Discounted (NPV, PI, IRR) with problems.

Text books:

T1. P. L. Mehta, "Managerial Economics", 21st Revised Edition, Sultan Chand & Sons Publishers
T2. I. M. Panday, "Financial Management", 10th Edition, Vikas Publishing House.

Reference Books:

R1. R.L.Varshney, K.L.Maheshwari, "Managerial Economics", Sultan Publishers
R2. Maheswari S.N., "Introduction to Accountancy", 9th Edition, Vikas Publishing House

Course code	Course Title	Core/Elective					
2ES301CS	PROGRAMMING FOR PROBLEM SOLVING	Core					
		L	T	P/D	Credits	SEE	CIE
		3	-	-	3	40	60

Course Objectives: The objective of this course is to impart knowledge of

- To introduce the basic concepts of Computing environment, algorithms and flowcharts
- To acquire knowledge about the basic concept of writing a program
- To understand modular and structured programming constructs in C
- To learn the concepts of arrays and applying in various techniques like searching, sorting.
- To learn the usage of structured data types and memory management using pointers

Course Outcomes: After completion of the course, the student will be able to:

CO.1 Formulate simple algorithms for arithmetic and logical problem.

CO.2 Implement conditional branching, iteration and recursion.

CO.3 Decompose a problem into functions and synthesize a complete program using divide andconquer approach.

CO.4 Use arrays, pointers, structures and file management to solve real world problems.

CO.5 Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

Unit – I (Hours :11)

Introduction to computing: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Algorithm, Flowchart / Pseudo code with examples

Introduction to C Language: History of C, Features, Structure of C program, Character set, Tokens, Data types, I/O statements, Type conversion Syntax and Logical Errors in compilation, object and executable code

Unit – II (Hours: 11)

Operators and Control Structures: Operators, Operator precedence, Arithmetic expressions, Conditional Branching and Loops, Writing and valuation of conditionals and consequent branching

Arrays: Arrays (1-D, 2-D), Character arrays and Strings

Unit – III (Hours: 10)

Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble and Selection), Finding roots of Equations.

Functions: Functions (including using built in libraries), storage Classes, Parameter passing in functions, call by value. Passing arrays to functions, idea of call by reference

Unit – IV (Hours: 10)

Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series.

Structure: Structures, Defining structures and Array of Structures, Unions concept

Unit – V (Hours: 8)

Pointers: Idea of pointers, Defining pointers, dynamic memory allocation, Use of Pointers in self-referential structures, notion of linked list (no implementation), command line arguments.

File Handling: Introduction to File Handling, Types of files, File operations, File input/output statements.

Textbooks

T1. Behrouz A. Forouzan and Richard F. Gilberg, "Computer Science A structured programming approach using C", Cengage Learning, 2007, Third Edition (Unit 1-5)

T2. Byron Gottfried, "Schaum's Outline of Programming with C", McGraw-Hill ,2019, Fourth Edition (Unit 1-5)

References/Suggested Reading

R1. E. Balaguruswamy, "Programming in ANSI C", Tata McGraw-Hill, 7th Edition, 2017 (Unit 1-5)

R2. Yashvant Kanetkar, "Let us C", BPB publications, 16th Edition, 2017.

R3. A.K Sharma, "Computer fundamentals and programming," Universities press, 2nd Edition, 2018.

Course code	Course Title	Core/ Elective					
2PC301CE	Building Materials and Concrete Technology	Core					
		L	T	P/D	Credits	SEE	CIE
		3	0	0	3	40	60

Course Objectives: The objective of this course is to make the student

- Understand physical properties and uses of various building materials
- Distinguish different types of paints, varnish and distemper.
- To understand the behavior of fresh and hardened concrete
- To understand the factor affecting the workability and strength of concrete
- To impart the methods of proportioning of concrete mixtures

Course Outcomes: After completion of the course, the student will be able to

CO.1. **Differentiate** between various building materials i.e., both conventional and smart building materials

CO.2. **Explain** the process of plastering, pointing and damp proofing.

