



SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH
FACULTY OF ENGINEERING

Shri Rawatpura Sarkar University, Raipur



Examination Scheme & Syllabus

For

Diploma in Mechanical Engineering

Semester-IV

(Effective from the session: 2022-23)



**SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH
FACULTY OF ENGINEERING**

**Three Years Diploma Programme
Scheme of Teaching and Examination
Diploma Fourth Semester Mechanical Engineering
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the session: 2022-23)**

S.N	Course Code	Course Title	Hours per week			Credit	Examination Scheme			Sem End Exam Duration (Hrs)
			L	T	P		Continuous Evaluation	Sem End Exam	Total	
1.	DENME401T	Fluid Mechanics & Hydraulics	3	1	-	4	30	70	100	3
2.	DENME401P	Fluid Mechanics & Hydraulics-Lab	-	-	4	2	15	35	50	-
3.	DENME402T	Material Technology	3	1	-	4	30	70	100	3
4.	DENME402P	Material Testing Lab	-	-	4	2	15	35	50	-
5.	DENME403T	Plants Maintenance & Safety	3	1	-	4	30	70	100	3
6.	DENME404T	Manufacturing Process	3	1	-	4	30	70	100	3
7.	DENME404P	Manufacturing Process -Lab	-	-	4	2	15	35	50	-
8.	DENME405T	Industrial Management	3	1	-	4	30	70	100	3
9.	DENME407P	Personality Development /Health/Yoga	-	-	4	2	15	35	50	-
						28			700	



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Course Title	FLUID MECHANICS & HYDRAULICS			
Course Code	DENME401T			
Course Credits	L	T	P	TC
	3	1	-	4
Prerequisites	Fundamental of mechanical engineering			
Course objectives	<ul style="list-style-type: none"> • The application of fluid mechanics by the inclusion of fluid machinery specially water turbine and water pumps. • Today the principles of fluid mechanics find wide applications in many situations directly or indirectly. • The use of fluid machinery, turbines, pumps in general and in power station are getting on accelerated fill up. • The mechanical technicians have to deal with large variety of fluids like water, air, steam, ammonia and oven plastics. • The major emphasis is given for the study of water. However, the principles dealt with in this course will be applicable to all incompressible fluids. 			
Course Contents	<p>UNIT-I Fundamental of Fluid Flow Definition of fluid-ideal and practical Compressible and incompressible fluids, Fluid properties - density, specific weight, specific gravity, dynamic and kinematic viscosity Types of flow-laminar and turbulent, steady and unsteady, uniform and non-uniform. Continuity equation. Simple numerical problems on continuity equation.</p> <p>Pressure and its Measurement Concept of pressure, intensity of pressure, pressure head, and gauge pressure, vacuum pressure, absolute pressure. Manometers- Piezometer, U-tube manometer, inclined manometer, and differential manometer inverted U-tube manometer, differential manometer Pressure gauges. Simple numerical problems on differential manometers.</p> <p>UNIT-II Hydrostatics & Flow Measurement Introduction, total pressure, center of pressure, plane, regular surfaces immersed in liquid, (horizontal, vertical and inclined) Center of buoyancy, meta-center, meta-centric height Condition of Equilibrium of floating and submerged bodies. Basic Equation of Fluid Flow Various forms of energies applicable to fluid flow such as potential energy, kinetic energy, Pressure energy, total energy of fluid flow. Concept of datum pressure, velocity and total head of fluid particles in motion. Bernoulli's theorem, general steady flow energy equation and derivation of Bernoulli's theorem, practical</p>			



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application of Bernoulli's equation Venturimeter, orifice-meter, pitot tube, flow nozzle-their construction, working and limitation. Simple problems on venturi meter, orifice meter, pitot tube.

UNIT-III

Flow Through Orifices And Mouth Pieces

Definition and types of orifices Vena contract, coefficient of contraction, velocity, discharge and resistance. Torricelli's theorem. Experimental determination of C_c , C_v , and C_d . Head loss due to sudden enlargement, contraction and obstruction in pipe, Mouth pieces types and their uses. Simple numerical problems on discharge through orifices and pressure calculations for mouth pieces, time of emptying vessel by orifice (cylindrical, conical). Flow from vessel to another, large orifices. Flow Through Pipes Laminar and turbulent flow, Reynolds number, differentiation of laminar and turbulent flow on the basis of Reynolds number, loss of head due to friction in pipes Darcy's formula and Chezy's equation. Hydraulic gradient and total energy line, flow through long pipes, pipes in series and parallels branches, equivalent and parallels Simple problems based on above formula Water hammer and its effect, surge tank.

