

Choice Based Credit System (CBCS)
Diploma IIIrd Sem ME

			Periods			Evaluation Scheme						
S. No	Subject Code	Name of Subject	L	T	P	Assignment	TA	Total	ESE	Subject Total	Credit	Hours
1	9D.204	Applied Mathematics	3	0	0	20	10	30	70	100	3	3
2	7D.205	Strength of Material	3	0	0	20	10	30	70	100	3	3
3	7D.203	Mechanical Engineering Material	3	0	0	20	10	30	70	100	3	3
4	7D.201	Electrical Engineering	3	0	0	20	10	30	70	100	3	3
5	7D.202	Manufacturing Technology	3	0	0	20	10	30	70	100	3	3
6	40D.201	Communication and Soft Skills	2	0	0	20	10	30	70	100	2	2
7	14D.201	# Disaster Management	3	0	0						0	3
8	40D.101	Life Skills I*										
PRACTICAL/DESIGN/DRAWING/SESSIONAL												
1	7DP.205	Strength of Material Lab			2		30	30	20	50	1	2
2	7DP.206	Mechanical Engineering Drawing			4		30	30	20	50	2	2
3	7DP.201	Electrical Engineering Lab			2		30	30	20	50	1	2
										750	21	23

Note- * Non-Credit Course

Non-Credit but qualifying course

Program: Diploma

Semester: Third

Course: Applied Mathematics

Course Code: 9D.204

L	T	P	C
3	0	0	3

Course Objective:

- To introduce the fundamental ideas of the functions of complex variables and developing a clear understanding of the fundamental concepts of Complex Analysis such as analytic functions, complex integrals and a range of skills which will allow students to work effectively with the concepts.
- To solve nonlinear differential equations by numerical methods.
- Students will solve nonlinear equations using analytic methods.
- Students will use mathematics concepts in real world situations.
- Students will simplify and perform operations with nonlinear expressions.

Unit I:

Complex Variable: Continuity, Differentiability, and analyticity of a function of a complex variable, Cau– Riemann equations in Cartesian and Polar form, Harmonic Function.

Unit II:

Ordinary Differential Equation :Formation of Ordinary differential equation ,Variable Separable Homogeneous Equation ,Solution of Bernoulli’s Equation ,Exact-Differential Equation.

Unit III:

Graph Theory and Laplace Transform: Graph, Sub graph, Walk travel and Path, Connected and Disconnected graph. Hand shaking theorem or Edge and Vertex of a graph. Matrix representation of graph(Incidence and Adjacency Matrices). Spanning Tree Kruskal’s Algorithms for minimal Spanning tree Laplace Transform: Definition of Laplace Transform, Inverse Laplace Transform.

Unit IV:

Numerical Solution of Algebraic Equation and Simultaneous Equation: Bisection Method, Regula – Falsi Method, Newton-Raphson Method, and Gauss elimination Method, Iterative Method –Gauss Siedal and Jacobi’s Method.

Suggested Reading:

1. *Higher Engineering Mathematics –Dr.B.S.Grewal Khanna Publication*
2. *Higher Engineering Mathematics –H.K.Das*
3. *Engineering Mathematic -N.P.Bali Laxmi Publication*
4. *Advance Engineering Mathematics –Erwin Kreyszig Wiley Publication.*
5. *Graph Theory: Prabhakar Gupta and Vineet Agarwal Pragati Prakashan*

Program: Diploma

Course: Strength of Material

Course Code: 7D.205

Course Objective:

L	T	P	C
3	0	0	3

- Analyze and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behavior of materials.
- Utilize appropriate materials in design considering engineering properties, sustainability, cost and weight.
- Perform engineering work in accordance with ethical and economic constraints related to the design of structures and machine parts.