CO.3. **Describe** the properties of fresh Concrete & Hardened Concrete

CO.4. Explain the procedure for testing of concrete materials and on fresh and hardened concrete as per IS code

CO.5. **Design** the concrete mix according to requirements of IS, BIS and ACI codes.

Unit-I: (10 Hrs)

Building Blocks: Conventional bricks, light weight bricks, hollow building blocks, Load bearing and non-load bearing blocks. Importance and Uses of Fly ash bricks. Provisions of IS 2572.

Timber: Uses and types of timber. Seasoning and its importance.

Paints, Varnish and Distemper: Characteristics of good paints, Bases, vehicles, thinners and coloring pigments. Painting of different types of surfaces; types of varnish, and application. Types of distemper, and application.

Unit-II: (10 Hrs)

Cement: Portland cement- chemical composition- Hydration of cement and hydration products- Heat of Hydration and Rate of hydration -Test on physical properties- Different grades of cement- Types of cements.

Aggregates: Classification of aggregate- Particle shape & texture- Bond, Strength & other mechanical properties of aggregate- Specific gravity, Bulk density, Porosity, adsorption & moisture content of aggregate- Bulking of sand- Deleterious Substance of aggregate- Soundness of aggregate- Sieve analysis- Fineness modulus- Grading curves- Grading of fine & coarse Aggregates- Gap graded aggregate- Maximum aggregate size.

Admixtures: Types of admixtures-mineral and chemical admixtures, water reducing agents.

Reinforcing steel: Types of reinforcement, specifications, storage and handling.

Unit-III: (8 Hrs)

Mortar: Types of mortar, preparation, setting and curing.

Plastering and Pointing: Types of plastering, preparation of surfaces, and defects. Types of pointing, preparation of surfaces.

Damp Proofing: Causes of dampness, effects of dampness, methods of damp proofing

Unit-IV: (10 Hrs)

Fresh Concrete: Workability- Factors affecting workability- workability tests- Setting times of concrete- Effect of time and temperature on workability- Segregation & bleeding- Mixing and vibration of concrete- Steps in manufacture of concrete, revibrating, types of curing.

Hardened Concrete: Water/Cement ratio- Abram's Law- Gel space ratio- effective water in the mix short term and long-term properties of hardened concrete and stress strain curves of concrete

Testing of Hardened Concrete: Compression tests- Tension tests- Flexure tests - non-destructive testing methods-Rebound hammer test-ultrasonic pulse velocity test

Unit-V: (10 Hrs)

Elasticity Creep & Shrinkage: Modulus of elasticity- Poisson's ratio- Creep of concrete- Factors influencing creep- Relation between creep & time- Nature of creep- Effects of creep- Shrinkage - types of shrinkage

Mix Design: Factors in the choice of mix proportions- Proportioning of concrete mix - IS method of mix design – British and ACI method of mix design.

Text Books

T1. S. P. Arora and S. P. Bindra, "Text book on Building Construction", Dhanpat Rai Publishing Co Pvt Ltd, 2014.
T2. M. S. Shetty, A. K. Jain, "Concrete Technology: Theory and Practice", 8th Edition, S Chand Publishing, 2018.

References/ Suggested Reading

R1. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, "Building Construction", 11th Edition, Laxmi Publications, 2016
R2. M. L. Gambhir, "Concrete Technology", 5th Edition, Tata Mc-Graw Hill Publishers, New Delhi, 2017.

Course code	Course Title	Core/ Elective					
2PC302CE	Solid Mechanics	Core					
		L	**T**	**P/D**	**Credits**	**SEE**	**CIE**
		2	1	0	3	40	60

Prerequisite: Engineering Mechanics

Course Objectives:

The objective of this course is to impart knowledge of

- Mechanical properties of materials & the stresses and strains in axially loaded members
- Evaluating shear forces and bending moments in beams,
- Bending stresses and shearing stresses in beams, combined direct and bending stresses short columns
- Evaluating compound stresses, principal stresses and planes, evaluation of stresses & strains in thin-walled pressure vessels
- Pure torsion theory and application to different types of springs

Course Outcomes:

After completion of the course, the student will be able to

CO1. Apply the fundamental concepts of stress and strain in the analysis and design of axially loaded members

CO2. Analyze determinate beams to construct shear force diagram and bending moment diagrams

CO3. Determine the bending and shear stress distribution in beams and also the stresses in members subjected to combined axial and bending loads.

