Scheme of Teaching and Examination for
III Semester DIPLOMA in CIVIL ENGINEERING BRANCH

THEORY

SL. No	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION SCHEME						
			Periods per Week	Periods in one Session	Hours of Exam.	Terminal Exam. (A) Marks	Final Exam. (B) Marks	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
1	Professional Mathematics	00301	6	60	3	20	80	100	26	36
2	Engineering Mechanics	00302	4	50	3	20	80	100	26	36
3	Computer Programming Through 'C	00303	4	50	3	20	80	100	26	36
4	Hydraulic & Fluid Mechanics	15304	4	60	3	20	80	100	26	36
5	Soil Mechanics	15305	4	60	3	20	80	100	26	36
	Total :-		22					500		

PRACTICAL

SL. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION SCHEME					
			Periods per Week	Periods in one Session	Hours of Exam.	Marks Internal Exam. (A)	Marks External Exam. (B)	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
6	Engineering Mechanics Lab.	00306	4	50	3	10	40	50	16	21
7	Computer Programming Through 'C	00307	6	60	3	10	40	50	16	21
	Total :-		10					100		

SESSIONAL

SL. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION SCHEME			
			Periods per Week	Periods in One Session	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject
8	Hydraulic & Fluid Mechanics	15308	4	50	20	30	50	25
9	Soil Mechanics Lab.	15309	4	50	20	30	50	25
10	Disaster management	15310	2	30	20	30	50	25
	Total :-		10				150	

Total Periods per Week	42	Total Marks	750

PROFESSIONAL MATHEMATICS

Subject Code	Theory			No of Period in one session : 60		
00301	**No. of Periods Per Week**			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	06	00	00	Internal Exam.	:	20

Rationale:

A technical diploma holder is engaged generally as first line supervisor. He forms a bridge between workers and management. He has to understand the language of the modern management and communicate with the workers in their language. This subject will help accomplishment of the task in stipulated time, develop attitude towards cost effectiveness, selection of most effective alternative methods. This course will also help the student to tackle different numerical methods and computational techniques for problem solving in research organization as a programmer.

Objective:

The course enables students to.

- Managerial skill based on mathematical footing
- The ability to find approximate solutions and/or answers to the problems where analytical methods become more complex.
- To choose correct numerical techniques for a given problem.

S.No.	Topics	Periods
01	GROUP –A (Numerical Methods)	**(20)**
02	GROUP-B (Statistical Techniques)	**(20)**
03	GROUP-C (Management Techniques)	**(20)**
	Total:	**(60)**

CONTENTS:

GROUP-A   (NUMERICAL METHODS)   **(20)**

01.01   Introduction to Numerical methods: Approximation and errors (Truncation & Round off).

01.02   Numerical solutions of non-linear and Transcendental equations: Iterative methods. Newton-Raphson's method. Bisection method and Regula-Falsi method.

01.03   Solution of Linear Simultaneous Equations: Gaussian Elimination method and Gauss-Jordan method.

01.04   Finite Difference: Backward and forward Differences. Finite Difference Interpolation Formula. Newton's Forward Difference formula and Newton's Backward Difference formula.

01.05   Numerical Differentiation & Integration: Newton's forward and backward differentiation formula. Trapezoidal Rule and Simpson's 1/3 rule for numerical integration.

01.06   Difference equations. simple problem Only

GROUP-B   (STATISTICAL TECHNIQUES)   **[20]**

02.01   Introduction to statistics: Measure of central tendencies: measures of dispersions: standard deviation and variance for discrete and grouped data: assumed mean and step deviation methods.

02.02   Theory of Probability: Random events and their types. Probability of Events. Definitions. Laws of Probability (Addition and Multiplication Laws)

02.03   Probability Distribution: Introduction to Arithmetic Mean and Standard Deviation of a probability distribution. Important probability distribution – Binomial distribution. Poisson's distribution & Their means and variance.

GROUP-C   (MANAGEMENT TECHNIQUES)   **[20]**

03.01   Linear Models

03.01.01   Introduction to Operations Research (O.R) Steps of O.R.

03.01.02   Linear Programming Problems: Formulation of a LPP. Mathematical Modelling and Solution by graphical method.

03.01.03   Solution by Simplex Method: Basic Feasible Solution (Degenerator and Non-degenerator)

03.01.04   Transportation problem: Introduction and Solution Procedure-

      (i)   Finding the initial basic feasible solution by N-W Corner Rule, Least cost method and Vogel's Approximation Method.

      (ii)   Test of optimality by **u-v** method only.

03.01.05   Assignment Problem: Introduction and Solution Procedure–Fundamental theory underlying Hungarian Method.

03.02   Network Analysis. CPM & PERT: Introduction.

03.02.01   Basic concepts – Activities. Nodes. Edges. Networking of a project. Various times calculations. CPM to determine the optimal project schedule.

03.02.02   PERT- Definition, difference between CPM & PERT. Pessimistic times, optimistic times. Most likely times of various activities.