Unit I:

Mechanical Properties of Materials, Simple stresses & Strains :

Mechanical properties– Elasticity, Plasticity, Rigidity, Ductility, Malleability, Toughness, Hardness, Brittleness, Creep, Fatigue. Concept & Definition of Simple stresses & strains Types-tensile, compressive, Shear, single & double shear, Punching shear, Thermal stresses, Hoop stresses & corresponding strains. Hooke's law, Young's modulus, Modulus of Rigidity, Change in length of the bar having uniform & stepped cross section stress-strain curves for ductile & brittle materials. Volumetric Strain, Bulk modulus, Poisson's ratio. Bi-axial & Tri-axial stresses & strains. Relationship among E, G, & K. Stresses & strains in bars of uniformly varying section subjected to axial load at ends only, Composite sections having same length. Temperature stresses & strains of uniform & composite sections.

Unit II:

Bending Moment & Shear Force:

Concept & definition of Shear force & bending moment. Relation between rate of loading, shear force & bending moment. Shear force & bending moment diagrams for cantilevers, simply supported beam & over hanging beam subjected to point loads & uniformly distributed load. Location of point of contra flexure.

Moment of Inertia :

Concept & definition of Moment of inertia, radius of gyration. Parallel & perpendicular axes theorem.(No derivation).Moment of inertia of square, rectangular, circular, semicircular, Triangular, Hollow square, Rectangular & circular only. MI of angle section, Channel section, T-section, I section about centroidal axis & any other axis parallel to centroidal axis. Polar moment of inertia.

Unit III:

Bending stresses:

Theory of simple bending, Assumptions in the theory of bending, moment of resistance, section modulus & neutral axis. Stress distribution diagram for Cantilever & simply supported beam. Equation of bending (No derivation).Simple numeral problem. Concept of direct & transverse shear stress. Shear stress equation (No derivation). Shear stress distribution diagrams Average shear stress & Maximum shear stress for rectangular & circular section.

Direct and Bending stresses:

Concept of Axial load, eccentric load, direct stresses, bending stresses, maximum & minimum stresses. Stress distribution diagram. Condition for no tension in the section. Problems on the above concepts for machine parts such as offset links-clamp, Bench vice, Drilling machine frame etc.

Unit IV:

Torsion: Concept of Pure Torsion, Assumptions in theory of pure torsion ,Torsion equation for solid and hollow circular shafts .Power transmitted by a shaft. Comparison between Solid and Hollow Shafts subjected to pure torsion (no problem on composite and non-homogeneous shaft)

Suggested Reading:

1. *Strength of Materials by Dr.D.S Bedi; (S Chand Publishers)*
2. *Strength of Materials by R.S Lehri and A.S. Lehri, (S.K Kataria and Sons.)*
3. *Strength of Materials by Dr.Sadhu Singh (Khanna Publishers)*
4. *Strength of Materials by R.S Khurmi (S.Chand & Co.)*
5. *Strength of Materials – G.H.Ryder - Macmillan, India*
6. *Strength of Materials– Andrew Pytel and Fredinand L.Singer, Addison –Wesley*
7. *Mechanics of Materials-SI Version 2nd Edition by EP Popov, (Prentice Hall India)*

Program: Diploma

Semester: Third

Course: Strength of Material Lab

Course Code: 7DP.205

L	T	P	C
0	0	2	1

List of Experiments:

1. Tensile Test: To prepare the tensile test upon the given specimen (Mild Steel).
2. Compression Test: To determine the compressive strength of the given specimen.
3. Torsion Test: To perform the Torsion test on given specimen.
4. Test: To determine the impact toughness of the given material.
5. Brinell hardness Test: To determine the hardness of the given specimen.
6. Rockwell Hardness Test: To determine the hardness of the given specimen.
7. To determine deflection of simply supported beam.

Program: Diploma

Semester: Third

Course: Mechanical Engineering Drawing

Course Code: 7DP.206

L	T	P	C
0	0	4	2

Course Objective:

- To enable students to acquire and use engineering drawing skills as a means of accurately and clearly communicating ideas, information and instructions.
- To enable students to acquire requisite knowledge, techniques and attitude required for advanced study of engineering drawing.
- The students should be proficient in using engineering drawing apparatus, materials and techniques.
- Students should be able to use and interpret standard conventions used in engineering drawing.

Unit I:

Projection of straight lines & planes:-Line inclined to both the planes. Plane inclined to both the planes limited to triangular, quadrilateral, pentagonal, hexagonal and circular planes. **Auxiliary views:** - Study of auxiliary planes, Projection of objects on auxiliary planes. Completing the regular views with the help of given auxiliary views (Use first angle method of projection).