CO4. Analyze the compound stresses at a point and evaluate principal stresses and **apply** in evaluating stresses in cylindrical pressure vessels

CO5. Evaluate the stresses of circular members subjected to torsion and analyze different types of springs.

Unit-I: (08 Hrs)

Mechanical properties of materials: Elasticity, Plasticity, Brittleness, Ductility, Malleability, Strength, toughness, hardness etc.

Simple Stresses and Strains: Definitions of stresses and strains, Hooke's Law, Modulus of Elasticity, Stress-Strain curve for ductile & brittle materials & concrete, Elastic constants, compound bars and temperature stresses.

Unit-II: (12 Hrs)

Shear Force and Bending Moment: Different types of beams and loads, shear force and bending moment diagrams for cantilever, and simply supported beams with and without over hangs subjected to different kinds of loads viz., point loads, uniformly distributed loads, uniformly varying loads and couples.

Bending Stresses in Beams: Assumptions in theory of simple bending, Derivation of flexure equation, Moment of resistance, calculation of stresses in statically determinate beams for different loads and different types of structural sections.

Unit-III: (08 Hrs)

Shear Stress in Beams: Derivation of equation of shear stresses, distribution across rectangular, circular, T and I section.

Direct and Bending Stresses: Direct loading, Eccentric loading, limit of eccentricity, Core of sections, rectangular and circular, solid and hollow sections

Unit-IV: (08 Hrs)

Compound Stresses: Stresses on oblique planes, principal stresses and planes. Mohr's circle of stress.

Application to pressure vessels: Thin cylinders subjected to internal fluid pressure, volumetric change. Thick Cylinders: Lame's equations, stresses under internal and external fluid pressures, Compound cylinders, Shrink fit pressure.

Unit-V: (08 Hrs)

Torsion: Theory of pure torsion in solid and hollow circular shafts, shear stress, angle of twist, strength and stiffness of shafts, Transmission of Power. Combined torsion and bending for determination of principal stresses and maximum shear stress. Equivalent bending moment and equivalent twisting moment.

Springs: Close and open coiled helical springs under axial load and axial twist, Carriage springs.

Text Books

T1. R. C. Hibbler, "Mechanics of Materials (SI Edition)," 9th Edition, Pearson, 2018.
T2. R. K. Bansal, "A Textbook of Strength of Materials: Mechanics of Solids (S.I. Units), 6th Edition, Laxmi Publications Pvt. Ltd., 2018

Reference Books:

R1. Ferdinand P Beer, E. Russell Johnston Jr., John T. DeWolf, David F. Mazurek and Sanjeev Sanghi, "Mechanics of Materials (SI Edition)," 8th Edition, McGraw-Hill, 2020.
R2. R. Subramanian, "Strength of Materials", 3rd Edition, Oxford University Press, New Delhi, 2016.

Course code	Course Title	Core/ Elective					
2PC303CE	Surveying	Core					
		L	T	P/D	Credits	SEE	CIE
		3	0	0	3	40	60

Prerequisite: Basic Mathematics

Course Objectives:	**Course Outcomes**:
The objective of this course is to impart knowledge of ➢ Conventional to latest surveying technologies ➢ Working principles of surveying equipment ➢ Measurement of distances, Angles, Areas and Volumes using various instruments ➢ Setting out methods of Horizontal and vertical curves ➢ Basics of advanced surveying concepts like Photogrammetry, GIS, GPS and Remote Sensing	After completion of the course, the student will be able to **CO1.** Explain the terminologies and concepts involved in basic and modern surveying equipment & technologies. **CO2.** Demonstrate the working principles and applications of basic and modern surveying instruments **CO3.** Apply the knowledge of surveying & levelling in calculating lengths, bearings, reduced levels, elevation differences and plotting. **CO4.** Apply the knowledge of theodolite and trigonometry in finding horizontal and vertical angles, heights of inaccessible points **CO5.** Make use of knowledge of curves concept in surveying, in setting out both horizontal and vertical curves.

