



MATS UNIVERSITY
ARANG, RAIPUR (C.G.)



Scheme & Syllabus

(1st Semester)

Diploma Diploma in Mechanical Engineering

MATS School of Engineering & I.T



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Scheme of Teaching & Examination

I – Semester

S. No.	Code	Subject	Total Credit	Periods per week			Scheme of marks	
				L	T	P	ESE	IM
1	DP100	Applied Mathematics-I	4	3	1	-	70	30
2	DP101	Applied Physics	3	3	0	-	70	30
3	DP102	Applied Mechanics	3	3	0	-	70	30
4	DP103	Computer Fundamentals and Its Applications	3	3	0	-	70	30
5	DP104	Environment and Ecology	3	3	0	-	70	30
6	DP105	Applied Physics Laboratory	1	-	-	2	30	20
7	DP106	Applied Mechanics Laboratory	1	-	-	2	30	20
8	DP107	Computer Fundamental Laboratory	1	-	-	2	30	20
9	DP108	Non Conventional Energy Sources Laboratory	2	-	-	4	30	20
10	DP109	Workshop Practice – I	2	-	-	4	30	20
Total			23	15	1	14	500	250

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	I
Branch	:	All Streams of Diploma in Engineering
Subject	:	Applied Mathematics-I
Total Theory Periods	:	48
Total Tutorial Periods	:	12
Total Credits	:	04
Code	:	DP 100

COURSE OBJECTIVES

- To develop the use of algebra techniques this is needed by engineers for practical applications.
- To familiarize the student with matrices, determinants and partial fractions. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools like binomial theorem, trigonometry and coordinate geometry and their usage.

UNIT I

ALGEBRA

LOGARITHMS- Definition of logarithm (Natural and Common logarithm.), Laws of logarithm. Examples.

PARTIAL FRACTION- Definition of polynomial fraction proper & improper. Fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non repeated linear factors, repeated linear factors and irreducible non repeated quadratic factors. To resolve improper fraction into partial fraction.

UNIT II

DETERMINANT AND MATRICES

DETERMINANT- Definition and expansion of determinants of order 2 and 3. Cramer's rule to solve simultaneous equations in 2 and 3 unknowns.

MATRICES- Definition of a matrix of order $m \times n$ and types of matrices. Algebra of matrices such as equality, addition, Subtraction, scalar multiplication and multiplication. Transpose of a matrix. Minor, cofactor of an element of a matrix, adjoint of matrix and inverse of matrix by adjoint method. Solution of simultaneous equations containing 2 and 3 unknowns by matrix inversion method.

UNIT III

BINOMIAL THEOREM

Definition of factorial notation, definition of permutation and combinations with formula. Binomial theorem for positive index. General term. Binomial theorem for negative index. Approximate value (only formula)

UNIT IV

TRIGONOMETRY

TRIGONOMETRIC RATIOS-Trigonometric ratios of any angle, Relation between degree and radian, Fundamental identities, Examples based on Fundamental Identities, factorization and defactorization formulae, inverse trigonometric ratios Definition of inverse trigonometric, ratios, Principal. Relation between inverse trigonometric ratios. values of inverse trigonometric ratios.



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UNIT V

COORDINATE GEOMETRY

POINT AND DISTANCES- Distance formula, Section formula, midpoint, centroid of triangle. Area of triangle and condition of collinearity.

STRAIGHT LINE- Slope and intercept of straight line. Equation of straight line in slope point form, slope-intercept form, two-point form, two-intercept form, normal form. General equation of line. Angle between two straight lines condition of parallel and perpendicular lines. Intersection of two lines.

CIRCLE- Equation of circle in standard form, centre – radius form, diameter form, two – intercept form. General equation of circle, its centre and radius.

VECTORS- Definition of vector, position vector, Algebra of vectors (Equality, addition, subtraction and scalar multiplication) Dot (Scalar) product with properties. Vector (Cross) product with properties. applications of vectors work done and moment of force about a point & line.

COURSE OUTCOMES

- This course equips students to have basic knowledge and understanding in one field of materials, algebra, trigonometry and coordinate geometry.

TEXT BOOKS

1. Higher Engineering Mathematics by B.S.Grewal (42th edition)-Khanna Publisher.
2. Advanced Engineering Mathematics by Erwin Kreyszig (8th edition)-John Wiley & Sons.

REFERENCE BOOKS

1. 1 Mathematics for polytechnic, S. P. Deshpande Pune Vidyarthi Griha
2. 2 Mathematics for Polytechnic Volume I, TTTI Publication
3. 3 Applied Mathematics, EEB Publication, Bhopal
4. 4 Trigonometry S. L. Loney S., Chand Publication
5. 5 College Algebra Frc.G. Valles Charotar Publication
6. 6 Matrices Ayres Schuam series, McGraw hill



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	I
Branch	:	All Streams of Diploma in Engineering
Subject	:	Applied Physics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 101

COURSE OBJECTIVE

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I

UNITS AND MEASUREMENTS

Fundamental units, Derived units, unit system, S.I. units – Their importance & notation, Base, S.I. units system & Abbreviations, Principle of vernier calipers, screw gauge & Speedometer. Definition of accuracy, precision and error, estimation of errors -absolute error, relative error and percentage error, rules and identification of significant figures. (Numerical on percentage error and significant figures)

UNIT II

FORCE, MOTION & GRAVITATION

Equations of motion, Newton's law of motion, Force & its derivation from Newton's laws of motion, Composition and resolution of forces, Parabolic Motion, Horizontal projection and projection at an angle, time of flight, Horizontal range and maximum horizontal range, Simple Problems, Centripetal acceleration, centripetal and centrifugal forces, Concept of friction and its application. Application to banking of roads, Newton's law of Gravitation, Basic forces in nature, Gravitational field, Potential, Relation between "g" & "G", factors influencing "g" escape velocity, Kepler's Laws of planetary motion, satellites, Time period of satellites, simple pendulum.