Intersection of solids:- Curves of intersection of the surfaces of the solids in the following cases:(a) Prism with prism, Cylinder with cylinder, Prism with Cylinder. When (i) the axes are at 90° and intersecting. (ii) The axes are at 90° and Offset. (b) Cylinder with Cone When axis of cylinder is parallel to both the reference planes and cone resting on base on HP and with axis intersecting and offset from axis of cylinder.

Unit II:

Conventional Representation: - 1. Standard convention using SP – 46 (1988). (a) Materials C.I., M.S, Brass, Bronze, Aluminum, wood, Glass, Concrete and Rubber. (b) Long and short break in pipe, rod and shaft. (c) Ball and Roller bearing, pipe joints, cocks, valves, internal /external threads. (d) Various sections- Half, removed, revolved, offset, partial and aligned sections. (e) Knurling, serrated shafts, splined shafts, and chain wheels. (f) Springs with square and flat ends, Gears, sprocket wheel (g) Countersunk & counter bore. (h) Tapers

Unit III:

Limits, Fits and Tolerances: - Characteristics of surface roughness- Indication of machining symbol showing direction of lay, roughness grades, machining allowances, manufacturing methods. Introduction to ISO system of tolerance, dimensional tolerances, and elements of interchangeable system, hole & shaft based system, limits, fits & allowances. Selection of fit. Geometrical tolerances, tolerances of form and position and its geometric representation. General welding symbols, sectional representation and symbols used in engineering practices

Unit IV:

Details to Assembly: Introduction, Couplings Universal couplings & Oldham's Coupling, Bearing – Foot Step Bearing & Pedestal Bearing, Lathe tool Post, Machine vice & Pipe Vice, Screw Jack, Steam Stop Valve. **Assembly to Details:** Introduction–Pedestal Bearing, Lathe Tail Stock, Drilling Jig, Piston & connecting rod, Gland and Stuffing box Assembly, Valve - Not more than eight parts, Fast & loose pulley.

Suggested Reading:

1. *Machine Drawing, N. D. Bhatt, Chorotar Publishing House, Anand, India.*
2. *Mechanical Engineering Design, J. E. Shingle & C. R. Mischke, Tata McGraw Hill Publications, New Delhi.*
3. *Machine Drawing, N. Sidheswar & Kannaiah, Tata McGraw Hill Publications, New Delhi.*
4. *Machine Drawing, N. D. Junnarkar, Pearson Education.*

Program: Diploma

Semester: Third

Course: Mechanical Engineering Material

Course Code: 7D.203

L	T	P	C
3	0	0	3

Course Objective:

- Impart knowledge of mathematics, basic and applied sciences.
- Ability to identify, formulate and solve mechanical engineering problems based on data interpretation, design, experiment and analysis of results.
- Ability to work in teams on multi-disciplinary projects in industry and research organizations.
- Develop awareness of the ethical, professional and environmental implications of work in a global and societal context.
- Ability to self-learn modern engineering tools, techniques, skills and contemporary engineering practice, necessary for engineering work.

Unit I:

Engineering Materials and their Properties: Introduction, Classification and Application of Engineering materials.

Properties of metals: - Physical Properties – Structure, Density, Melting point. **Mechanical Properties**– Strength, elasticity, ductility, malleability, plasticity, toughness, hardness, hardenability, brittleness, fatigue, thermal conductivity, electrical conductivity, thermal coefficient of linear expansion. Introduction to Corrosion, types of Corrosion, Corrosion resisting materials.