Unit-I: (6 Hrs)

Classification and principles of surveying;

Linear Measurements: Accessories for linear measurements; Principle of Chain surveying; Scales; Offset; Cross staff.

Angular Measurements: Types of meridians; Bearing systems and conversions; magnetic declination; Fore & Back Bearings; definition of local attraction; Traversing - Open & Closed traverse.

Plane Table surveying: Accessories of Plane Table; Advantages & Disadvantages of Plane Tabling.

Unit-II: (14 Hrs)

Levelling: Definitions; Dumpy and Auto level; Temporary Adjustment of level; Types of levelling operations; Curvature & refraction corrections; Sensitiveness of bubble tube; Reciprocal levelling; Calculation of reduced level - HI & Rise and fall methods.

Contouring: Characteristics and uses of contours

Computation of Areas - Using Simpson's and Trapezoidal rule;

Computation of Volumes - Using Simpson's and Trapezoidal rule for a Level Section.

Electronic Distance Measurement: Principle and Types of EDM instruments

Total station: Parts of a Total Station, Advantages and Applications; Field Procedure for total station survey

Unit-III: (12 Hrs)

Theodolite Survey: Introduction to Theodolite; Definitions; Fundamental lines of a Theodolite; Temporary Adjustments; Measurement of horizontal and vertical angle; Coordinates & their computations, Omitted measurements; Trigonometric levelling: Calculations of elevations and distances of accessible and inaccessible objects by single and double plane methods.

Unit-IV: (12 Hrs)

Curves: Theory of simple curves, setting out of simple curves by linear and angular methods; Elements of simple, compound & Reverse curves; Elements of Transition curve: length of transition curve; Vertical Curves-Types of vertical curves - Length of vertical curve

Unit-V: (6 Hrs)

Photogrammetric Surveying: Vertical, Tilted and oblique photographs; Flying height and Scale of a Vertical Photograph

Global Positioning Systems: Segments; GPS measurements; errors.

Remote Sensing*:* Introduction; Classification of remote sensing; Idealised Remote sensing system

Geographic Information System*:* Definition; Components of GIS; Recent trends and applications of GIS

Text Books

T1. Punmia, B. C., Ashok. K. Jain, & Arun. K. Jain. "Surveying-Vol. 1", 17th Edition, Laxmi Publications Pvt Limited 2022

T2. Punmia, B. C., Ashok. K. Jain, & Arun. K. Jain. "Surveying-Vol. 2", 16th Edition, Laxmi Publications Pvt Limited 2019

Reference Books:

R1. Basak, N. N. "Surveying & Levelling", 2nd Edition, McGraw-Hill Education, 2021.

R2. Anji Reddy, M., "Remote Sensing and Geographical Information System", 4th Edition, B.S. Publications, 2012

Course code	Course Title	Core/ Elective					
2MC302HS	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (Common for all branches)	Core					
		L	T	P/D	Credits	CIE	SEE
		3	1	0	0	40	60

Course Objectives: The objective of this course is:

- To reinforce the students understanding with the pan-Indian heritage in terms of culture, traditions and knowledge.
- To impart understanding of the importance of the roots of the traditional knowledge and types.
- To impart basic knowledge on the evolution of the multiple languages that highlight India's diversity.
- To know Indian Languages, Philosophies, Religion, Literature, Fine arts and Technology.
- To explore the Ancient Science, Scientists in Medieval and Modern India; the education system.

Course Outcomes: After completion of the course, the student will be able to

CO.1 Understand the concepts of Indian culture and Traditions and their importance.

CO.2 Distinguish the Indian languages and literature

CO.3 Learn the philosophy of ancient, medieval and modern India.