Books Recommended: Text Books

1.   Operations Research. Sultan Chand & Sons, New Delhi, 1990   -   Kanti Swaroop. P.K Gupta and Man Mohan
2.   Operations Research. Sultan Chand & Sons, New Delhi, 1990   -   Heera & Gupta
3.   Operations Research. Macmillan Publishing Co. New York, 1982   -   H.A.Taha
4.   Computer based numerical algorithm, East West Press, 1975   -   E.V Krishna Murthy & S.V. Sen
5.   Computer oriented numerical method, Prentice Hall India, 1980   -   V. Rajaraman

ENGINEERING MECHANICS

Subject Code	Theory			No of Period in one session : 50		
00302	**No. of Periods Per Week**			**Full Marks**	**:**	**100**
	L	**T**	**P/S**	**Annual Exam.**	**:**	**80**
	04	**00**	**00**	**Internal Exam.**	**:**	**20**

Rationale:

The subject forms an important part of Engineering curricula for developing the concepts required in the design of various structures. The subject deals with the basic concept of mechanic of body and the behaviour of material used in practice and in structures under varying load conditions. The first part of the subject deals with the applied mechanics science. Which describe the condition of body in rest or motion under the action of forces. In its preview come variety of general and specialized engineering disciplines concerned with analysis of structures and machines and the mechanism of their parts.

In the Second part, the principles of strength of materials is introduced in which the student will learn to distinguish between different types of stress and strain and also the qualitative assessment of stress and strains in material element under the action of internal forces.

Objective:

Knowledge Workers will be able to:

- Analyze and understand the physical behaviour of members of engineering structures.
- Acquire knowledge of various elements of structures.
- Utilise the basic principles.
- Develop skill to tackle field problem.
- Solve the problems by the application of basic principles.
- Judge the suitability of materials in design process.

S.No.	Topics	Periods
	PART-A	
01	Introduction	(02)
02	Vector Methods	(02)
03	Introduction to system of forces and equilibrium	(06)
04	Friction	(04)
05	Kinematics and kinetics of a particle	(03)
06	Kinematics and kinetics of rigid body	(02)
07	Impulse and Momentum	(02)
08	Work, Energy and Power	(04)
	Total :	**(25)**
	PART-B	
01	Simple stress and strains	(07)
02	Elastic constants	(03)
03	Center of Gravity (Centroid)	(02)
04	Moment of Inertia	(05)
05	Shearing force and bending moments	(08)
		(25)
	Total :	**(50)**

CONTENTS:
PART-A
TOPIC: 01 – INTRODUCTION: [02]
Idealisation of mechanics; Concept of rigid body; External forces (Body forces & surface forces) Law of Mechanics.
TOPIC: 02 VECTOR METHODS: [02]
Equality and equivalence of vectors; Free and Bound vector; Moment of a force about a point and a line; Couple and moment of a couple.

TOPIC: 03 – INDTRODUCTION TO SYSTEM OF FORCES AND EQUILIBRIUM: [06]

Statically equivalent force system; simplest equivalent of a system of forces; force analysis, free body diagram, equation of equilibrium.

TOPIC: 04 – FRICTION: [04]
Basic Concept of different Friction (Static, Dynamic, Sliding, Rolling, Fluid).
TOPIC: 05 – KINEMATICS AND KINETICS OF A PARTICLE: [03]
Rectilinear and curvilinear translations; normal and tangential component of acceleration.
TOPIC:06 – KINEMATICS AND KINETICS OF RIGID BODY: [02]
Simple concept of Angular Velocity and angular acceleration. Effective forces on a rigid body. D' Alembert's principle.
TOPIC:07 – IMPULSE AND MOMENTUM: [02]
Linear impulse and linear momentum, angular impulse and angular momentum, definitions only;
TOPIC: 08 – WORK, ENERGY AND POWER: [04]
Work done by forces and couples, potential and kinetic energy, work-energy; conservation of energy; concept of power and efficiency.

PART-B
TOPIC: 01 – SIMPLE STREES & STRAIN: [07]

01.01	Definition of various terms and their units (S.I. Units)
01.02	Stress and strain due to axial load and transverse load relation between stress and strain. Hook's law. Studies of stress strain curve. Factor of safety & working stress. Concepts of isotropic materials.
01.03	Stress & strain in simple section & composite bar. Stress & strain due to temperature variation.
01.04	Shrinking on hoop's stresses.

TOPIC: 02 – ELASTIC STRESS & STRAIN: [03]

02.01	Linear strain and lateral strain, poisson's ratio, volumetric strain
02.02	Change in volume due to axial, biaxial & triaxial loading. Bulk modulus.
02.03	Shear stress and strain, modulus of rigidity.
02.04	Simple shear. Complementary shear stress.
02.05	Various Relations among modulus of elasticity, modulus of rigidity & bulk modulus.

TOPIC: 03 – CENTER OF GRAVITY (CENTROID): [02]

03.01	Definition of center of gravity & centroid.
03.02	Determination of C.G of various sections symmetrical and unsymmetrical sections.
03.03	Determination of C.G. of perforated sections.

TOPIC: 04 – MOMENT OF INERTIA: [05]

04.01	Definition of M.I.; radius of gyration, second moment of area.
04.02	Parallel axis theorem & perpendicular axis theorem.
04.03	Derivation of M.I. of regular area-rectangular, triangular circular about centroidal axis.
04.04	M.I. of built up section, symmetrical and unsymmetrical about centroidal axis, modulus of sections.