UNIT-IV

Pumps

Centrifugal pumps: - Construction, working and installation. Classification of centrifugal pumps, types & impellers, casings, stages, coupling, mounting in parallel arrangements, priming, cavitation's, operating characteristics of pumps. Selection of pump.. Selection of pump. Pumps (Submersible & Reciprocating) Submersible pumps: - Construction, working & installation. Classification & pumps: Types of impellers, casings, stages and couplings, mounting, Priming, Cavitation's, operating characteristics of pumps. Selection of pump. Reciprocating Pump:- Construction, working, installation, Classification of pump, single acting, double acting, slip, negative slip, max speed of reciprocating pump. Use of air vessels, cavitations and indicator diagrams, operating characteristics of pumps. Selection of pump.

UNIT-V

Impact Of Jet

Impact of Jets Impact of jet on flat and curved plates- stationary and moving Work done by pelton runner, velocity diagrams Simple numerical problems on axial, radial flow. Water turbines Meaning, classification-Impulse and reaction turbine. Comparison, description and working of pelton, Francis and Kaplan turbines. Selection of turbines, operating characteristics. Jet pumps: - Construction, working and installation. Classification of jet-pumps, types of impellers, casings, stages, couplings, mounting Priming, cavitation, operating characteristics of pumps.



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Course Outcomes	<ul style="list-style-type: none">• In physics and engineering, fluid mechanics is that describes the flow of fluids—liquids and gases.• It has several sub disciplines, including aerodynamics (the study of air and other gases in motion) and hydrodynamics (the study of liquids in motion).• Fluid dynamics has a wide range of applications, including calculating forces and moments on aircraft, determining the mass flow rate of petroleum through pipelines, predicting weather patterns, understanding nebulae in interstellar space and modelling fission weapon detonation.
Text Books	<ol style="list-style-type: none">1. Khurmi (s.chand & Co.)-“A text book of hydraulics, fluid mechanics and Hydraulic machines”2. M.manohar –“Fluid mechanics”3. Priyani-“Hydraulic & Hydraulic machines.”4. R.L. Draughtlery & A.C. Jugersoll-“ Fluid mechanics with engineering applications” (Mcgraw Hills)
References Books	<ol style="list-style-type: none">1. R.L. Draughtlery- “Fluid mechanics with engineering applications”, A.C. Jugersoll (Mcgraw Hills)2. V.N. Rao & Hasan-“ Journal of experiments in hydraulic laboratory”, Now heights)3. Dr. M.L. mathur-“ Fluid mechanics”, (Std. Publications) Bansal-“ Fluid mechanics”



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Course Title	MATERIAL TECHNOLOGY				
Course Code	DENME402T				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Basic knowledge of different materials and basic engineering chemistry etc.				
Course objectives	<ul style="list-style-type: none"> • The knowledge of materials, their properties and behavior is essential for people associated with engineering activities. Materials Technology plays an important role in design and production of a product from the point of view of reliability and performance of the product. • The curriculum of the subject emphasizes upon understanding the properties and behavior of materials in correlation with their structure and external environmental effects. • materials available for engineering use is quite vast, hence only the basic groups of materials such as ferrous, non-ferrous along with their general characteristics and application have been stressed upon. 				
Course Contents	<p>UNIT-I Engineering Materials Introduction to engineering materials. Classification of engineering materials and their properties, mechanical properties of materials, destructive and non-destructive testing. structure of solid materials: classification, amorphous and crystalline states, unit cells and crystal structure(bcc , fcc, and hcp) allotropy, solidification of metals, ingot solidification, dendritic growth and its effect on properties, methods of preventing dendritic growth, growth of single crystals-column crystal, equated grains, segregation of impurities, grain and grain boundaries, structural imperfection - types of imperfections, impurity atoms, point defects, line defects, screw and mixed dislocations, surface defects.</p> <p>UNIT-II Permanent Deformation Types & mechanism of plastic flow, Slip phenomenon in single crystals, Dislocation theory, Twinning, & Annealing, Recovery, Recrystallization and grain growth, Practical Metallography, preparation of specimen, selecting the specimen, grinding and polishing, Etching and etching reagents, The metallurgical microscope, use and care of microscope. Micro-examination, Sulphur printing.</p> <p>UNIT-III Phase Diagrams & Iron-Carbon System Basic definition of phases, solid solutions- types, formation, examples, characteristics, Factors affecting the formation of solid solutions, Equilibrium or phase diagrams plotting of equilibrium diagrams, Interpretation, phase rule, lever</p>				



