Scheme of Teaching and Examination
III Semester DIPLOMA in MECHANICAL ENGINEERING

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 Machanics	00302	4	50	3	20	80	100	26	36
3	Computer Programming Through 'C '	00303	4	50	3	20	80	100	26	36
4	Energy Conversion-I	25304	6	75	3	20	80	100	26	36
5	Material Science and Technology	25305	6	50	3	20	80	100	26	36
		Total :-	26					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	Mechanical Engineering Lab.	25308	6	50	40	60	100	50
9	Energy Conversion-Lab	25309			20	30	50	
Total :-			42				150	
Total Periods per Week				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: <u>Text Books</u>

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	Theory			No of Period in one session : 50		
	No. of Periods Per Week			Full Marks	:	100
00303	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

ENERGY CONVERSION - I

Subject Code	Theory			No of Period in one session : 75		
25304	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	06	00	00	Internal Exam.	:	20

Rationale:

A diploma holder technician in Mechanical Engineering has to encounter with the use of, and conversion of chemical energy into thermal energy, thermal energy into mechanical energy, waste products carrying heavy amount of unuseful energy into useful energy. Conversion of solar energy into different types of energies utilized in different plants, like railway, automobile etc.

The E.C.I. has been introduced in Diploma II to give the base for the conversion/utilization of technologies being used or to be used in different organisations.

Objective:

The objective of the course is to provide the basic concepts of the conversion of unuseful energy into useful energy so that students should be able to develop the new ideas about the energy and can be able to develop a new technology/advance technology to give more & more useful energy.
The basic concepts provide the following items:

(i) Knowledge of different types of energy.
(ii) Utilization of waste products/unutilized material into biogas or biomass.
(iii) Concept of wind mill.
(iv) Better utilization of abundant energy of the sun in the form of solar energy.
(v) Conversion of chemical energy into thermal energy.
(vi) Conversion of other types of energies into thermal energy.
(vii) Chemical capacity of traditional fuel.
(viii) Capacity of steam, use of steam table, molliers chart.
(ix) Production of steam.
(Knowledge of steam generators etc.)

S.No.	Topics	Periods
01	Sources of Energy.	(10)
02	Heat Transfer for Solar Energy Utilization	(05)
03	Solar Radiation Analysis	(06)
04	Storage of Solar Energy	(06)
05	Methods of Solar Energy	(08)
06	Fuels and Combustion of fuels	(04)
07	Thermodynamics	(18)
08	Air Cycles	(08)
09	Steam & Steam Generators	(10)
	Total :	**(75)**

CONTENTS:

TOPIC: 01 – SOURCES OF ENERGY: [10]

01.01	Definition of energy, types of sources of energy (conventional & non conventional)	(01)
01.02	Caouses for evaluation of non-conventional energy, small description.	(01)
01.03	Types of non-conventional energy & their resources.	(02)
01.04	Availability of non-conventional energy and its usefulness.	(01)
01.05	Description of wind mill, its types and performance.	(02)
01.06	Bioconversion and Biomass (photo synthesis, biogas generation Materials for biogas, ocean.	(02)

TOPIC: 02 – HEAT TRANSFER FOR SOLAR ENERGY UTILIZATION: [05]

02.01	Introduction, Conduction, Convection, Radiation, Reflectivity, Transmissibility,	(03)
02.02	Problems of heat through an insulated wall of pipe, theory only	(02)

TOPIC: 03 – SOLAR RADIATION ANALYSIS: [06]

03.01	The characteristics of the sun.	(01)
03.02	Solar constant, Solar Radiation at the earths surface.	(02)
03.03	Determination of solar time, derived solar angles.	(03)

TOPIC: 04 – STORAGE OF SOLAR ENERGY: **[06]**

04.01 Types of energy storage (theory,electrical storage, chemical storage, in the form of potential hydraulic energy (hydro storage).

TOPIC: 05 – METHODS OF SALAR ENERGY UTILIZATION: **[08]**

05.01 Solar pumping (01)
05.02 Solar distillation (01)
05.03 Solar cooking (02)
05.04 Solar green house (01)

TOPIC: 06 – FUELS AND COMBUSTION OF FUELS: **[04]**

06.01 Fuels – Introduction, desirable properties of good fuel. (01)
06.02 Classification – Solid, Liquid, Gas. (01)
06.03 Calorific Value – Lower C. V. Higher C. V. Air/Oxygen required for complete combustion, octane and cetane no. of fuels
Requirements of Aviation fuel, Fuel additive, CNG – Introduction. (01)