TOPIC: 05 – SHEARING FORCE & BENDING MOMENT: [08]

05.01	Types of beams and types of supports, types of loading.
05.02	Concept and definitions of shear force and bending moment, sign convention.
05.03	Shear force and bending moment diagrams for cantilever, simply supported beam, over hanging beam for various types of loading & couples, point of contraflexure.
05.04	Relation between B.M, S.F. and rate of loading.

Books Recommended:
Text Books

1.	Strength of Materials	-	R.S. Khurmi
2.	Mechanics of Structure	-	S.B. Junarkar
3.	Strength of Materials	-	Ramamrutham
4.	Theory of Structure	-	Vazirini & Ratwani
5.	Strength of Materials & Mechanics of Structure.	-	Punamia
6.	Teaching plans of Strength of Material	-	T.T.T.I. Madras
7.	द्रव्य सामर्थ्य	-	गुरूचरण सिंह
8.	Engineering Mechanics	-	I.H. Shames
9.	Engineering Mechanics	-	Beer & Johnson
10.	Strength of material	-	S.K. Singh

COMPUTER PROGRAMMING THROUGH C

Subject Code **00303**	Theory			No of Period in one session : 50		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	04	00	00	Internal Exam.	:	20

Rationale:

Computers play a vital role in present day life, more so, in the professional life of technician engineers. In order to enable the students use the computers effectively in problem solving, this course offers the modern programming language C along with exposition to various engineering applications of computers.

Objective:

The objectives of this course are to make the students able to:

- Develop efficient algorithms for solving a problem.
- Use the various constructs of a programming language viz. conditional, iteration and recursion.
- Implement the algorithms in "C" language.
- Use simple data structures like arrays, stacks and linked list solving problems.
- Handling File in "C".

S.No.	Topics	Periods
01	Introduction to Programming	(03)
02	Algorithm for Problem Solving	(08)
03	Introduction to 'C' Language	(08)
04	Condition and Loops	(07)
05	Arrays	(07)
06	Functions	(07)
07	Structures and Unions	(04)
08	Pointers	(06)
	Total :	**(50)**

CONTENTS:

TOPIC: 01 – INTRODUCTION TO PROGRAMMING: [03]

The Basic Model of Computation, Algorithms, Flow-charts, Programming Languages, Compilation, Linking and Loading, Testing and Debugging, Documentation. Programming Style-Names, Documentation & Format, Refinement & Modularity.

TOPIC: 02 – ALGORITHM FOR PROBLEM SOLVING: [08]

Exchanging values of two variables, summation of a set of numbers. Reversing digits of an integer, GCD (Greatest Common Division) of two numbers. Test whether a number is prime. Organize numbers in ascending order. Find square root of a number, factorial computation, Fibonacci sequence. Compute sine Series. Check whether a given number is Palindrome or not. Find Square root of a quadratic equation. multiplication of two matrices,

TOPIC: 03 – INTRODUCTION TO 'C' LANGUAGE: [08]

03.01   Character set, Variable and Identifiers, Built-in Data Types, Variable Definition, Declaration, C Key Words-Rules & Guidelines for Naming Variables.

03.02   Arithmetic operators and Expressions, Constants and Literals, Precedence & Order of Evaluation.

03.03   Simple assignment statement. Basic input/output statement.

03.04   Simple 'C' programs of the given algorithms

TOPIC: 04 – CONDITIONAL STATEMENTS AND LOOPS: [07]

04.01   Decision making within a program

04.02   Conditions, Relational Operators, Logical Perator.

04.03   If statement, it-else statement.

04.04   Loop statements

04.05   Break, Continue, Switch

TOPIC: 05 – ARRAYS: [07]

What is an Array?, Declaring an Array, Initializing an Array.

One dimensional arrays: Array manipulation: Searching, Insertion, Deletion of an element from an array; Finding the largest/smallest element in array; Two dimensional arrays, Addition/Multiplication of two matrices.

TOPIC: 06 – FUNCTIONS: [07]

Top-down approach of problem solving. Modular programming and functions, Definition of Functions Recursion, Standard Library of C functions, Prototype of a function: Formal parameter list, Return Type, Function call, Passing arguments to a Function: call by reference; call by value.

TOPIC: 07 – STRUCTURES AND UNIONS: [04]

Basic of Structures, Structures variables, initialization, structure assignment, Structures and arrays: arrays of structures,

TOPIC: 08 – POINTERS: [06]

Concept of Pointers, Address operators, pointer type declaration, pointer assignment, pointer initialization pointer arithmetic.