UNIT-III

ELASTICITY, SURFACE TENSION & VISCOSITY

Concept of elasticity, Deformation, Stress, Strain- its kinds and units, Hooke's law, elastic unit, elastic fatigue, Modulus of elasticity, Young's Modulus and its determination by Searl's method. Molecular forces, cohesive and adhesive forces, surface tension & surface energy, Reason for spherical shape of Rain Drops, Angle of contact, pressure difference a liquid surface excess pressure inside a liquid drop & soap bubble, shape of liquid surface In a capillary tube, Rise of liquids in a capillary tube, Determination of surface tension by capillary rise method. Effect of temperature on surface tension, examples of surface tension. Concept of viscosity & coefficient of viscosity, streamline and Turbulent flow.

UNIT IV

LIGHT, LASER AND SOUND

APPLICATIONS OF LIGHT- Refraction and refractive index. Defects in image formation (Qualitative), Simple and compound microscope, astronomical and Galileo telescopes and their magnifying powers.



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LASER - Properties of laser, spontaneous and stimulated emission, population inversion, optical Pumping, construction and working of He-Ne laser.

APPLICATIONS OF SOUND–ULTRASONIC Production of ultrasonic waves by using magnetostriction and piezo – electric methods. Applications to drilling cold welding, cleaning, flaw detection and exploration.

ACOUSTICS-Reflection, refraction and absorption of sound waves by surfaces. Echo and reverberation.

UNIT V

MODERN PHYSICS

PHOTO ELECTRICITY- Concept of photon, Plank's hypothesis, properties of photon, photo electric effect, Characteristics of photoelectric effect, work function, Einstein's photoelectric equation(no derivation), photoelectric cell-construction ,working and applications

X-RAYS - Introduction to x-rays, types of x-ray spectra-continuous and characteristics, production of x-rays using Coolidge tube, minimum wavelength of x-rays, properties of x-rays, engineering, medical and scientific applications.

COURSE OUTCOME

- The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

TEXT BOOKS

1. Applied Physics Vol. I&II H.C. Saxena & Prabhakar Singh
2. Applied Physics Vol. I&II D.Halliday & R.Rasnick
3. Engineering Physics – BVN Rao

REFERENCE BOOKS

1. Principles of Physics – K.K. Mohindroo
2. Basic Principles of Physics – Brij Lal Subramanyam.
3. Physics-I V. Rajendran, Tata McGraw- Hill raw- Hill publication, New Delhi
4. Applied physics Arthur Beiser, Tata McGraw- Hill raw- Hill Publication, New Delhi
5. Engineering Physics by R.K.Gaur and S.L.Gupta, Dhanpat Rai Publication, New Delhi.



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Semester	:	I
Branch	:	All Streams of Diploma in Engineering
Subject	:	Applied Mechanics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 102

COURSE OBJECTIVES

- To gain a fundamental understanding of the concepts of force, moments, moment of inertia.
- To study engineering properties of materials, force-deformation and stress-strain relationship
- To learn fundamental principles of equilibrium, compatibility, and force-deformation relationship, and principle of superposition of forces.
- To analyze; determinate beams to determine axial forces, shear forces, bending moments.

UNIT I

FUNDAMENTAL CONCEPTS

Definition of Mechanics, Statics, Dynamics, Kinetics, Kinematics. Concept of space, mass, particle, body, rigid body. Scalar, vector, fundamental units, derived units.

UNIT II

FORCES AND FRICTION

FORCE- concept, definition, unit, graphical representation. Concept of system of forces- non-coplanar, coplanar, concurrent, non-concurrent & parallel forces. Composition & Resolution of forces. Free body diagrams, law of parallelogram, Varignon's theorems.

FRICTION- Rough & Smooth surfaces, concept of friction. Types of friction, Coloumb's law of friction, Co-efficient of friction, angle of friction, angle of repose. Ladder and wedge friction. Friction in Journal bearings Method of reducing friction.

UNIT III

CENTROID AND CENTRE OF GRAVITY

CENTROID- Definition of centroid, moment of an area about an axis, centroid of basic geometrical figures such as square, rectangle, triangle, circle, semicircle and quarter circle. Centroid of composite geometrical figures.

CENTRE OF GRAVITY- Definition, centre of gravity of simple solids such as cylinder, sphere, hemisphere, cone, cube, and rectangular block. Centre of gravity of composite solids (No hollow solids shall be considered).

UNIT IV

SIMPLE LIFTING MACHINES

Load, Effort, Mechanical advantage, Velocity ratio, Efficiency and relation between them. Law of Machine, Reversibility of Lifting machine. Study of Machines- Differential wheel & axel, Weston



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differential pulley block, Simple Screw Jack, Worm & Wheel, Single and Double purchase Winch, System of pulleys.

TRANSMISSION OF POWER- Transmission of power through Belt, Rope and Gears, Ratio of tension on tight and slack sides. Spur, Helical & Bevel gear, Rack and Pinion gear. Gear Trains- Simple, Compound, Reverted.

UNIT V

KINETICS AND KINEMATICS- Kinetics of particle, motion under constant force, Newton's Laws of Motion. D' Alemberts principle. Motion under constant torque, Flywheel. Kinematics in Cartesian and polar coordinates. Angular displacement, Angular Velocity, Angular Acceleration. Motion under gravity.