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	<p>rule and its applications, Thermal equilibrium diagrams, uses, their Construction and interpretation, Iron Carbon diagram and its interpretation, solidification and cooling of various carbon steels, structures produced, Correlations of Mechanical properties with carbon content.</p> <p>UNIT-IV Heat Treatment Process</p> <p>Objective of heat treatment, Description of processes, Annealing, hardening, normalizing and tempering Hardening processes- surface hardening, Flame hardening case hardening, methods, their scope, limitation and advantages, Quenching mediums and its effect on hardness- Hardening defects due to improper quenching, Hardenability, Jommy test and interpretation of its results, TTT curves- interpretation and use.</p> <p>UNIT-V Ferrous And Nonferrous Metal</p> <p>classification, types of cast irons- their micro- structure, formation, properties and uses, alloy cast irons-various alloying elements used, their effects on properties and uses, classification, composition and uses of plain carbon steels, effect of impurities, alloy steels-classification, various elements used for alloying, their effects on properties and uses of alloy steels, tools steels- typical composition, requirement of tool steels, high speed steel, high carbon steel, standardization of steels. Designation of steels as per b.i.s codes. copper- its properties and uses, copper base alloys- brasses and bronzes, their classification, composition, properties and uses, designation of copper alloys as per b.i.s, aluminum- its, properties and uses, □ aluminum alloys- their composition, classification properties and uses (only commonly used important alloys), bearing alloys their composition and field of application.</p>
<p>Course Outcomes</p>	<ul style="list-style-type: none"> • Material technology explains the classification schemes that are used to categorize engineering materials. • Explain the differences in the mechanical behavior of engineering materials based upon bond type, structure, composition, and processing • it is for specific engineering applications using mechanical properties such as: yield strength, tensile strength, ductility or elongation, impact strength, toughness, Poisson's ratio, flexural strength, hardness, fatigue etc.
<p>Text book</p>	<ol style="list-style-type: none"> 1. O.P. Khanna –“A Textbook of material Science & metallurgy” 2. S.K.Choudhary- “Material Science of Processes” 3. Lauttin- “Material Science of Processes” - Lakhtin Pub.MIR publisher, Moscow 4. 4. A. Kempstyl- “Material of Engineers MH”
<p>References</p>	<ol style="list-style-type: none"> 1. K.M..Ralls-“Introduction to Material Science and Engineering”



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	<p>T.H.CourtneyJohn WulffPub. Wiley Eastern N. Delhi.</p> <p>2. R. Higgins.-“ Engineering metallurgy”</p> <p>3. B.S. Narang –“Material Science” CBS Pub. &Distributors- Delhi</p>
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Course Title	PLANT MAINTANCE & SAFETY				
Course Code	DENME403T				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Basic industrial engineering and management of plant and safety				
Course objectives	<ul style="list-style-type: none"> • To Maintenance of the machines and equipment is of paramount importance in any organization. To • Maintenance of the machines always lead to the timely production schedules of the less problems of the break downs in the industries. • The diploma pass- outs works in wide spectrum in any industry like the production, quality control planning etc. • To knowledge of the maintenance of the plant machinery. The course is intended to inculcate basic concept of the plant maintenance and safety aspects. 				
Course Contents	<p>UNIT-I Introduction to Plant Maintenance Introduction to maintenance, its need and scope classification, primary and secondary functions of the maintenance department. Functions and responsibilities of plant maintenance departments. Nature of maintenance problems in case of (a) rotating parts (b) reciprocating parts. Economic aspects and development trends in maintenance. fundamentals of basic maintenance practices: different maintenance practices procedure of corrective or break down maintenance, scheduled maintenance, preventive maintenance and predictive maintenance, methods of keeping record for condition of equipment, maintenance and replacement of parts standard data for maintenance and replacement of parts, standard data for maintenance form time standards (time to complete the maintenance job), lubrication standards.</p> <p>UNIT-II Organizational structure of maintenance department General duties and responsibilities of maintenance department, general organizational structure of maintenance department in large- and small-scale industries Controls in maintenance department by using suitable planning and scheduling procedure, machines, equipment, reference cards, maintenance records and lubrication plans for machines Use of lubrication plans and inspection Plant maintenance benefits, procedure, schedules. Lubrication Store keeping of consumable and non-consumable materials, spare parts, inventory and control Methods of storing different classes of materials. Types of lubricants, lubrication systems & their selection criteria.</p> <p>UNIT-III Maintenance cost and maintainability</p>				