Book Recommended:

1. Programming with C. Second Edition. Tata McGraw-Hill, 2000 - Byron Gottfried
2. How to solve by Computer, Seventh Edition, 2001, Prentice hall of India. - R.G. Dromey
3. Programming with ANSI-C, First Edition, 1996, Tata McGraw hill. - E. Balaguruswami
4. Programming with ANSI & Turbo C. First Edition, Pearson Education. - A. Kamthane
5. Programming with C. First Edition, 1997, Tara McGraw hill. - Venugopla and Prasad
6. The C Programming Language, Second Edition, 2001, Prentice Hall of India. - B. W. Kernighan & D.M. Ritchie
7. Programming in C, Vikash Publishing House Pvt. Ltd., Jungpura, New Delhi. - R. Subburaj
8. Programming with C Language, Tara McGraw Hill, New Delhi. - C. Balagurswami
9. Elements of C, Khanna Publishers, Delhi. - M. H. Lewin
10. Programming in C. - Stephen G. Kochan
11. Programming in C, khanna Publishers, Delhi. - B. P. Mahapatra
12. Let us C, BPB Publication, New Delhi. - Yashwant kanetkar
13. Programming in C, Galgotia Publications Pvt. Ltd. Dariyaganj, New Delhi. - Kris A. Jamsa
14. The Art of C Programming, Narosa Publishing House, New Delhi. - Jones, Robin & Stewart
15. Problem Solving and Programming. Prentice Hall International. - A.C. Kenneth
16. C made easy, McGraw Hill Book Company, 1987. - H. Schildt
17. Software Engineering, McGraw Hill, 1992. - R.S. Pressman
18. Pointers in C, BPB publication, New Delhi. - Yashwant Kanetkar

7

Hydraulics & Fluid Mechanics

Subject Code **15304**	Theory			No of Period in one session : 60		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	04	0	0	Internal Exam.	:	20

Rationale:

The Civil Engineering studies involve behaviour of fluids both in static & dynamic stages. The behaviour of fluid and its pressure characteristics when flowing in closed conduit or in open channels has to be studied & analysed for its proper handling. Hydraulics & Hand Machines'' is to be introduced in the curriculum.

Objective:

The study is to introduce the student with topics of fluid properties, fluid statics & dynamics, its flow characteristics in close conduits & open channels. This will enable the student understand the flow in pipes as encountered in planning & sanitary arrangements and open channel flow as open encountered in irrigation channels.

The curriculum has been divided into the following topics, given below:

S.No.	Topics	Periods
01	Fluid Properties	(06)
02	Hydrostatics	(10)
03	Buoyancy	(04)
04	Hydro-Kinematics	(09)
05	Measurement of flow	(05)
06	Flow over notch and weirs	(05)
07	Flow in Pipes	(04)
08	Flow through open channel	(12)
09	Pumps & Hydraulics Machines	(05)
	Total :	**(60)**

CONTENTS:

TOPIC: 01 – FLUID PROPERTIES: [06]
01.01   Basic ideas of fluid.
01.02   Physical Properties of fluid.
01.03   Brief study of fluid Properties like density, specitic weight, Surface tension, visocosity.
01.04   Liquid commonly used in hydraulics.
01.05   Normal values of parameters for water.
01.06   Definition of fluid Mechanics and ideal fluids.
01.07   Knowledge of units and dimensions of various Parameters like discharge, Pressure, Pressure head, energy and Power.

TOPIC: 02 – HYDROSTATICS: [10]
02.01   Total liquid pressure.
02.02   Intensity of liquid pressure and pressure head.
02.03   Atmospheric pressure, pressure gague, Negative pressure and absolute pressure.
02.04   Laws of Liquid pressure.
02.05   Piezometer, simple manometer, Different manometer, inverted manometer.
02.06   Total pressure on plane immersed surface.
02.07   Centre of pressure and its location for horizontal vertical and inclined surfaces.

TOPIC: 03 – BUOYANCY: [04]
03.01   Buoyent force and center of buoyancy.
03.02   Kinds of equilibrium of a floating Buoyancy Stable, unstable and neutral Equilibrium.
03.03   Concept of Meta-centre and Meta-centric Height.

TOPIC: 04 – HYDRO-KINEMATICS: [09]
04.01   States of Flow-Laminar and Turbulent,
04.02   Types of Flow-Steady and unsteady, uniform and non-uniform sub critical and super critical, compressible and non compressible.
04.03   Reylonds Number, Frounds Number and Webber Number.
04.04   Equation of continuity for one dimensional steady flow.
04.05   Datum head, velocity head, Pressure head and total head.
04.06   Bernoulli's Equation and its proof, Modified Bernoulli's Equation.
04.07   Pitot tube-Principle and its use.
04.08   Venturimeter.
04.08.01   Coefficient of Venturimeter.
04.08.02   Discharge of Venturimeter.

04.08.03   Application of Venturimeter.

TOPIC: 05 – MEASUREMENT OF FLOW: **[05]**
05.01   Orifice.
05.01.01   Orifices and its types-small and orifices, free and drowned orifices.
05.01.02   Flow through
      (a)   Sharp edged small orifices & loss of head at sharp edged small orifices.
      (b)   Sharp edged Large orifice of Rectangular shape.
      (c)   Drowned orifice (sharp edged or bell mouthed) of any shape.
      (d)   Partially submersed Rectangular orifice.
05.01.03   Velocity or Approach and its effect.
05.01.04   Mouth Piece-External Cylindrical Mouth Piece.