COURSE OUTCOME

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

TEXT BOOKS

1. A Text Book of Applied Mechanics, R.S. Khurmi, S. Chand & Company Ltd., New Delhi
2. Applied Mechanics, I. B. Prasad, Khanna Publisher, New Delhi
3. Engineering Mechanics, Beer – Johnson, Tata McGraw Hill, Delhi

REFERENCE BOOKS

1. Engineering Mechanics, Basu, Tata McGraw Hill, Delhi
2. Applied Mechanics, R. S. Khurmi, Dhanpat Rai & sons, Delhi
3. Fundamental of Applied Mechanics, Dhade, Jamdar & Walawalkar, Vidhyarthi Gruh Prakashan, Pune
4. Engineering Mechanics, Timoshenko & Young, McGraw Hills Publication, New Delhi



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	I
Branch	:	All Streams of Diploma in Engineering
Subject	:	Computer Fundamentals and Its Applications
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 103

COURSE OBJECTIVES

- This course will introduce student to the field of computer science and the fundamentals of computer.
- It is specifically designed for students with no prior programming experience, and touches upon a variety of fundamental topics.
- The goal of the computer science curriculum is to provide students with the knowledge and tools that will allow them to design and implement effective, economical, and creative solutions for the needs of individuals, society, and the high-tech economy.

UNIT I

COMPUTER APPRECIATION

Definition of electronic compute, history, generation, characteristics & application of computers, classification of computers, RAM, ROM, computer, hardware, CPU, various I/O devices, peripherals, storage media, software, definition and concepts.

UNIT II

DATA COMMUNICATION & NETWORKS

Computer networks, networking of computers, introduction to LAN, WAN, MAN, network topologies, basic concepts in computers networks, introduction to GPRS, CDMA, GSM & FM technologies.

UNIT III

FAMILIARIZATION WITH OPERATING SYSTEM

Introduction to computer Operating System (Dos, 2000/Xp), Introduction to Dos structure, system files, batch files & configuration files, Booting the system from hard disk. Brief Introduction to Dos internal & external commands, Familiarization with windows structures, its use and application.

UNIT IV

COMPUTER APPLICATIONS SOFTWARE

Word processing software - MS-WORD, Data analysis software - MS-EXCEL Introduction to electronic spreadsheet, Presentations software - MS-POWER POINT

UNIT V

INTERNET TECHNOLOGY

What is Internet, Equipment Required for Internet connection (MODEM and Terminal Adapters)



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Sending & receiving Emails, Browsing the WWW, Creating own Email Account, Internet chatting (textual /voice), Bulletin Boards, Video conferencing, FTP (uploading and downloading files), Web-Site Access and Information Search, Browsers and search engines.

COURSE OUTCOME

- Compare and contrast various types of computers.
- Explain the purpose of CPU and how it works.
- Describe how information is stored in memory.
- Know about various types of software's and its applications.

TEXT BOOKS

1. Introduction to Computers- Peter Norton's, Tata McGraw Hills Publishing Co.l Ltd. N. Delhi, IInd Edition, 1998
2. Vikas Gupta , Comdex Computer Course Kit First , Dreamtech publication
3. Henry Lucas Information Technology for management 7th Tata Mc-Graw Hills

REFERENCE BOOKS

1. B.Ram, Computer Fundamentals Architecture and Organisation , Revised 3rd , New Age International.
2. Computer Today S.K.Basanbhara, Galgotia Publication, 1 st Edition, 2000
3. Computer Organization and Architecture, William Stalling, Prentice Hall of India Pvt.Ltd ,N.Delhi, IV th - Edition, 1999.
4. Structured computer Organization , Andrews Tanenbaum, Prentice Hall of India Pvt.Ltd, N.Delhi, III rd- Edition, 1997



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Semester	:	I
Branch	:	All Streams of Diploma in Engineering
Subject	:	Environment and Ecology
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 104

COURSE OBJECTIVE

- This course introduces students to environment concerns. Students are expected to learn about environment, factors affecting it.
- Environmental ethics and its protection through lectures, presentations, documentaries and field visits.

UNIT I

CONCEPTS OF ENVIRONMENTAL SCIENCES AND NATURAL RESOURCES

Environment, Levels of organizations in environment, Structure and functions in an ecosystem; Biosphere, its Origin and distribution on land, in water and in air, Broad nature of chemical composition of plants and animals. Renewable and Non-renewable Resources, Forests, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternative).

UNIT II

BIODIVERSITY AND ITS CONSERVATION

Biodiversity at global, national and local levels: India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses), and strategies for conservation.

UNIT III

ENVIRONMENTAL POLLUTION

Types of pollution- Air, water (including urban, rural, marine), soil, noise, thermal, nuclear; Pollution prevention; Management of pollution- Rural/Urban/Industrial waste management [with case study of any one type, e.g., power (thermal/nuclear), fertilizer, tannin, leather, chemical, sugar], Solid/Liquid waste management, disaster management.

UNIT IV

ENVIRONMENTAL BIOTECHNOLOGY AND ENVIRONMENTAL MONITORING

Biotechnology for environmental protection- Biological indicators, bio-sensors; Remedial measures- Bio-remediation, phyto-remediation, bio-pesticides, bio-fertilizers; Bio-reactors- Design and application. Monitoring- Identification of environmental problem, tools for monitoring (remote sensing, GIS); Sampling strategies- Air, water, soil sampling techniques.



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UNIT V

SOCIAL ISSUES AND ENVIRONMENT

Problems relating to urban environment- Population pressure, water scarcity, industrialization; remedial measures; Climate change- Reasons, effects (global warming, ozone layer depletion, acid rain) with one case study; Legal issues- Environmental legislation (Acts and issues involved), Environmental ethics

COURSE OUTCOMES

- Describe a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Critically analyze technical subject matter (written or oral) for scientific merit apply learned environmental knowledge and understanding to solve technical /research problems in new contexts.

TEXTBOOKS

1. Gilbert M. Masters, “Introduction to Environmental Engineering and Science”, 2nd Edition, Pearson Education, 2004.
2. Benny Joseph, “Environmental Science and Engineering”, Tata McGraw-Hill, New Delhi, 2006.