Unit II:

Ferrous Metals and Alloys: Characteristics and application of ferrous metals. Phase equilibrium diagram for Iron and Iron Carbide. Flow diagram for production of Iron and Steel, Classification, composition and uses of cast iron, effect of sulphur, silicon and phosphorous. Classification, composition and application of low carbon steel, medium carbon steel and high carbon steel with their chemical composition. Magnetic materials: - Properties & Applications of commonly used magnetic materials (Permanent magnets and temporary magnets). Alloy Steels: - Low alloy steel, high alloy steel, tools steel & stainless steel. Effect of various alloying elements such as – Chromium, nickel, manganese, molybdenum, tungsten, vanadium. Tool Steels: - High speed Steels (HSS), Hot & cold Working dies, shear, punches etc., properties & applications. Special Cutting Tool Materials – Diamond, Stelites & Tungsten Carbide

Non Ferrous Metals and Alloys: Properties, applications & chemical compositions of Copper alloys (naval brass, muntz metal, Gun metal & bronzes), Aluminium alloys (Y-alloy & duralumin) & bearing materials like white metals, leaded bronzes & copper lead alloys. Desired properties of bearing materials.

Unit III:

Heat Treatment: Explain purpose of heat treatment. Describe processes of heat treatment and elaborate the methods of Annealing, normalizing, hardening, tempering, mar tempering, age hardening and surface hardening methods. List effects of heat treatment on the properties of steel. Explain hardenability of steel.

Non Metallic Materials: Polymeric Materials – Introduction to Polymers- types, characteristics, properties and uses of Thermoplastics, Thermosetting Plastics & Rubbers. Thermoplastic Plastics - characteristics and uses of ABS, Acrylics, Nylons and Vinyls. Thermosetting Plastics - Characteristics and uses of polyesters, Epoxies, Melamines & Bakelites. Rubbers – Neoprene, Butadiene, Buna & Silicons – Properties & applications. Properties and applications of following Engineering Materials – Ceramics, Abrasive, Adhesive and Insulating materials such as Cork, Asbestos, Thermocole and Glass Wool. Introduction to Composite Materials – Laminated & Fibre reinforced materials - Structure, Properties & Applications.

Unit IV:

Powder Metallurgy & Non-destructive Testing: Advantages, limitations and applications of Powder Metallurgy for engineering products. Brief Description of Process of Powder Metallurgy – Powder making, blending, compacting, sintering, infiltration & impregnation. Applications of Powder metallurgy for tungsten carbide tip tools & porous bearing. Importance of Non-destructive testing, Difference between Destructive and Nondestructive testing. Nondestructive testing methods - Radiography (X-Ray & Gamma Ray), Ultrasonic crack detection, Dye penetrant test, Magnaflux test – Comparison & applications.

Suggested Reading:

1. *Material Science and Metallurgy* by V. D. Kodgire, Everest Publishing House, 34th Edition 2013.
2. *A Text Book of Material Science and Metallurgy* by O.P.Khanna, Dhanpat Rai and Sons.
3. *Material Science and Metallurgy* by R.K.Rajput, S.K.Katari and Sons.
4. *Elements of Material Science and Engineering: VanVlack, Wesley Pub. Comp.*
5. *Material Science and Metallurgy* by Parashivamurthy K.I.
6. *Material Science & Processes* by S.K.Hazra Choudhury.

Program: Diploma

Semester: Third

Course: Manufacturing Technology

Course Code: 7D.202

L	T	P	C
3	0	0	3

Course Objective:

- Students will learn to use the knowledge of fundamental technical sciences integrated with applied technical specialties, such as engineering materials and mechanics, and electrical circuits, and will successfully apply analytical techniques and problem-solving skills necessary to adapt to technological changes and for a career within the manufacturing industry.
- Students will learn to use the academic experience from projects, laboratory experimentation, classroom lectures, and demonstrations, and will apply the in-depth technical knowledge attained in areas such as applied mechanics, computer-aided engineering graphics, design, manufacturing processes and materials, tooling, automation and production operations.
- Effectively use of their communication skills in oral, written, visual and graphic modes within interpersonal, team, and group environments.
- Will learn to demonstrate professionalism and ethics including a commitment to utmost performance quality and timeliness, respect for diversity, and awareness of international issues; and will initiate continuing professional development that demonstrates their commitment to the responsibilities of the contemporary engineering technologist throughout their careers.

Unit I:

Casting:

Patterns - Material used, types, Patterns allowances, Cores, Core allowances. Moulds - Mould materials, Types of sand, Moulding processes Sand molding, Pit molding, machine molding. Shell molding. Melting practice. Types of furnaces with specific application Cupola furnace, Electric arc furnace. Casting principle and operation. Special casting processes. Viz die casting, centrifugal casting, Investment casting. Casting defects.