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	<p>Definition, classification of maintenance cost procedures for obtaining cost data, maintenance cost control, productivity index and factors affecting the maintenance productivity index, use of control indices. Definition, factors in maintainability, maintenance index. Wear and its effect: definition of wear and types of wear, causes of wear, effects of wear on performance, wear reduction and component replacement.</p> <p>UNIT-IV Restoration and safety engineering Surface coating, reconditioning methods Welding, metallization, chromium plating, seals & packing Depreciation methods. Safety engineering Safety principles and practices Safe layout, Engineering Aspects of safety- Machine tools/Equipment's safety, guarding/interlocking/vibration-damping etc. Safety during manufacturing processes like welding, grinding, machining, handling of chemicals etc. Regular plant inspection and safety Audit, Hazard Analysis Safety of electrical installations and general electrical safety practices, Machine maintenance, Lubrication/oiling, Safety during material handling in shops.</p> <p>UNIT-V Safety management Accidents causes/body part affected, Accidents classified (minor, reportable, fatal, dangerous occurrences), Accident Reporting and statistics. Factory Act & Regulations: Salient points. Electric regulations: Salient points. Safety Measurement and analysis of accidents. Enquiry committees and implementation of recommendations. Fire prevention & protection:-fire potential areas firefighting measures: equipment's, training, and requirements. Concept of occupational health:- industrial hygiene, first aid occupational disease & control measures. Managing noise/dust/fumes/heat stress/ventilation. Personal protective equipment's for head, face, eye, ear, respiratory organ and other body parts and training to workers. Safety awareness, safety organizations.</p>
<p>Course Outcomes</p>	<ul style="list-style-type: none"> • The objective of plant maintenance is to achieve minimum breakdown and to keep the plant in good working condition at the lowest possible cost. • Machines and other facilities should be kept in such a condition which permits them to be used at their optimum (profit making) capacity without any interruption or hindrance.



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Text book	<ol style="list-style-type: none">1. Accident Prevention Manual for Industrial operations Frank E. McElroy, P.E., C.S.P. Editor in chief. National Safety Council, Chicago, U.S.A2. Accident Prevention Manual for Administration and programs Frank E. McElroy, P.E., C.S.P. Editor in chief. National Safety Council, Chicago, U.S.A.3. Council, Chicago, U.S.A.
References	<ol style="list-style-type: none">1. M.P. Rules Krishanlal Sethi –“Commentary on-Factories Act” with The lawyers Home, Indore-72. H.W. Heinrich –“Industrial Accident Prevention” McGraw Hill Book Company,3. N.V. Krishnan –“A Introduction to Safety Engineering and Management” DPS Publishers Pvt. Ltd. Calcutta.