REFERENCE BOOKS

1. A. K. Chatterji, “Introduction to Environmental Biotechnology”, Prentice Hall of India, New Delhi, 2006.
2. R.K. Trivedi, “Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards”, Vol. I and II, Enviro Media.
3. Nebel B. J., “Environmental Science”, Prentice Hall of India, New Delhi, 1987.



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Semester	:	I
Branch	:	All Streams of Diploma in Engineering
Subject	:	Applied Physics Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 105

COURSE OBJECTIVES

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

LIST OF EXPERIMENTS

1. To use Vernier Caliper for the measurement of dimensions of given object.
2. To use Micrometer Screw Gauge for the measurement of dimensions (Length, Thickness, Diameter) of given object.
3. To verify Hooke's Law by Searle's method and to calculate Young's modulus of elasticity of steel wire.
4. To determine the value of "g" using simple pendulum.
5. To determine Young's modulus of elasticity of the material of given wire using Searl's apparatus.
6. To determine surface tension of water by capillary rise method.
7. To determine coefficient of viscosity of given fluid (Glycerin) using Stoke's Method.
8. To determine coefficient of viscosity of a fluid by Poiseuille's method.
9. To determine refractive index of the material of prism using graph.
10. To determine focal length of concave mirror & convex lens.
11. To determine focal length of combination of two lenses.
12. To determine mechanical equivalent of heat by using Joules calorimeter.
13. To determine the velocity of sound by using resonance tube.
14. To verify characteristics of photoelectric cell.
15. Use of Thermocouple as a thermometer for the measurement of unknown temperature (Boiling Point of Water)

COURSE OUTCOMES

- The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.



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Semester	:	I
Branch	:	All Streams of Diploma in Engineering
Subject	:	Applied Mechanics Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 106

COURSE OBJECTIVES

- To gain a fundamental understanding of the concepts of force, moments, moment of inertia.
- To learn fundamental principles of equilibrium, compatibility, and force-deformation relationship, and principle of superposition of forces.
- To analyze; determinate beams to determine axial forces, shear forces, bending moments.

LIST OF EXPERIMENTS

1. Verification of law of triangle of forces.
2. Verification of law of Parallelogram of forces.
3. Verification of law of Polygon of forces
4. To verification of Lami's theorem.
5. Demonstration of Non-concurrent, Non-Parallel forces (Funicular diagram)
6. Verification of Law of Moments.
7. Determination of coefficient of friction for surfaces of different materials on-
a) Horizontal Plane b) Inclined Plane
8. Draw – V-T diagram's for different combinations of-
a) Velocities b) Uniform accelerations
9. Find-out Mechanical advantage, Velocity Ratio and Efficiency for following
1. Machines- a) Simple Screw b) Differential Wheel & Axle c) Simple Purchase Crab d) Differential Pulley Block.
10. Demonstration of use of inclined plane as a lifting machine.
11. Experimental location of center of gravity of plane plate of uniform thickness.
12. Comparison of coefficient of friction of various pair of surfaces and determination of angle of repose.
13. To verify equilibrium of parallel forces – simply supported beam reactions.
14. To find MA, VR, Efficiency, Ideal Effort, Effort lost in friction for various loads and establish law of machine and calculate maximum efficiency. Also check the reversibility of a machine
a) Worm and worm wheel or Differential axle and wheel
b) Weston's differential pulley block or Geared pulley block
c) Single purchase crab or Double purchase crab
d) Simple screw jack.
e) Two sheave and three sheave pulley block.
16. Graphical solutions on graph paper of the following:
a) Concurrent force system: Two problems
b) Parallel force system: Two problems
c) Reactions of a beam having vertical point loads & UDL: Two problems



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COURSE OUTCOME

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.



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Semester	:	I
Branch	:	All Streams of Diploma in Engineering
Subject	:	Computer Fundamental Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 107

COURSE OBJECTIVES

- This course will introduce student to the field of computer science and the fundamentals of computer.
- It is specifically designed for students with no prior programming experience, and touches upon a variety of fundamental topics.
- The goal of the computer science curriculum is to provide students with the knowledge and tools that will allow them to design and implement effective, economical, and creative solutions for the needs of individuals, society, and the high-tech economy.

LIST OF EXPERIMENTS

1. **PRACTICE ON WINDOWS 7/8:** Starting Windows, Exploring the desktop, Arranging windows, My Computer, The start button, Creating Shortcuts, Practice on moving and sizing of windows - Study of file organization: creating, copying, moving, renaming and deleting. - Practice on Windows Accessories- Notepad, Word Pad and Paint. - Editing document & formatting text, Previewing and printing document/Image file. - Practice on Windows Explorer. - Recycle bin - Shutting down windows.
2. **PRACTICE ON MS-WORD:** Create and format document, - Edit and Modify text- changing font size type and style, AutoText, AutoComplete, AutoCorrect, grammar and spellchecker, Find and replace of text- Open save and print a document - Insert, modify table **PRACTICE ON MICROSOFT EXCEL:** Create, save & format worksheet, - Open and save worksheet file, - edit & modify data, - use formula and functions, - split windows and freeze pans, - Create, edit, modify, print worksheet/charts.
3. **PRACTICE ON POWERPOINT:** Create, edit, insert, move, slides - Open and save presentation- Insert picture, slide layout, action button - Present slide show.
4. **PRACTICE ON:** Identification of type of Account. - Connecting to internet, Dial up access, - Web browsing,-Searching websites.
5. **PRACTICE ON:** Information searching - Email services Creating email accounts & Receiving and sending mails

COURSE OUTCOME

- Compare and contrast various types of computers.
- Explain the purpose of CPU and how it works.
- Describe how information is stored in memory.
- Know about various types of software's and its applications.