TOPIC: 06 – FLOW OVER NOTCHES AND WEIRS: **[05]**
06.01   Notches & weirs, its shape.
06.02   Narrow crested, Broad Crested and submerged weir.
06.03   Flow through Rectangular, triangular, and trapezoidal notches, cipalleti, Francis Formula and contraction.

TOPIC: 07 – FLOW IN PIPES: **[04]**
07.01   Definition of Hydraulic gradient line & Total energy line.
07.02   Losses in pipe.
07.03   Concept of equivalent pipe .
07.04   Simple idea of water hammer (excluding Numerical problems).

TOPIC: 08 – FLOW THROUGH OPEN CHANNEL: **[12]**
08.01   Steady uniform flow through rectangular and trapezoidal channels
08.02   Chazy's and Minning's formula.
08.03   Channel of most efficient cross section-Rectangular and Trapezoidal.
08.04   Specific energy diagram.
08.05   Super critical, sub critical and critical depth of Flow.
08.06   Hydraulic jump.
08.06.01   Hydraulic jump with the help of specific energy diagram.
08.06.02   Formation and use of Hydraulic jump.
08.06.03   Elementary idea of standing wave flume without Mathematical treatment.

TOPIC: 09 – PUMPS & HYDRAULIC MACHINE: **[04]**
09.01   Pumps and its type. (Working principle only, excluding numerical problems).

TOPIC: 10 – HYDRAULIC MACHINE: **[06]**
10.01   Hydraulics transmission of power. Hydraulic Power system.
10.05   Impulse and reaction turbine.
10.06   Power Station-Components. Working principle and their uses only.

Books Recommended:

Text Books
1.	Hydraulics, Fluid Mechanics and Hydraulic Machine (Hindi). M. B. K.	-	J. Lal
2.	Hydraulics, Fluid Mechanics and Hydraulic Machine, Dhanpat Rai & Sons, New Delhi.	-	Shariff
3.	Fundamental Principle of Hydraulics, Charotar Book Stall, Anand.	-	V. B. Priyani
4.	Hydraulics & Hydraulic Machinery, T.M.H.	-	T.T.T.I.
5.	Hydraulics & Fluid Mechanics.	-	Dr. Jagdish Lal

Reference Books
1.	Fluid Mechanics,	-	S. Nagaratnam
2.	Hydraulics, Fluid Mechanics and Hydraulic Machine, S. B. H.	-	Modi and Seth

SOIL MECHANICS

Subject Code	Theory			No of Period in one session : 60		
15305	**No. of Periods Per Week**			**Full Marks**	:	**100**
	L	T	P/S	**Annual Exam.**	:	**80**
	04	00	00	**Internal Exam.**	:	**20**

Rationale & Objective:

Soil Mechanics is a well recognized subject of Civil Engineering now a days and its study is considered essential for technicians in effective execution and maintenance of a number of Civil Engineering activities like foundation, rigid and flexible pavements, underground dams etc. the mission of technical education is to develop technical man-power which can be utilized for effective and efficient implementation of modern Civil Engineering Projects by theoretical and practical analysis of soil under project area. For fulfillment of this primary objective, the following topics with the contents are included in this curriculum. This curriculum will be able to generate multiple effects in developing knowledge as well as appropriate skill of technicians and it will be helpful in creation of attitude of this towards application of Soil Mechanics in Civil Engineering works for strength and durability of the structures.

S.No.	Topics	Periods
01	Introduction	(02)
02	Basic Properties of Soil	(05)
03	Determination of Index Properties of Soil	(07)
04	Classification of Soil	(04)
05	Soil Structure	(03)
06	Permeability	(06)
07	Compaction	(04)
08	Shear Strength of Soil	(04)
09	Earth Pressure	(06)
10	Bearing Capacity	(05)
11	Foundation Engineering	(08)
12	Miscellaneous Topics	(06)
	Total :	**(60)**

CONTENTS:

TOPIC: 01 – INTRODUCTION: [02]
01.01   Basic concept of Soil and its formation.
01.02   Definition of Soil Mechanics & its application in Civil Engineering Works.
01.03   Acquaintance with Indian Soil in general & Soil of Bihar in particular

TOPIC: 02 – BASIC PROPERTIES OF SOIL: [05]
02.01   Soil mass as a three phase system.
02.02   Definition and brief explanation of Water content, unit weights, specific gravity, void ratio, Porosity, degree of saturation, percentage of air voids, air content and Density index.
02.03   Functional Relationship among above parameters.
02.04   Numerical problems based on above topics.

TOPIC: 03 – DETERMINATION OF INDEX PROPERTIES OF SOIL: [07]
03.01   Water content determination by (i) even drying methods, (ii) Sand Bath Method and (iii) Pycnometer method.
03.02   Laboratory Method for determination of Specific gravity.
03.03   Particle Size Distribution-Basic Concept.
03.03.01   Methodology of Sieve analysis.
03.03.02   Sedimentation Analysis-Theory and Limitation, Stoke's law
03.03.03   Consistancy of Soil-Brief idea including Atterberg limits.
03.04   Fundamental concept of Liquid limit, plastic limit & shrinkage limit and their determination in the laboratory.
03.04.01   Simple idea of plasticity, consistency index.
03.04.02   Simple Numerical Problems related to above topics.