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Course Title	MANUFACTURING PROCESS			
Course Code	DENME404T			
Course Credits	L	T	P	TC
	3	1	-	4
Prerequisites	Basic production engineering and applied chemistry			
Course objectives	<ul style="list-style-type: none"> • The expansion of technology, Manufacturing Processes is advancing very fast. • It is therefore essential for students to have insight regarding the various methods of manufacturing processes. • The course gives the opportunity for exhaustive study about machining, metal casting, mechanical working of metals, and metal joining. 			
Course Contents	<p>UNIT-I Introduction to manufacturing processes</p> <p>Introduction to different Conventional manufacturing processes, Exposure to various Non-conventional manufacturing processes, metal casting as a manufacturing method, different casting processes, advantages and limitations of casting as a production process, casting tools, special casting methods via Die casting, Centrifugal casting, Investment (lost wax) casting and Continuous casting, Casting defects-causes and analysis, area of application of casting process.</p> <p>UNIT-II Pattern making & molding</p> <p>Definition of pattern, Types of patterns their details, materials & allowances, Pattern making tools, colour code for pattern definition, Molding, methods, types of moulds & moulding materials, Mouldings sand its composition, and properties, Testing parameters of sand, and their effects, Sand preparation & conditioning, Defects of moulds, Cores and core making, core boxes.</p> <p>Melting & pouring: cupola, crucible, pit and electric arc furnaces, their salient features, advantages and limitations, preparing furnaces for melting and safety aspects, casting processes, Runner, risers and gate, Cleaning of casting.</p> <p>UNIT-III Heat treatment processes</p> <p>Annealing, normalizing, tempering, hardening, case-hardening, effects of heat treatment processes on material properties. hot working & cold working: introduction to hot and cold working, principal of mechanical working, importance, comparison between cold & hot working, structural changes during process, pre-heating of stock, defects in ingots and rectification, advantages and disadvantages of hot working, equipment required for hot working of metals, different hot working methods, basic principal of cold</p>			



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	<p>working, strength, hardness, residual stresses in cold working, type of cold working processes, forging, press working, riveting, cold rolling, drawing, spinning, factors which decide stocks used in hot working of a given product.</p> <p>UNIT-IV</p> <p>Forming Processes</p> <p>Principal of metal rolling, Basic components of a simple rolling equipment, difference between a bloom and billet as applied to rolling, Roller material, selection and desirable properties, Principle of thread rolling, Types of rolling mill. Metal drawing: Basic principle of drawing of metals, Differentiate between drawing and deep drawing of metals, Principle of wire drawing, Basic equipment required for wire-drawing, Die details, Process of metal spinning. Extrusion: Definition, Classify the methods for extrusion, their advantages & limitations, Tube extrusion, Impact extrusion, Application of extrusion processes. Forging : Die forging, difference between the cold die and hot die forgings, Advantages of forming by forging, common defects of forged parts, Limitations of forging, Progressive forging, Press forging, Upset forging, Die material, Applications of forging processes in engineering.</p> <p>UNIT-V</p> <p>Joining Process And Press Work</p> <p>Introduction & classification of metal joining processes, weldability of metals, metallurgy of welding. arc welding- carbon arc, metal arc, inert gas arc –TIG, MIG & submerged arc, gas welding - principle of operation & techniques, gas cutting, resistance welding- spot, seam, butt, projection, percussion techniques, special welding -thermit, ultra sonic, electron beam, explosive, friction, atomic hydrogen, electro-slag, plasma arc welding processes, soldering & brazing – types, tools, working principle, consumables, applications, adhesive bonding - glue, quick fix, araldite, fevicol, dendrite working principle, advantages & disadvantages, electrodes – types, selection, flux and their uses, defects in welds, testing and inspection, accident prevention in gas, fusion & arc welding. Press work: introduction to press working of metals, principle of press working, description of the simple press working, press working operations-punching, shearing, drawing, bending, slitting, curling, notching, trimming, double action press dies, specifications of a press, safety precautions to be used while working on a press.</p>
<p>Course Outcomes</p>	<ul style="list-style-type: none">• Demonstrate understanding of casting process• 2. Illustrate principles of forming processes• Demonstrate applications of various types of welding processes.• Differentiate chip forming processes such as turning, milling, drilling, etc.• Illustrate the concept of producing polymer components and ceramic components.• Distinguish between the conventional and modern machine tools.



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Text book	<ol style="list-style-type: none">1. Hazara & Choudhary-Work shop technology2. Dalela.- Materials and manufacturing process3. Yankee.-Manufacturing processes
References	<ol style="list-style-type: none">1. S.E. rusinof-“Manufacturing processes”2. R.E. Rossi-“ Welding Engineering”3. P.L. Jain-“ Foundry Engineering”