Unit II:

Welding:

Classification. Gas welding techniques. Types of welding flames. Arc Welding – Principle, Equipment, Applications. Shielded metal arc welding. Submerged arc welding. TIG / MIG welding .Welding defects. Brazing and soldering: Types, Principles, Applications

Unit III:

Milling:

Classification. Basic parts and their functions – column and knee type. Types of operations. Types of milling cutters.

Lathe Operations: Types of lathes – light duty, Medium duty and heavy duty geared lathe.

Drilling: Classification, Basic parts and their functions - Radial drilling machine, Types of operations.

Unit IV:**Rolling and Extrusion:**

Principles of rolling and extrusion. Hot and cold rolling. Types of rolling mills . Different sections of rolled parts. Methods of extrusion – Direct, Indirect, backward & impact Extrusion, Hot extrusion, Cold extrusion Advantages, disadvantages and applications. **Forging:** Forging Processes – Drop forging, Die forging or press forging. Types of dies - Open Die, Closed Die (Single Impression and Multi-impession). Closed die forging operations - Fullering, Edging, Bending, Blocking,

Suggested Reading:

1. *Element of Workshop Technology Volume I and II -Hajara Chaudhary and Bose S.K., Asia Publishing House.*
2. *Production Technology Volume I and II –P.N.Rao, Tata McGraw Hill Publication.*
3. *Production Technology- R.K.Jain, Khanna Publications.*
4. *Production Technology- P.C.Sharma, Khanna Publication.*
5. *Workshop Technology-Chapman W.A.J., ELBS Publication.*
6. *Production Technology- HMT, Tata McGraw Hill Publication.*

Program: Diploma

Semester: Third

Course: Electrical Engineering

Course Code: 7D.201

L	T	P	C
3	0	0	3

Course Objective:

- To understand the basic concepts of magnetic, AC & DC circuits
- To explain the working principle, construction, applications of DC machines, AC machines & measuring instruments.
- To Gain knowledge about the fundamentals of wiring and earthing.

Unit I:

Introduction to Electrical power supply system Generation, Transmission, Distribution & Utilization. AC supply & DC Supply. Electric wiring & Illumination: Simple Electric Installations with 2 sockets, 2 fans, 2 lamps, fuses. Introduction to different accessories like MCCB, ELCB, wires & cables. Different types of lamps their specifications, Electric safety, Tariff & Power conservation ; Necessity of Earthing, types safety tools, first aid measures, types of tariff, pf improvement only methods, energy conservation & audit, fire extinguishing methods electrical engineering.

Unit II:

AC Fundamentals: Definitions cycle, frequency, phase, period, maximum value, average value, R.M.S. value. Concept of current, voltage, power & energy in R, L, & C circuits. (Simple Numerical). Three phase supply: Star & Delta circuit, Line & Phase relationship, power equation. (Simple Numerical.)

Unit III:

Utilization of Electrical Energy: Industrial applications: Classification of drives, factors for selection of motor for different drives, Enclosures & Mountings Electric heating & welding: Working principle & types selection of system, specifications & rating. Electro metallurgical Electro Agro Systems: used in electroplating, Electrical machines used in electro-agro systems (irrigation pumps). Measuring Instrument: Introduction to construction, operation and use of AC & DC ammeter, voltmeter, Electrodynamics Wattmeter, energy meter & digital multi-meter. DC Motor: Construction and principle of operation. Speed torque characteristics. Types, specifications & ratings and applications .Types of insulation used.