TOPIC: 04 – CLASSIFICATION OF SOIL: [04]
04.01   Objects of Classification.
04.02   Properties of Soil Classification.
04.03   System of Soil Classification :-
    (i)   Particle Size Classification
    (ii)   Textural Classification.
    (iii)   Highway Research Board Classification
    (iv)   Indian Soil Classification

TOPIC: 05 – PERMEABILITY: [06]

06.01   Introduction-Discharge Velocity & Seepage Velocity.

06.02	Head, Gradient & Potential.
06.03	Darcy's law and its limitations.
06.04	Factors affecting permeability.
06.05	Laboratory methods for determination of coefficient of permeabilithy-Constant head & falling head methods.
06.06	Simple Numerical Problems on above topics.

TOPIC: 06 – COMPACTION & CONSOLIDATION: [07]

07.01	Theory of Compaction and factors influencing compacted density of soil.
07.02	Brief description of laboratory tests related to compaction of soil-Standard Proctor test & Modified Standard Proctor Test.
07.03	Effect of Compaction on Soil Properties.
07.04	BASUC CONCEPT OF CONSOLIDATION & Coefficient of consolidation.

TOPIC: 07 – SHEAR STRENGTH OF SOIL: [04]

08.01	Brief idea of Shear strength and Stress Analysis by Mohr's Circle.
08.02	Mohr-Coulomb Failure Theory.
08.03	Measurement of Shear Strength of soil by
	(i) Direct Shear Test
	(ii) Triaxial Compression Test.

TOPIC: 08 – EARTH PRESSURE: [06]

09.01	Basic Concept of active earth pressure, Passive earth pressure and Earth pressure at rest.
09.02	Rankine's theory-its assumptions and application in the determination of active earth pressure & passive earth pr. Simple cases.

TOPIC: 09 – BEARING CAPACITY: [05]

10.01	Definition of bearing capacity, Gross pressure intensity, Net pressure intensity, ultimate bearing capacity, Net ultimate bearing capacity, Net safe bearing capacity and allowable bearing pressure etc.
10.02	Rankine's Analysis for determination of minimum depth of foundation.
10.03	Terzaghi's Analysis-Assumptions & Limitations.

TOPIC: 10 – FOUNDATION ENGINEERING: [08]

11.01	Pile Foundations-Common types of piles.
11.01.01	Pile Driving-types of hammer
11.01.02	Load carrying capacity of piles by static & dynamic formulae-Basic numerical problems related to it.
11.01.03	Pile Load Test & Cycle Load Test.
11.01.04	Group Action in Pile-Efficiency of Pile group & settlement of pile group in clay.
11.01.05	Under-reamed Pile.
11.02	Concept of well foundation.

TOPIC: 11 – MISCELLENEOUS TOPICS: [06]

12.01	Clay Mineralogy- Kaolinite, Montimorillonite & Illite, Minerals of clay.
12.02	Soil Stabilisation- Brief introductions.

Books Recommended:

1.	Soil Mechanics & Foundation Engineering Standard Book House, Delhi – 110006	-	Dr. B. C. Punamia
2.	Soil Engineering in Theory and Practice Volume 1 & 2. C. B. S. Publishers & Distributors, Delhi-110006	-	Dr. G. R. Choudhary
3.	Engineering Properties of Soil. T. M. H.	-	S. K. Gulati
4.	Soil Mechanics & Foundation Engineering, Khanna Publishers, Delhi- 110006	-	S. K. Gerg
5.	Soil Testing, Khanna Publishers, Delhi -110006	-	S. Mithal
6.	Problems on Soil Mechanics, khanna Publishers, Delhi- 110006	-	B. P. Verma
7.	Soil Mechanics & Foundation Engineering, Standard Publishers Distributors, Delhi- 110006	-	K. R. Arora
8.	मृदा यांत्रिकी एवं नींव इंजिनियारी, Standard Publishers Distributors, Delhi- 110006	-	भगीरथ लाल गुप्ता
9.	मृदा यांत्रिकी	-	डॉ॰ जे॰ झा
10.	Relevant B. I. S. Codes	-	

ENGINEERING MECHANICS Lab.

Subject Code	Practical			No of Period in one session : 50		
00306	**No. of Periods Per Week**			**Full Marks**	:	50
	L	T	P/S	**Annual Exam.**	:	40
	04			**Internal Exam.**	:	10

Rationale & Objectives:

The Engineering Mechanics Laboratory is a subject which will help technician to understand the application of theory that he has studied in practice by performing experiments and verifying results.

Besides the above the objective of the curriculum with effective skill will be developed in them to observe experimental data, and to analyse the results.

These topics of this curriculum will certainly build their confidence in performing the utilization of principle of mechanics in Civil Engineering works.