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Course Title	INDUSTRIAL MANAGMENT				
Course Code	DENME505T				
Course Credits	L	T	P	TC	
	3	1	-	4	
Prerequisites	Industrial engineering basic science & management etc				
Course Objectives	<ul style="list-style-type: none"> • Student has been earmarked for this course since the shop floor provides majority of the opportunity available for employment & many diploma pass outs are engaged in shop floor supervisory work. • It has been found necessary to impart information related to the concepts, principles, procedures and ‘understanding’ of management techniques. • Problematic situations on the shop floor. A systematic frame of thinking and a proper problem-solving • Help them to deal with worker’s psychology, their motivation level, and finally an idea of how Communication transfer is effected form the highest to lowest level. • Study of CPM and PERT value Analysis, Inventory control, and economic batch size determination. • It is hoped to course will evoke considerable interest in the diploma students and will help to get jobs earlier. 				
Course Contents	<p>UNIT-I Management & system thinking concepts Management- definition, activities, Theories-Decision, Quantitative, Mathematical, Behavioral Sciences, System definition and parameters, Production system, Non-production system and objectives, System design, procedure, system variables, Different types of model under system thinking. MATERIALS MANAGEMENT: Introduction & function of Material Management purchase system, Inventory, need & advantages of Inventory control, Different techniques of Inventory control -A.B.C. analysis, simple treatment only, Correlation, stock turn over, order quantity, Lead time purchase cycle, Economic order Quantity, simple numerical problems ,Safety stock, Stores Management-Definition and importance, Storing Procedure and store records.</p> <p>UNIT-II Production planning and control Production system, concept of planning, meaning of PPC, Classification & characteristics of each type, Function of &place of PPC in a organization, Production and consumption rate, Job, Batch and Mass production, Batch size, Buffer stock, Production cost components, Concept of production scheduling. Difference between Loading & Scheduling, Gantt chart scheduling, advantages and preparation of GANTT chart, Interpretation updating, critical</p>				



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	<p>ratio scheduling, Gap phasing and Lap phasing.</p> <p>UNIT-III Industrial Relations Scope, definition, need, objective and function of personnel management, Job analysis, Job description and its constituents, Man power as resources, recruitment, selection, training and terminal behavior in an organization, Communication in Industry its need and importance, Classification, technique and barriers in communication and their effects, Grievances, its meaning, factors responsible for grievances, process and condition for handling of grievances, Strikes and lockouts, conditions, conciliation and adjudication machinery, Motivation, meaning and its benefits, factors responsible for lack of motivation, techniques to boost the motivation in workers, Job satisfaction, social and economic values, factors influencing job satisfaction.</p> <p>UNIT-IV Organizational Dynamics & Computers Management Organization structure, characteristic and principle of organization, Modern organization approach, Types of organization, meaning and signification of various types, Organization change, resistance to change, employee's attitude, factors for reducing the resistance to change. Computers in Management Value Analysis & Computers in Management Concept of Cost and Concept of value, Objectives, components and types of value, V.A. procedure and V.A. Test. DARA SIRI method, value improvement procedures, Role of computers in management, introduction to computer system, Personal computer and its uses-introduction to management information system (MIS).</p> <p>UNIT-V Planning and preparing project report Selection of project, Scheduling of activities Involved, Model format, Project planning, preparation of action plan for implementation, preparation of project, Cases: - illustrate some real cases, the students are advised to 1. Visit few small scale industries situated in the city, nearby industrial area, Discuss the problem related to S.S.I. with entrepreneurs, Collect information about the market rates, quality & quantity of goods of their choice, Develop logical & analytical approach to purchase the raw material, finished good, Prepare project report for the industry, they are willing to start.</p>
<p>Course Outcomes</p>	<ul style="list-style-type: none"> • Illustrate the need for optimization of resources and its significance • Develop ability in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products. • Demonstrate the concept of value analysis and its relevance. • Manage and implement different concepts involved in method study and understanding of work content in different situations. • Describe different aspects of work system design and facilities design pertinent to manufacturing industries.



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	<ul style="list-style-type: none">• 6. Illustrate concepts of Agile manufacturing, Lean manufacturing and Flexible manufacturing
Text book	<ol style="list-style-type: none">1. Learning package on Industrial Management T.T.T.I., Bhopal.2. Kuntz -Essentials of Management , Mcgraw Hill.3. Ahuja.-Industrial organization and management Value Analysis Miles.
References	<ol style="list-style-type: none">1. R.S. Diwedi.-“Manpower Management”2. R.S. Davar.-“Personnel Management and Industrial Relations”3. O.P. Khanna-“ Industrial Engineering and Management”