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Semester	:	I
Branch	:	All Streams of Diploma in Engineering
Subject	:	Non Conventional Energy Sources Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	02
Code	:	DP 108

COURSE OBJECTIVES

- This course introduces students to environment concerns. Students are expected to learn about environment, factors affecting it.

LIST OF EXPERIMENTS

1. Study of Solar Radiation by using Pyranometer.
2. Study of Solar Distillation or Solar Still.
3. Study of solar water pumping
4. To study the constructional details of a box type solar cooker.
5. Prepare delicious food by using solar cooker.
6. Study of Thermo siphon solar water heating system.
7. Study of Forced circulation solar water heating system
8. Study of Solar Street Lighting and Lanterns.
9. Study of Bio gas plant.
10. Study of Horizontal Wind Mill
11. Study of Fuel cells.

COURSE OUTCOMES

- Describe a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability



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Semester	:	I
Branch	:	All Streams of Diploma in Engineering
Subject	:	Workshop Practice – I Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	02
Code	:	DP 109

COURSE OBJECTIVES

- To develop in students, Carpentry skills, welding skills.
- To expose them to existing national standards related to Fitting Skills.
 - A. Carpentry Shop
 - B. Fitting Shop
 - C. Welding Shop

LIST OF EXPERIMENTS

1. Measurement Identification and use of the various measuring tools & instruments.
2. Wood working (carpentry shop)
 - 2.1 Identification of carpentry tools and their uses.
 - 2.2 Perform various wood working operations.
3. Fitting Shop.
 - 3.1 Identification of various tools used and the operations performed in fitting shop.
 - 3.2 Perform various fitting operations.
 - 3.3 Marking of job as per dimension.
 - 3.4 Sawing.
 - 3.5 Chipping.
 - 3.6 Filling.
 - 3.7 Taping.
 - 3.8 Reaming.
 - 3.9 Drilling.
4. Welding Shop
 - 4.1 Identification and use of the various tools and equipments.
 - 4.2 Perform the arc welding and gas welding operations.
 - 4.3 Perform the soldering and Brazing operations.

COURSE OUTCOMES

- Ability to Fitting Skills.
- Ability to Carpentry skills, welding skills



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Scheme & Syllabus

(2nd Semester)

Diploma in Mechanical Engineering

MATS School of Engineering & I.T



MATS UNIVERSITY

ARANG, RAIPUR (C.G.)



Scheme of Teaching & Examination

II – Semester

S. No.	Code	Subject	Total Credit	Periods per week			Scheme of marks	
				L	T	P	ESE	IM
1	DP200	Applied Mathematics-II	4	-	1	-	70	30
2	DP201	Applied Chemistry	3	-	0	-	70	30
3	DP202	Engineering Drawing	2	-	0	-	70	30
4	DP203	Basic Electrical and Electronics	4	-	1	-	70	30
5	DP204	Communication Skills	3	-	0	-	70	30
6	DP205	Applied Chemistry Laboratory	1	2	-	2	30	20
7	DP206	Engineering Drawing Laboratory	2	4	-	4	30	20
8	DP207	Basic Electrical and Electronics Laboratory	1	2	-	2	30	20
9	DP208	Communication Laboratory	1	2	-	2	30	20
10	DP209	Workshop Practice – II Laboratory	2	2	-	2	30	20
Total			23	15	2	12	500	250

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)



MATS UNIVERSITY

ARANG, RAIPUR (C.G.)



MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	All Streams of Diploma in Engineering
Subject	:	Applied Mathematics-II
Total Theory Periods	:	48
Total Tutorial Periods	:	12
Total Credits	:	04
Code	:	DP 200

COURSE OBJECTIVES

- To develop the use of calculus techniques, this is needed by engineers for practical applications.
- To familiarize the student with statistics and complex numbers. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their

UNIT I

FUNCTION AND LIMIT

FUNCTION- Definitions of variable, constant, intervals such as open, closed, semi-open etc. Definition of Function, value of a function and types of functions, Simple Examples.

LIMITS- Definition of neighborhood, concept and definition limit. Limits of algebraic, trigonometric, exponential and logarithmic functions with simple examples

UNIT II

DERIVATIVES

Definition of Derivatives, notations. Derivatives of Standard Functions Rules of Differentiation. (Without proof). Such as Derivatives of Sum or difference, scalar multiplication, Product and quotient. Derivatives of composite function (Chain rule). Derivatives of inverse and inverse trigonometric functions. Derivatives of Implicit Function, Logarithmic differentiation Derivatives of parametric Functions. Applications of Derivative.

UNIT III

INTEGRATION

Introduction, Definition, Method of substitution, Integration by parts, Integration by Partial Fraction Method, Integration of the form and Reduction Formula., Definite Integral – Introduction

UNIT IV

STATISTICS

Measures of Central tendency (mean, median, mode) for ungrouped and grouped frequency distribution. Graphical representation (Histogram and Ogive Curves) to find mode and median Measures of Dispersion such as range, mean deviation, Standard Deviation, Variance and coefficient of variation. Comparison of two sets of observations.

UNIT V

COMPLEX NUMBER

Definition of Complex number. Cartesian, polar, Exponential forms of Complex number. Subtraction, Multiplication and Division). De-Moivre's theorem (without proof) Examples based on it, roots of



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complex numbers, roots of unity, Euler's form of Circular functions, hyperbolic functions and relations between circular & hyperbolic functions

COURSE OUTCOMES

- This course equips students to have basic knowledge and understanding in one field of materials, integral and differential calculus.