CO.4 Acquire the information about the fine arts in India

CO.5 Know the contribution of scientists of different eras, interpret the concepts and the importance to

protect Intellectual property of the nation

Unit-I: (10 Hrs)

-Dawn of human civilization and evolution of various cultures

-Introduction to 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: (12 Hrs)

Indian Languages, Culture and Literature:

Indian Languages and Literature-I: the evolution and 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: (10 Hrs)

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: (10 Hrs)

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. Their relation in terms of modern scientific perspective.

-Protection of traditional knowledge, significance, value to economy

-role of government in protection of indigenous knowledge and technology; protection of traditional knowledge bill, 2016.

Unit-V: (8 Hrs)

Education System in India:

-Education in ancient, medieval and modern India

-Aims of education, subjects, languages, National Education Policy.

-Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

Text Books

T1. Kapil Kapoor and Avadhesh Kumar Singh, "Indian Knowledge Systems" (2 Vols-Set), Published by D K Print world, 2007

T2. Basanta Kumar Mohanta and Vipin K. Singh, "Traditional Knowledge System and Technology in India", 2012

References/ Suggested Reading

R1. Nitin Singhania, "Indian Art and Culture," 4th Edition, 2021

R2. S. Narain, "Education and Examination Systems in Ancient India", Kalpaz Publications, 2007.

R3. M. Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsidass Publishers, New Delhi, 2005

R4. Samskrita Bharati, Science in Samskrit, Published by Samskrita Bharati, New Delhi, India, 2007

R5.1.7-Position paper, National Focus Group on Arts, Music, Dance and Theatre NCERT, March 2006, ISBN 81-7450-494-X, NCERT, New Delhi, 2010.

R6. Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, New Delhi, 1989

Course code	Course Title	Core/Elective					
2ES351CS	PROGRAMMING FOR PROBLEM SOLVING LAB	Core					
		L	T	P/D	Credits	SEE	CIE
				2	1	40	60

Prerequisite: Mathematical Knowledge, Logical and Analytical Thinking

Course Objectives: The objective of this course is to make the student

- Understand the fundamentals of programming in C Language.
- Write, compile and debug programs in C.
- Formulate solution to problems and implement in C.
- Effectively choose programming components to solve computing problems

Course Outcomes: After completion of the course, the student will be able to

CO1. Choose appropriate data type for implementing programs in C language

CO2. Design and implement modular programs involving input output operations, decision making and looping constructs

CO3. Apply the concept of arrays, pointers for implementing programs and string handling

CO4. Design and implement programs to store data in structures and files

CO5. Develop confidence for self-education and ability for lifelong learning need for computer languages

List of Experiments:

1. Finding maximum and minimum of given set of numbers, finding roots of quadratic equation.
2. Sin x and Cos x values using series expansion.
3. Generating Pascal triangle, pyramid of numbers.
4. Factorial, Fibonacci, GCD recursive and non-recursive procedures
5. Linear search and binary search using recursive and non-recursive procedures.
6. Bubble sort and selection sort.
7. Matrix addition and multiplication using arrays,
8. Programs on pointers: pointer to arrays, pointer to functions.
9. Programs on structures and string manipulations.
10. File handling programs.

Note: Minimum eight experiments has to be done

Text Books

T1. Yashvant Kanetkar, "Let us C", BPB publications, 16th Edition, 2017.

T2. A.K Sharma, "Computer Fundamentals and Programming", Universities press, 2nd Edition, 2018.