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Course Title	FLUID MECNANICS & HYDRAULICS - LAB				
Course Code	DENME401P				
Course Credits	L	T	P	TC	
	-	-	4	2	
Prerequisites	Fundamental of mechanical engineering				
Course objectives	1. To understand and apply national and international standards while drawing machine component. 2. To understand the concept of various tolerances and fits used for component design. 3. To familiarize in drawing assembly, orthographic and sectional views of various machine components.				
Course Contents	<p style="text-align: center;">LIST OF PRACTICALS / TUTORIALS</p> 1. To measure the pressure of water in pipe by (a) Piezometer (b) Different types of manometers. 2. To verify Bernoulli's equation. 3. To determine discharge through a given venturimeter. 4. To determine discharge through a given orifice meter. 5. To determine discharge through a pitot tube. 6. To determine Cc, Cv, and Cd for different types of orifices and mouth piecas. 7. To determine loss of head due to: -A) Sudden enlargement. B) Sudden contraction. C) Friction in pipes. 8. Study of pelton wheel, Francis turbine, and Kaplan turbines. 9. To determine performance characteristics of above-mentioned water turbines. 10. Study of reciprocating pump. 11. To determine h.p. of reciprocating pump. 12. Study of centrifugal pump. 13. To determine operating characteristics of centrifugal pump.				
Course outcome	<ul style="list-style-type: none"> • Students are able to- Evaluate hydrostatic forces on various surfaces and predict stability of floating bodies. • Formulate and solve equations of the control volume for fluid flow systems Calculate resistance to flow of incompressible fluids through closed conduits and over surfaces 				



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Course Title	MATERIAL TESTING -LAB				
Course Code	DENME402P				
Course Credits	L	T	P	TC	
	-	-	4	2	
Prerequisites	Basic science and engineering of materials				
Course objectives	Develop intuitive understanding of the subject to present a wealth of real world engineering examples to give students a feel of how material science is useful in engineering practices.				
Course Contents	<p style="text-align: center;">1. LIST OF EXPERIMENTS</p> <ol style="list-style-type: none">1. Study and use of metallurgical microscope.2. Preparation of micro specimen.3. To study micro structural characteristics of gray cast Iron, white cast iron and Malleable cast iron.4. To study microstructure of carbon steel.5. To study of effect of normalizing & annealing on the hardness and micro- structure of high carbon steel.6. To study the effect of carbon and temperature on hardening of steel.7. To study the effect of temperature & properties during tempering of steel.8. To study the effect of quenching media on hardness of steel9. To study the Carbonizing and hardening of steel.10. To study Jommy Hardenability test and its industrial use.11. To study the microstructure of some important brasses and bronzes.12. To observe the micro structural characteristics and other properties of various cast irons and prepare a report there of for industrial use.				
Course outcome	<ul style="list-style-type: none">• Identify various crystal imperfections, deformation mechanisms, and strengthening mechanisms• Demonstrate understanding of various failure mechanisms of materials.• Interpret Iron-Iron carbide phase diagram, and different phases in microstructures of materials at different conditions.• Select appropriate heat treatment process for specific applications.• Identify effect of alloying elements on properties of steels• Illustrate basics of composite materials, Nano- materials and smart materials.				



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Course Title	MANUFACTURING PROCESS -LAB				
Course Code	DENME404P				
Course Credits	L	T	P	TC	
	-	-	4	2	
Prerequisites					
Course objectives	<ul style="list-style-type: none">• Diploma engineer in professional life has to operate, supervise and maintain Production systems available in the industry.• In view of this, it is mandatory for him to understand the fundamentals, concepts, principles and advancements in the manufacturing processes while working on the shop floor.				
Course Contents	<p>LIST OF EXPERIMENTS</p> <ol style="list-style-type: none">1. Industrial visits and report preparation on any two heat treatment processes.2. Preparation of two types of pattern considering all the aspects of pattern making with the help of production drawing.3. Industrial visits and report preparation on any two casting processes.4. One sheet metal job covering maximum sheet metal operations.5. Green sand mould preparation and finishing.6. One job on each internal & external thread cutting (V or Square).7. One job comprises of simple turning, step turning and taper turning.8. One job on eccentric turning.9. Practical on Tool grinding10. One job of slot cutting on shaper machine11. One job on drilling machine comprises of drilling, counter sinking, tapping.12. One job on each, lap welding and T- joint.13. Visit to an industry having CNC machines and Automation facilities and then preparation of report.				
Course outcome	<ul style="list-style-type: none">• Students able to identify the various mechanical process and mechanical instruments• Students are able to operate different types of work in a field and other field which are related to that.				