TEXT BOOKS

1. Introductory Method of Numerical Analysis, Sastry S. S. (, PHI)
2. Mathematical Statistics, Ray and Sharma

REFERENCE BOOKS

1. Modern Algebra Sharma and Seth (Ram Prasad and Sons)
2. Mathematics for polytechnic, S. P. Deshpande, Pune Vidyarthi Griha
3. Applied Mathematics, EEB Publication, Bhopal.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	All Streams of Diploma in Engineering
Subject	:	Applied Chemistry
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 201

COURSE OBJECTIVES

- To make the students conversant with atomic structure.
- Principles of electrochemical reactions, acids and bases.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT I

ATOMIC STRUCTURE

Definition of Atom, Fundamental Particles of Atom – their Mass, Charge, Location, Definition of Atomic no., Atomic Mass no., Isotopes & Isobars, & their distinction with suitable examples, Bohr's Theory, Definition, Shape of the orbitals & distinction between Orbits & Orbitals, Hund's Rule, Filling Up of the Orbitals by Aufbau's Principle (till Atomic no. 30), Definition & types of valency (Electrovalency & Covalency), Octet Rule, Duplet Rule, Formation of Electrovalent & Covalent Compounds.

UNIT II

ELECTRO CHEMISTRY

ACIDS AND BASES- Concept of acids and bases, their strength in ionization constant. PH value, acid base titration, choice of indicators. Hydrolysis, Buffer solution. **ELECTROLYSIS** - Concept of electrolysis. Kohlrausch law, Ostwald dilution laws, Transport no. Faraday's law of electrolysis. Engineering applications (electrometallurgy, electroplating & electrorefining)

UNIT III

SOLUTIONS & COLLOIDS

Solute, solvent, solution & colloids. Particle size and colloidal state Types of colloidal solution, reparation of colloids, properties of colloidal solutions, Origin of change on colloidal particles, precipitation of Coagulation of colloidal solution. Protective colloids and Gold number, Emulsions cleansing action of soaps, Detergents, Gels.

UNIT IV

METALS

Occurrence of Metals, Definition of Metallurgy, Mineral, Ore, Gangue, Flux & Slag, Mechanical Properties of metals such as Hardness, Toughness, Ductility, Malleability, Tensile strength, Machinability, Weldability, Forging, Soldering, Castability. Stages of Extraction of Metals from its Ores in detail i.e. Crushing, Concentration, Reduction, and Refining. Physical Properties & Applications of some commonly used metals such as Fe, Cu, Al, Cr, Ni, Sn, Pb, Zn, Co, Ag, W.



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UNIT V

FUELS AND EXPLOSIVES

Classification of fuels, solid fuels, liquid fuels, gaseous fuels, characteristics of a good fuel, calorific value, Determination of calorific value by Bomb calorimeter, Explosives- classification and application.

LUBRICANTS, PAINTS AND VARNISHES- Lubricant- meaning types, theory of lubrication, properties of good lubricants with special emphasis on Flash, Fire point, pour point and cloud point. Specification number and viscosity, Paints and Varnish – Constituents, properties and uses.

COURSE OUTCOMES

- The knowledge gained on solutions, fuels, energy sources and atomic structure will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS

1. Jain & Jain- Engineering Chemistry, Dhanpat Rai and Sons
2. Engineering Chemistry by O. P. Agrawal.
3. S. S. Dara, Engineering Chemistry, S. Chand Publication

REFERENCE BOOKS

1. Vedprakash Mehta, Polytechnic Chemistry by Jain brothers
2. Physical Chemistry by Glosstone.
3. Modern Text Book of Applied Chemistry by P.C. Jain, Dr. G. C. Saxena and Dr.A. K. Goswami.



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ARANG, RAIPUR (C.G.)



MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	All Streams of Diploma in Engineering
Subject	:	Engineering Drawing
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	02
Code	:	DP 202

COURSE OBJECTIVES

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.

UNIT I

INTRODUCTION, ENGINEERING CURVES AND SCALES

Introduction to drawing equipments, instruments and their uses, Planning of drawing sheet as per I.S. 696 – 1972, Indian standard practices of laying out and folding of drawing Different types of lines used in engineering drawing, Standard practice for writing single stroke vertical and inclined capital and lower cases letters (practice to be done on sketch book), Standard practice of writing numerals (practice to be done on sketch book)

ENGINEERING CURVES AND SCALES: Types and Method of construction of engineering curves, Practice problems of drawing various Engineering Curves, Importance of scale in engineering drawing, Types of scales- plain, diagonal etc, Practical problems for constructing various types of scale.

UNIT II

ORTHOGRAPHIC PROJECTION OF POINTS, LINES AND PLANES

Definitions of various terms associated with orthographic projections, Planes of projections, Concept of Quadrants, First and third angle method of projection, Projection of line (limited to first quadrant), Projection of planes with respect to reference planes, Practice problems on projection of points, lines and planes.

UNIT III

PROJECTION OF SOLIDS AND SECTION OF SOLIDS

Projection of simple solids – cube, prism, cylinder, cone and pyramids, Sectional view – need for sectional view – cutting plane – cutting, plane line-representation as per I.S. code- hatching – section of simple solids, cube, prism, cylinder, cone.

UNIT IV

ISOMETRIC PROJECTIONS

Limitations of orthographic projections, Definitions of the terms axonometric, oblique, Isometric and diametric, projections, Procedure for preparing isometric oblique, Isometric view of geometrical solids and simple machine parts, Practice problems.



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UNIT V

NUTS & BOLTS- Free hand sketches of nuts, bolts, rivets, threads, split pin, foundation bolts, keys and couplings.

COURSE OUTCOMES

- Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- Do orthographic projection of lines and plane surfaces.
- Draw projections and solids and development of surfaces. perspective sections of simple solids.
- Demonstrate computer aided drafting.

TEXT BOOKS

1. I.S. 696 (Latest revision). BIS, India.
2. Engineering Drawing, N.D. Bhatt, Charotar Publisher, Anand.
1. 3 Engineering Drawing & Machine Drawing, R. K. Dhawan, Kumar, S. Chand & Co.
2. 4 Engineering Drawing, R.B. Gupta, Satya Prakashan, Delhi.