Course code	Course Title	Core/ Elective					
					Core		
2PC351CE	**Surveying Laboratory**	**L**	**T**	**P/D**	**Credits**	**SEE**	**CIE**
		0	0	1	1	40	60

Prerequisite: Basic Mathematics

Course Objectives:	**Course Outcomes**:
The objective of this course is to make the student ➢ Handle the various surveying instruments and to take measurements from them. ➢ Understand the procedure of taking readings and of extracting the terrain information ➢ Familiar and competent enough to develop map in suitable scale by using different surveying instruments like total station, dumpy level, global positioning system (GPS) etc.	After completion of the course, the student will be able to **CO1.** Demonstrate the working principles and handling procedures of basic surveying instruments like chain, cross staff in finding out linear measurements **CO2.** Demonstrate the levelling instruments and apply the knowledge of levelling in finding out the reduced levels of ground **CO3.** Demonstrate the working principles and handling procedures of theodolite, total station and Hand-held GPS **CO4.** Make use of surveying equipment in computing lengths, areas & bearings of given field work **CO5.** Apply the knowledge of trigonometrical levelling in finding out reduced levels of elevated objects which are both accessible and inaccessible points

List of Experiments:

1. Find out the area using chain and cross staff surveying.
2. Introduction to levelling: Differential levelling using dumpy/Auto level
3. Profile and cross-sectional levelling using Dumpy/Auto level
4. Measurement of horizontal angles by repetition / reiteration methods using Vernier Theodolite.
5. Measurement of vertical angle: Application to simple problems of height and distance by measuring angle of elevation and depression
6. Single plane method: Determination of R.L. of an elevated Object using two Instrument Stations which are placed in a same vertical plane- when the base of the Object is inaccessible.
7. Two plane method: Determination of R.L. of an elevated Object using two Instrument Stations which are not placed in the same vertical plane- when base of the Object inaccessible.
8. Introduction to Total station and applications: Application to simple problems of height and distance by measuring angle of elevation and depression and determination of R.L of the target object.
9. Total station and applications: Determination of area enclosed in a closed traverse having minimum 5 stations
10. Global Positioning System (GPS): Determination of Latitude and Longitude of any four stations and computation of the area.

Text Books

T1. Punmia, B. C.,Ashok. K. Jain, & Arun. K. Jain. "Surveying-Vol. 1", 17th Edition, Laxmi Publications Pvt Limited 2022
T2. Punmia, B. C.,Ashok. K. Jain, & Arun. K. Jain. "Surveying-Vol. 2", 16th Edition, Laxmi Publications Pvt Limited 2019

Reference Books:

R1. http://nptel.ac.in/
R2. http://vlab.co.in/

Course code	Course Title	Core/ Elective					
2PC352CE	Concrete Technology Laboratory	Core					
		L	T	P/D	Credits	SEE	CIE
			0	2	1	40	60

Prerequisite: Knowledge of Building materials

Course Objectives: The objective of this course is to make the student

- Conduct tests on cement
- Conduct tests on Fine Aggregate and Coarse Aggregate
- Conduct tests on concrete in fresh state
- Conduct tests on hardened concrete in hardened state
- Evaluate the strength and quality of concrete

Course Outcomes:

After completion of the course, the student will be able to

CO.1. Determine the properties of given cement sample and assess its suitability for use in construction.

CO.2. Determine the properties of fine and coarse aggregate samples to assess their suitability for use in construction works.

CO.3. Measure the workability of concrete and recommend its suitability for structural works.

CO.4. Determine the compressive strength of concrete

CO.5. Conduct destructive and non-destructive tests to evaluate the quality and strength of concrete.

List of Experiments:

1. Determination of the specific gravity of the given cement sample
2. Determination of the standard consistency of the given cement sample
3. Determination of the initial setting time and final setting time of the given cement sample
4. Determination of the bulking of Fine Aggregate
5. Determination of the bulk density, void ratio, porosity and specific gravity of given Fine
6. Determination of the bulk density, void ratio, porosity and specific gravity of given coarse Aggregate
7. Determination of the fineness modulus of Fine Aggregate
8. Determination of the fineness modulus of Coarse Aggregate
9. Determination of the slump & compaction factor of concrete mix (Workability)
10. Determination of the compressive strength of concrete cubes
11. Demo on Non-destructive testing of concrete specimen

Text Books

T1. M.S. Shetty, “Concrete Technology- Theory & Practice”, S. Chand & Company Publishers.
T2. IS 10262:2019,” Indian Standard Concrete Mix Proportioning – Guidelines”