TOPIC: 07 – INTRODUCTION TO THERMODYANAMICS: **[18]**

07.01 Basic concept of thermodynamics. Heat and Energy. Thermodynamic systems, closed system, open system, solated system. (02)
07.02 Properties of system and their classification. Properties of perfect gases. Different types of thermodynamic process. (02)
07.03 Laws of gases and their characteristics equation. Specific heats of gases and their relation with gas constant, Representation of processes
on P-V & T-ϕ diagram (02)
07.04 Laws of Thermodynamics - /eroth Law of Thermodynamics. (03)
07.05 First Law of Thermodynamics, Statement, explanation & application. Non-flow energy equation (closed system), calculation of
work done, Heat transfer and internal energy for different thermodynamic process. (03)
07.06 Second Law of Thermodynamics, Statement, explanation & application. (02)
Concept of Heat Engine & Heat Pump. Efficiency of Heat Engine, (02)
Concept of Refrigerator and C.O.P. Concept of entropy. (02)
thermodynamic processes (T-ϕ diagram) (01)
07.07 Calculation of changes of entropy. Heat transfer to different thermodynamic system. (01)

TOPIC: 08 – AIR CYCLES: **[08]**

08.01 Definition of a Cycle, Cylinder Bore, Stroke ratio, Stroke length, Stroke Volume. Clearance, Clearance ratio, Compression ratio, Pressure ratio, m.e.p. and air standard efficiency. (01)
08.02 Concept of reversible and irreversible processes and cycles. (01)
08.03 Ideal Cycle (Cornot Cycle), Representation on P-V & T-ϕ and H-ϕ diagrams Derivation and Calculation of m.e.p. and air standard efficiency. (01)
08.04 Otto Cycle, Representation on P-V & T-ϕ and H-ϕ diagrams. Derivation and Calculation of m.e.p. and air standard efficiency. (01)
08.05 Diesel Cycle, Representation on P-V & T-ϕ and H-ϕ diagrams. Derivation and Calculation of m.e.p. and air standard efficiency. (01)

TOPIC: 09 – STEAM AND STEAM GENERATORS: **[10]**

09.01 Formation and properties of Steam. (01)
09.02 Formation of steam at a constant pressure, constant temperature, constant volume. Total heat graph during steam formation. (02)
09.03 Important terminology used for steam. Wetsteam, Super saturated steam. Dryness fraction, Latent heat of vaporization, Sensible heat of water. (01)
09.04 Total heat of enthalpy of steam. Entropy of steam. Steam table and its use. (01)
09.05 Use of Mollier's chart. (01)
09.06 Advantage of super heating, External work done suring evaporation, Internal Energy of steam, Problems on properties of steam. (01)
09.07 Steam generators, Introduction to steam generators, Classification of boilers. (02)

Books Recommended:

1. Solar Energy Utilization - G.D. Rai
2. Heat Engine - P.L. Ballaney. Khanna Publications
3. A Text Book of Engineering Thermodynamics - R.S. Khurmi, S. Chand & Co.
4. Engineering Thermodynamics - J.K. Gupta, Ram Nagar, Delhi.

MATERIAL SCIENCE & TECHNOLOGY

Subject Code	Theory			No of Period in one session : 50		
	No. of Periods Per Week			Full Marks	:	100
25305	L	T	P/S	Annual Exam.	:	80
	06	00	00	Internal Exam.	:	20

Rationale:

Rapid technological developments in the fields of new materials and their alloys makes the selection of material difficult for engineers or technician. Adequate knowledge about properties of material like wear, abrasion, corrosion, structure, deformation of metals is essential. A brief knowledge about heat treatment of metals, its advantages and disadvantages is required for technicians. The syllabus of Material Science & Technology has been aimed to provide the students the knowledge of metal behaviour in different service conditions.

Objective:

The students will be able to:

(a) Know about metallic deformation.
(b) Corrosion, its prevention.
(c) Selection of suitable materials.
(d) Heat treatment processes.