REFERENCE BOOKS

1. Geometrical Drawing, P.S. Gill , ketson & Sons.
2. Machine Drawing, By P.S. Gill, ketson & Sons.
3. Engineering Drawing Gujral & Shende, Khanna Pub. N.Delhi.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	All Streams of Diploma in Engineering
Subject	:	Basic Electrical and Electronics
Total Theory Periods	:	48
Total Tutorial Periods	:	12
Total Credits	:	04
Code	:	DP 203

COURSE OBJECTIVES

- To explain the basic theorems used in Electrical circuits and the different components and function of electrical machines.
- To explain the fundamentals of semiconductor and applications.
- To impart knowledge of communication.
- To explain the principles of digital electronics.
- To impart knowledge of communication.

UNIT I

D.C. CIRCUIT

Ohm's Law, series and parallel circuit, various basic definitions related to dc circuit/network, Source transformation and network reduction technique, ideal and practical current and voltage sources, Kirchhoff's laws and its application.

ELECTRIC INDUCTION- Faraday's Laws, Lenz Law; Thumb rule, Fleming's rules.

UNIT II

A.C. CIRCUIT

Principles of A.C. Circuits, Definition of cycle, frequency, amplitude and time period. Instantaneous, RMS and maximum value of sinusoidal wave; form factor and Peak Factor, average values, Concept of Phase and Phase difference, Concept of resistance, inductance and capacitance in simple A.C. Circuit. Power factor and improvement of power factor by use of capacitors.

MEASURING INSTRUMENTS

Principle and construction of instruments used for measuring current, voltage, Power and energy.

UNIT III

TRANSFORMERS

Introduction to single line diagram of power system (generation, transmission and distribution), What is transformer and its importance in power system, classification of transformer in detail, Working, Principle and construction of single phase transformer, Transformation ratio, emf equation, losses and efficiency, Auto-transformer, Applications of various transformer.

UNIT IV

ELECTRICAL MACHINE

D.C. MACHINES-Working, Principle and construction of D.C. machines (D.C. motor and generator), Classification of D.C. machines, Application of D.C. Machines.



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A.C.MOTOR- INDUCTION MOTOR- Working, principle and construction of 3phase induction motors, Type of induction motorsslip ring and squirrel cage. Slip and torque speed characteristics of induction motor. Application of 3phase induction machines Concept of single phase induction motors and its applications.

UNIT V

BASIC ELECTRONICS

Difference between conductor, insulator and semi-conductor and its properties. Basic idea of semiconductors P and Ntype, Diodes, Zener diodes and their applications, TransistorPNP and NPN, their characteristics and uses. Characteristic and application of thyristors, Introduction: - rectifier, inverter, chopper, cyclo-converter. Characteristics and applications of servo motors.

COURSE OUTCOMES

- Ability to identify electronics components and use of them to design circuits.
- Ability to fabricate electrical circuits.

TEXT BOOKS

1. A Text book of Basic Electrical Engineering, Sahadev and Chaturvedi.
2. A Text book of Basic Electrical Engineering, B. L. Thereja. Vol-I

REFERENCE BOOKS

1. A Text book of Basic Electrical Engineering, B. L. Thereja. Vol-II
2. Basic Electrical Engineering by I. J. Nagrath, (T.M.H.)
3. Cotton, H. "Advance Electrical Technology," ISSAC Pitman, London



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	All Streams of Diploma in Engineering
Subject	:	Communication Skills
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 204

COURSE OBJECTIVES

- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.

UNIT I

PASSAGE FOR COMPREHENSION

(1)Language of Science (2) Robotic Revolution (3) Designing a Car (4)New Wonders of camera (5)Non-conventional sources of Energy (6)Our Environment (7)Entrepreneurship (8)Safety practices(9) Taming the Atom Radar and its Uses (10) A Volcano (11)Precision – A Measure of Progress (12) Laser

UNIT II

APPLIED GRAMMAR

(1)Determiners (2)Auxiliaries (3)Tenses (4)Conditional (5)Passive (6)Prepositions (7)Subject-verb Agreement (8)Clauses & Connectors (9) Basic Sentence (10) Pattern(11) Infinitives(12) Narration (13)Common Errors(14) Modifiers (15) Paragraph Writing

UNIT III

LETTER WRITING

THEORY: Introduction Purposes of Letters, Characteristics of a Letter, Mechanics and Style, Types of Business Letters: - Letter of Enquiry, Answer to an Enquiry .

WRITING SKILLS: (1) Application (For Job/Leave) (2) Letter of Enquiry and replies (3) Letter for Order Placement (4) Letter of Complaints (To Editor/ Appropriate Authorities)

UNIT IV

REPORT WRITING

Writing Progress – Report of a job, General outline for preparing a Project Report.

UNIT V

TECHNICAL WRITING

A Communication Skill , Basic facts of Technical Writing .

FEATURES OF TECHNICAL WRITING- Features of Technical Writing, Style: Literary and Technical, Mechanics of Technical Writing.

FORMS OF TECHNICAL WRITING - Forms, Writing Definitions, Writing Technical Descriptions, Writing Technical Descriptions of Processes, Writing Instructions .



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WRITING TECHNICAL REPORTS- (a). Qualities of a Good Report (b). Forms of Reports (c). Types of Report

COURSE OUTCOMES

- speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.

TEXT BOOKS

1. Communication Skill for Teaching Students, Book-I. M/s Somaiya Publications. Pvt. Ltd., Bhopal.
2. Living English Structure –W.S. Allen
3. Practical English Grammar (Exercises I by Thomson & Martinet)

REFERENCE BOOKS

1. English Conversation Practice by Grant Taylor.
2. Grammar & Composition by P R Sarkar, Anand Marg Publication, Easter, Matropolition Calcutta.
3. Essentials of English & Business Communication by Rajendra Pal,J.S Korlahalli S.Chand & Sons, New Delhi.