CONTENTS:

Eight experiments to be performed in the Laboratory:

1. Determination of elongation of wire under external load.
2. Tensile Test on mild steel specimen.
3. Tensile Test on high tensile specimen.
4. Compression Test on metal.
5. Compression Test on bricks.
6. Determination of Young's Modulus of Elasticity of wire.
7. Determination of reaction at the support of beam.
8. Determination of bending moment of a simply supported beam.
9. Determination of reaction at the support of roof truss.
10. Determination of deflection of beams.
11. Determination of moment of inertia of fly wheel.
12. Determination of bending moment of a over hanging beam.
13. Verification of Polygon Law of forces.
14. Verification of Triangle Law of forces.
15. To find moment of inertia of fly wheel.
16. Compression Test on metal.
17. Tensile Test on M. S. specimen
18. Determination of co-efficient of friction on inclined plane.

Books Recommended:

Text Books

1. अभियांत्रिक यांत्रिकी . जे॰ के॰ कपूर
2. Strength of Materials - Bininder Singh
3. Mechanics of Structure, Vol. I - S.B. Junarkar.
4. Strength of Materials - R.S. Khurmi.
5. Engineering Mechanics and Strength of Materials - I.B. Prasad.
6. Teaching plans of Strength of Material - T.T.T.I. Madras

COMPUTER PROGRAMMING THROUGH 'C'

Subject Code	Practical			No of Period in one session : 60		
00307	**No. of Periods Per Week**			**Full Marks**	**:**	**50**
	L	**T**	**P/S**	**Annual Exam.**	**:**	**40**
	06	**00**	**03**	**Internal Exam.**	**:**	**10**

CONTENTS:

List of Practicals:
1. Programming exercise on executing a C program.
2. Programming exercise on editing C program.
3. Programming exercise on defining variables and assigning values to variable.
4. Programming exercise on arithmetic and relational operations.
5. Programming exercise on arithmetic expressions and their evaluation
6. Programming on infix, postfix, transformation using stack.
7. Programs on array implementation.

Books Recommended:

1. How to solve it by Computer, Prentice Hall of India, 1992.   - R.G. Dromey.
2. The C Programming Language, Prentice Hall of India, 1989.   -B.W. Kernighan & D.M. Ritchie.
3. The Spirit of C Programming, Jaico Publishing House, New Delhi, 1987.   - Cooper, Mullish
4. Application Programming in C. Macmillain International editions, 1990.   - Richa'd Johnson-Baugh & Martin Kalin
5. The Art of C Programming, Narosa Publishing House, New Delhi.   - Jones, Robin & Stewart
6. Problem Solving and Programming. Prentice Hall International.   - A.C. Kenneth.
7. C made easy, McGraw Hill Book Company, 1987.   - H. Schildt
8. Software Engineering, McGraw Hill, 1992.   - R.S. Pressman
9. Programming in C, Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi   - R. Subburaj
10. Programming with C language, Tata McGraw Hill, New Delhi.   - C. Balaguruswami
11. Elements of C, Khanna Publishers. Delhi   - M. H. Lewin
12. Programming in C   - Stephan G. Kochan.
13. Programming in C, Khanna Publishers. New Delhi   - B.P. Mahapatra
14. Let us C, BPB Publication. New Delhi   - Yashwant Kanetkar
15. Programming in C, Galgotia Publications Pvt. Ltd. Dariyaganj, New Delhi.   - Kris A. Jamsa

HYDRAULICS LAB.

Subject Code	SESSIONAL			No of Period in one session : 50		
15308	**No. of Periods Per Week**			Full Marks	:	50
	L	T	P/S	Annual Exam.	:	30
	04	00	02	Internal Exam.	:	20

Rationale:

Experimental verification of the mathematical calculations in operation of some of the hydraulic machines in theory will be useful in service area.

Objective:

It will help student to conduct and operate the hydraulic equipments and know the results, then he can compare their results with mathematical calculations. He will also be able to find out the experimental errors which normally occurs.

CONTENTS

Journals based on any eight experiments performed in the Laboratory is to be prepared.

01   Measurement of pressure by piezometre and pressure gauges.
02   Verification of Bernouli's theorem.
03   Discharge through venturimeter.
04   Determination of C_v, C_c and C_d through sharp edged circular orifice.
05   Determination of Coefficient of discharge through a rectangular notch.
06   Determination of Coefficient of discharge through a triangular notch.
07   Determination of Coefficient of discharge through a rectangular weir or trapezoidal weir.
08   Determination of loss of head due to friction for a given pipe.
09   Determination of metacentric height of a floating body.
10   Determination of critical value of Reynold's number.
11   Determination of time o emptying a tank.
12   Determination of velocity head by Pitot tube.
13   Study of working principle of centrifugal pump.
14   Study of working principles of Reciprocating pump.
15   Study of working principle of a pelton wheel.
16   Study of working principles of a francis turbine.

SOIL MECHANICS LAB.

Subject Code	SESSIONAL			No of Period in one session : 50		
15309	**No. of Periods Per Week**			**Full Marks**	**:**	**50**
	L	T	P/S	Annual Exam.	:	30
	04			Internal Exam.	:	20

Rationale & Objective:

The Soil Mechanics Laboratory is essential as soil posses a variety of physical properties, most of, which are not constant. This diversity in the nature of the soil need experimental analysis of the soil be performed by the technicians. For this purpose, the present curriculum envisages the skill development of the technicians in performing experiments as well as the presentation and analysis of the experimental data. It will be helpful in building confidence among the technicians in selecting/designing the appropriate components of Civil Engg. works.