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Course Title	PERSONALITY DEVELOPMENT / HEALTH / YOGA				
Course Code	DENME407P				
Course Credits	L	T	P	TC	
	-	-	4	2	
Prerequisites	Nil				
Course objectives	<ul style="list-style-type: none"> • To help children know and accept individual and collective responsibility for healthy living at home, school and in the community. • To help children know their health status, identify health problems and be informed for taking appropriate remedial measures. • To create awareness among children about rules of safety in appropriate hazardous situations to avoid accidents and injuries. • To acquaint them with first-aid measures about common sickness and injuries. • To help children learn correct postural habits in standing, walking, running, sitting and other basic movements so as to avoid postural defects and physical deformities. • To help children improve their neuromuscular coordination through participation in a variety of physical activities in order to physical fitness. • To help children strive for excellence in games and sports. • To provide skills for dealing with psycho-social issues in the school, home and the community. 				
Course Contents	<p>Framework of Syllabus</p> <p>For effective implementation of the subject of Health and Physical Education, the committee identified several broad themes and these included:</p> <ol style="list-style-type: none"> 1. We and our environment. 2. Human Body; physical fitness and health 3. Food and Nutrition 4. Social Health and relationships with others 5. Safety and Security 6. Consumer Health; <p>Vocational and leadership aspects. Each of these themes has been addressed in a progressive and spiral manner keeping in view the preparedness of the child's level of development. Certain broad principles have guided the process of syllabus formulation and these are:</p> <ol style="list-style-type: none"> 1. Health education and physical education must not be treated merely as an instructive area since they have strong experiential component to them. 2. Some aspects of the subject will draw from other curricular area like environmental science, science and social science. How ever this subject will have its own core content and therefore needs to be treated on par with other subjects. 3. The experiences of NGOs, teacher educators and individual teachers who 				



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	<p>have been involved in curriculum, syllabi and material development and transaction must be considered for replication and upscaling in rural and urban schools.</p> <p>4. Experiences of ‘vertical programmes’ like the ICDS, midday meal programme, adolescent health and mental health have been appropriately considered while forming the syllabus.</p> <p>5. In view of the conscious efforts of the government to promote excellence in games and sports, the syllabus provides for indoor and outdoor games for school children.</p> <p>6. It seeks to create a broad based approach for the enhancement of skills and nurturing potentially talented children in games and sports.</p>
Course Outcomes	<ul style="list-style-type: none">• Ability to Identify, define the actual requirements, formulate, research literature, and analyze complex physical education and sports sciences related problems to reaching substantiated conclusions.• Apply the knowledge of basic sciences that may be relevant and appropriate to physical education and sports sciences leading to solution of complex sports related issues and problems.• Recognition of the need for and an ability to engage in continuing professional development.• Identify the research problem in the field of physical Education and sports.• Know to summarize the various research literature.• Understand and apply the basics of statistics in research.• Organize the samples and sampling techniques which is relevant to the study.
Text Books	<ol style="list-style-type: none">1. Goyandka, Harikrishandass : Yoga Darshan Geeta Press, Gorakhpur (Samvat 2061).2. Karel Werner : Yoga and Indian Philosophy Motilal Banarasidas.,19753. Swami Vivekananda : Jnana Yoga, Bhakti Yoga, Karma Yoga, Raja Yoga (4separate books) Advaita Ashrama, Kolkata, 2011 & 20124. Basavaraddi I. V. and Pathak, S. P. : Hathayoga ke Aadhar avam Prayoga (Sanskrit-Hindi), MDNIY, New Delhi, 20075. Sahay G. S. : Hathayogapradipika MDNIY, New Delhi, 20136. Gita press Gorakhpur : Shreemad Bhagvadgita Gita press Gorakhpur, Samvat 2073
References Books	<ol style="list-style-type: none">1. Stephens, Mark : Teaching Yoga, Essential Foundation & Techniques, North Astantic Books, California2. Duggal, Styapal : Teaching Yoga, The Yoga Institute, Santacruz, Bombay, 1985 21 Ramdev, Swami : Pranayama Rahasya



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