S. No.	Topics	Periods
01	Deformation of metals	(07)
02	Fracture of metals	(04)
03	Corrosion of metals	(06)
04	Phase diagram & alloy system.	(08)
05	Heat treatment	(10)
06	Testing of materials	(08)
07	Shaping of metals	(09)
		(52)

CONTENTS:

TOPIC: 01 – DEFORMATION OF METALS: [07]

01.01	Introduction, classification of deformation, elastic and plastic, comparison between elastic & plastic deformation.	(02)
01.02	Modes of plastic deformation slip and twinning.	(02)
01.03	Dislocation theory: types of dislocation – edge and screw dislocation.	(01)
01.04	Deformation of polycrystalline material, comparison between recovery and reerystallization.	(02)

TOPIC: 02 – FRACTURE OF METALS: [04]

02.01	Introduction, causes of fracture.	(02)
02.02	Classification of fracture, brittle & ductile, comparison between brittle & ductile fracture.	(02)

TOPIC: 03 – CORROSION OF METALS: [06]

03.01	Introduction, mechanism & classification of corrosion.	(02)
03.02	Factors influencing corrosion, prevention and control of corrosion	(02)
03.03	Metallic & Non-metallic coatings for corrosion control.	(02)

TOPIC: 04 – PHASE DIAGRAM AND ALLOY SYSTEM: [08]

04.01	Introduction, allotropic forms of pure iron, critical points, iron-carbon system.
04.02	Phase diagram for iron carbon system, solid phase in iron-iron carbide phase diagram, critical temperature eutectoid, hypereutectoid and hypereutectoid steels.
04.03	Modified iron-iron carbide diagram, primary and secondary transformation in steel, micro-constituents of steel and east-iron.

TOPIC: 05 – HEAT TREATMENT: [10]

05.01	Introduction	(01)
05.02	Annealing	(02)
05.03	Normalising	(01)
05.04	Hardening	(02)
05.05	Tempering	(01)
05.06	Carburizing	(02)
05.07	Advantages & disadvantages of heat treatment	(01)

TOPIC: 06 – TESTING OF MATERIAL: **[06]**

05.01	Introduction, classification of testing.	(01)
05.02	Hardness testing – Brinel, Rockwel, Vickers diamond test	(02)
05.03	Tensile Test	(01)

TOPIC: 07 – SHAPING OF METALS: **[09]**

07.01	Introduction, classification of metal shaping processes	(01)
07.02	Cold working processes – rolling, drawing, bending, shearing, squeezing shot peening, advantages and disadvantages.	(04)
07.03	Hot Working – methods, rolling, drawing, welding, extruding, spinning, forging, advantage and disadvantages, comparison between cold working and hot working.	(04)

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	00	2 week continue	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 analyses 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 . जे०के० कपूर
2. Strength of Materials - Bininder Singh
3. Mechanics of Structure, Vol. 1 - 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

MECHANICAL ENGINERING LAB.

Subject Code 25308	Sessional			No of Period in one session : 50		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	60
	06			Internal Exam.	:	40

Rationale & Objective:

A Diploma holder technician (Mechanical) should be able to handle types of machines and can think about the better use of modification of the machines.

Sl, No. Topics Periods

A Applied Mechanics Laboratory

CONTENTS:

TOPIC:A – APPLIED MAECHANICS LABORATORY:

A.01 Verification of Law of Parallelogram of Forces.
A.02 Verification of Hooke's Law by Searl's Appratus.
A.03 To find modulus of rigidity of M.S. Rod by Torsion method.
A.04 To find the reaction at supports for a simply supported beam having point loads at different position and Draw S.F. and B.M.
A.05 To find the moment of inertia of a fly wheel.
A.06 To determine stiffness of a spring and its modulus of rigidity.
A.07 To find the maximum deflection of a simply supported beam and cantilever beam having point load at the middle and the free end respectively.
A.08 To find the reactions at fixed end and draw S.F.and B.M. diagram having point loads at free end.

ENERGY CONVERSION LAB

Subject Code	Sessional			No of Period in one session : 50		
25309	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	60
	06			Internal Exam.	:	40

Rationale & Objective:

A Diploma holder technician (Mechanical) should be able to handle types of machines and can think about the better use of modification of the machines.

Sl, No. Topics Periods

A Energy Conversion Laboratory

CONTENTS:

TOPIC:A – ENERGY CONVERSION LABORATORY:

At least four experiments should to be done, in which, Experiment No. C.01 is compulsory:

C.01 Study of Solar devices:
a) Solar Cooker
b) Solar Street Lighting System
c) Solar Pumping
d) Solar Heating & Cooling System
e) Solar Drier
f) Any device which uses solar energy,
(At least one device should be prepared by group of students)
C.02 Detailed study of Gobar Gas Plant
C.03 Working of 2 stroke/4 stroke I.C. Engines.
C.04 Study of Boilers (Water tube/ Fire tube)
C.05 Calculation of I.H.P., B.H.P., of a Heat Engine
C.06 Troubleshooting of Water Cooler/Refrigerator.
C.07 Visit to Factory/Power Plant for knowing about steam generation & its utilization.