CONTENTS

Preparation of Journal based on any <u>Eight</u> experiments of the following:

01   Determination of water content by Oven Drying Method.
02   Determination of water content by Sand Bath Method.
03   Determination of Specific gravity of soil by Density Bottle.
04   Determination of Specific gravity of soil by Pycnometer.
05   Determination of Field Density by Water Displacement Method.
06   Determination of Field Density by Core Cutter Method.
07   Determination of Field Density by Sand Replacement Method.
08   Determination of Grain Size Distribution by Sieving.
09   Determination of Grain Size Distribution by Hydrometer.
10   Determination of Liquid Limit of Soil.
11   Determination of Plastic Limit of Soil.
12   Determination of Shrinkage Limit of Soil.
13   Determination of Permeability by Constant Head Test.
14   Determination Permeability by Falling Head Test.
15   Determination of Compaction of Soil by Standard Proctor Test.
16   Determination of Compaction of Soil by Modified Proctor Test.

Books Recommended:
<u>Text Books</u>

1.   Soil Mechanics & Foundation Engineering, Standard Book House, Delhi-110006   -   Dr. B. C. Punamia
2.   Soil Engineering in Theory and Practice Volume-1 & 2, C. B. S. Publishers & Distributors,   -   Dr. Alam Singh &
     Delhi-110006   Dr. G. R. Choudhary
3.   Engineering Properties of Soil, T. M. H.   -   S. K. Gulati
4.   Soil Mechanics & Foundation Engineering, Khanna Publishers, Delhi- 110006   -   S. K. Gerg
5.   Soil Testing, Khanna Publishers, Delhi-110006   -   S. Mithal
6.   Problems on Soil Mechanics, Khanna Publishers, Delhi-110006   -   B. P. Verma
7.   Soil Mechanics & Foundation Engineering, Standard Publishers Distributors, Delhi-110006   -   K. R. Arora
8.   मृदा यांत्रिकी एवं नींव इंजिनियरी, Standard Publishers Distributors, Delhi-110006   -   भगीरथ लाल गुप्ता
9.   मृदा यांत्रिकी   -   डॉ॰ जे॰ झा
10. Relevant B. I. S. Codes   -

DISASTER MANAGEMENT

Subject Code	SESSIONAL			No of Period in one session :		
15310	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	Annual Exam.	:	30
	-	-	02	Internal Exam.	:	20

Course Objective:

The Course would focus on types of hazards Disasters. The main objective is to study the emerging approaches in Disaster Reduction & Management. The emphasis will be on programmes of National & International organization for Disaster preparedness, Mitigation and awareness.

Expected Learning Outcome:

The students who shall take this course can prepare hazard zonation maps through education on Disasters and Community Involvement. Teaching will include field trip & interaction with programmes of disaster research & mitigation by national organizations

Journal will be Prepared on each unit

Unit-I

Types of Environmental hazards & Disasters

    a)   Natural hazards and Disasters
    b)   Man induced hazards & Disasters

Earthquake Hazards/ disasters

        -     Causes of Earthquakes
        -     Distribution of earthquakes
        -     Hazardous effects of earthquakes
        -     Earthquakes Hazards in India
        -     Human adjustment, perception & mitigation of earthquake.
        -

Floods Hazards/ disasters
        -     Causes of floods
        -     Flood hazards India
        -     Flood control measures (Human adjustment, perception & mitigation)

Unit –II

Emerging approaches in Disaster Management- Three Satges

    1.   **Pre- disaster stage (preparedness)**

        a)   Preparing hazard zonation maps, Predictability/ forcasting & warning
        b)   Preparing disaster preparedness plan
        c)   Land use zoning
        d)   Preparedness through (IEC) Information, education & Communication Pre-disaster stage (mitigation)

e) Disaster resistant house construction
f) Population reduction in vulnerable areas
g) Awareness

2. Emergency Stage

a) Rescue training for search & operation at national & regional level
b) Immediate relief
c) Assessment surveys

3. Post Disaster stage-Rehabilitation

a) Political Administrative Aspect
b) Social Aspect
c) Economic Aspect
d) Environment Aspect

Unit-III

Natural Disaster Reduction & Management

a) Provision of Immediate relief measures to disaster affected people
b) Prediction of Hazards & Disasters
c) Measures of adjustment to natural hazards

References

R.B. Singh (Ed) Environmental Geography, Heritage Publishers New Delhi, 1990

Savinder Singh Environmental Geography, Prayag Pustak Bhawan,1997

Kates, B.I & white, G.F The Environment as Hazards, oxford, New York, 1978

R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000

H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003
R.B. Singh, space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994

Dr. Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003

A.S. Arya Action Plan for Earthquake,Disaster, Mitigation in V.K. Sharma (Ed) Disaster Management IIPA Publication New Delhi,1994

R.K. Bhandani An overview on Natural & Man made Disaster & their Reduction, CSIR, New Delhi

M.C. Gupta Manuals on Natural Disaster Management in India, National Centre for Disaster Management, IIPA, New Delhi, 2001