Unit IV:

A.C. Machines: Transformer: Construction and principle of operation. EMF equation and transformation ratio. Load test, efficiency and regulation. Specifications & rating. Auto transformer & 3 phase transformer concept only. Applications of transformers .AC motor: Construction and principle of operation of 3 phase induction motor. Speed torque characteristics, slip, speed control of Induction Motor by variable frequency drive(VFD)-working principle and block diagram only, Reversal of rotation, starters- Direct ON Line Starters and Star-Delta Starters-Working principle, Construction, Circuit diagram and Applications. Study the following motors with respect to specifications and rating, Construction and applications. 1) Single phase motors a) Capacitor start, b) Capacitor start and run, c) Shaded pole 2) Universal motor 3) Stepper motor 4) Servomotor Alternator: Construction, & applications. Self and separate excitation. -Construction, principle of operation, & applications

Suggested Reading:

1. *Electrical Machines* by S. K. Bhattacharya – Tata McGraw Hill Publications
2. *Electrical machines* by M. V. Deshpande – Wheeler Publication.
3. *Theory & Performance of Electrical Machine* by J. B. Gupta
4. *D. C. Machines and Transformers* by K. Mungnesh Kumar – Vikas Publication
5. *A Text Book of Electrical Technology* by B. L. Thereja – S. Chand publication
6. *Electrical Machine* by Dr. P. K. Mukherjee & S. Chakraborty
7. *AC Machines* by M. G. Say
8. *The performance and design of D. C. machines* by A. E. Clayton.

Program: Diploma

Semester: Third

Course: Electrical Engineering Lab

Course Code: 7DP.201

L	T	P	C
0	0	2	1

List of Experiment

1. Verification of resistance of resistor using color code.
2. Verification of ohm's law.
3. Verification of Kirchhoff's voltage law.
4. Verification of Kirchhoff's current law.
5. Equivalent resistors in series and parallel connection.
6. Verification of Norton's theorem.
7. Verification of superposition theorem.
8. Verification of the venin theorem.

Program: Diploma

Semester: Third

Course: Communication & Soft Skills

Course Code: 7DP.201

Course Objective:

The aim is to develop students' soft skills, communication, leadership and teamwork skills; and personal development skills using practical approach and exposure of students to the realities of the world.

- To enhance Leadership – assessing the requirements of a task, identifying the strengths/weaknesses within the team, utilising the diverse skills of the group to achieve the set objectives.
- To improve *Communication* – demonstrating clear briefing and listening /speaking skills.
- To make them realize that effective *communication* and interpersonal skills are crucial to increase employment opportunities and to compete successfully in the business environment.

The *course* aims to cause a basic awareness about the significance of *soft skills* in professional and interpersonal *communications and* facilitate an all-round development of personality. Hard or technical skills help securing a basic position in one's life and career. But only *soft skills* can ensure a person retain it, climb.

Unit I:

COMMUNICATION SKILLS

- Introduction
- Role of Communication in Today's World
- Objective of Communication
- Process of Communication
- Elements of Communication
- Essentials of Communication
- Barriers/ Factors Inhibiting Communication
- Flow of Communication
- Verbal Mode of Communication

Unit II:

COMMUNICATION NETWORK

- Non Verbal Mode of Communication
- Kinesics/Body Language, proxemics , chronemics, para lingual
- , Speaking, Listening & Talking
- Style in Technical Communication
- Communication Skills; Reading, Writing

Unit IV:

GRAPHICS

- Introduction
- Planning of Graphics
- Types of Graphics(textual ,visual, tables, bar Charts, pie charts, line charts, organizational charts, flow charts, maps & Pictographs)
- Placing of Graphics
- Construction of Graphics.

Unit IV:

TELEPHONIC CONVERSATION SKILLS

- Introduction
- Stages in Telephonic Conversation
- Listening & Speaking Skills
- Telephonic Skills
- Problems in Telephonic Conversation
- Intensive Listening

Suggested Reading:

1. *Monippally, Matthukutty. M. 2001. Business Communication Strategies. 11th Reprint. Tata McGraw-Hill. New Delhi*
2. *Swets, Paul. W. 1983. The Art of Talking So That People Will Listen: Getting Through to Family, Friends and Business Associates. Prentice Hall Press. New York*
3. *Lewis, Norman. 1991. Word Power Made Easy. Pocket Books*
4. *Sen , Leena .Communication Skills ; Eastern Economy Edition*
5. *Ghanekar , Dr. Anjali . Essentials of Business Communication Skills ; Everest Publishing House*
6. *David Green . Contemporary English Grammar, Structure & Composition ; MacMillan*
7. *Dictionary; Oxford*