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MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	All Streams of Diploma in Engineering
Subject	:	Applied Chemistry Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 205

COURSE OBJECTIVES

- To make the students conversant with atomic structure.
- Principles of electrochemical reactions, acids and bases.

LIST OF EXPERIMENTS

1. Identification of two cations and two anions in a given sample of ore/powder/mixture.
2. To determine percentage of copper in a given sample by Brass titration.
3. Qualitative Analysis of **any five Solutions**, Containing One Basic & One Acidic Radical.
4. To determine percentage of Iron in a iron salt by redox titration.
5. To Determine the % of Fe in the Given Ferrous Alloy by KMnO_4 Method.
6. Calorimetric estimation of metals in a given sample of an alloy.
7. Measurement of Ph of different solutions.
8. Proximate analysis of a sample of coal.
9. To find out the Flash point/Fire point of dry/non drying oils.
10. Determination of Calorific value (C.V.) of solid fuel by Bomb Calorimeter

COURSE OUTCOMES

- The knowledge gained on solutions, fuels, energy sources and atomic structure will facilitate better understanding of engineering processes and applications for further learning.



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MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	All Streams of Diploma in Engineering
Subject	:	Engineering Drawing Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 206

COURSE OBJECTIVES

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.

LIST OF EXPERIMENTS

1. Problems on Scales and Letterings (One sheet).
2. Problems on Curves (One sheet).
3. Simple Orthographic Projections- One for First Angle and One for Third Angle Projection (Two sheets).
4. Orthographic projections with sections (One sheet).
5. Isometric projection for two objects (One sheet).
6. Projection of Points and Lines (One sheet).
7. Projection of Planes (One sheet).
8. Projection of Solids (Two sheets).
9. Section of Solids (Two sheets).
10. Development of surface (Two sheets).

COURSE OUTCOMES

- Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- Do orthographic projection of lines and plane surfaces.
- Draw projections and solids and development of surfaces. perspective sections of simple solids.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	All Streams of Diploma in Engineering
Subject	:	Electrical and Electronics Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 207

COURSE OBJECTIVES

- To explain the basic theorems used in Electrical circuits and the different components and function of electrical machines.
- To explain the fundamentals of semiconductor and applications.
- To explain the principles of digital electronics.

LIST OF EXPERIMENTS

1. To study the symbolic representation of various elements & sources used in electric circuit.
2. To Study various instruments & devices used in electric laboratory.
3. To verify ohm's law
4. To study series & parallel connection of electric circuit
5. To verify kirchhoff's law.
6. To determine value of R & L of choke coil.
7. To determine the efficiency of a transformer by direct loading test.
8. To study the auto transformer.
9. To study the various parts of DC machine.
10. To study the constructional details of three phase induction motor.
11. To study & draw VI characteristics of SCR.
12. Demonstrate the function of diode as a rectifier.
13. To study & testing of common electrical appliances. e.g. ceiling fan, water heater, grinder etc.
14. To calibrate of energy meter using voltmeter and ammeter.

COURSE OUTCOMES

- Ability to identify electronics components and use of them to design circuits.
- Ability to fabricate electrical circuits.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	All Streams of Diploma in Engineering
Subject	:	Communication Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 208

COURSE OBJECTIVES

- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.

LIST OF EXPERIMENTS

1. LISTENING SKILLS

Teacher reads an unseen passage or plays an audio file once. Students have to answer the questions after listening to the passage.

2. MAKING PRESENTATIONS

The list of the topics should be displayed during practical session. Students select a topic each through lottery. Presentation should be for five minutes. All the presentations of the students have to be completed before the end examination.

3. RECORD

Students have to answer the questions given in the activities in the students' lab manual in a separate notebook or a record book. In the same notebook or record book, they shall answer the questions given in the assignments.

4. GROUP DISCUSSION

Before commencing the Discussion the groups and their topics should be displayed. The students shall be divided on the basis of roll number or as per the convenience of the teacher. Each group may consist of five or six students. The Group Discussion may be conducted simultaneously for two or three groups.

5. SPEAKING SKILLS

Teacher asks the students questions individually. Topics for this activity are:

- | | |
|----------------------------|---------------------------------------|
| • Introducing Oneself | • Describing Events |
| • Describing Objects | • Speaking from Observation / Reading |
| • Reporting Past Incidents | • Interview Skills |

COURSE OUTCOMES

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.



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ARANG, RAIPUR (C.G.)



MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	II
Branch	:	All Streams of Diploma in Engineering
Subject	:	Workshop Practice – II Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 209

COURSE OBJECTIVES

- To develop in students, Moulding skills, machining skills.
- To expose them to existing national standards related to Smithy shop.
 - A. Smithy Shop
 - B. Moulding Shop
 - C. Machine Shop

LIST OF EXPERIMENTS

1. Smithy Shop

- | | |
|--|-------------------|
| 1.1 Identification of various tools and equipments used & their use. | 1.5 Bending |
| 1.2 Perform various smithy operations. | 1.6 Setting down. |
| 1.3 Up setting. | 1.7 Welding. |
| 1.4 Drawing down. | 1.8 Cutting. |
| | 1.9 Punching. |

2. Moulding Shop

- | | |
|--|----------------------|
| 2.1 Identification and use of the various tools. | 2.5 Drawing |
| 2.2 Perform various sheet-metal operations. | 2.6 Squeezing. |
| 2.3 Shearing | 2.7 Marking on sheet |
| 2.4 Bending | 2.8 Snipping. |
| | 2.9 Grooving |

3. Machine shop

- | | |
|---|---------------------------------------|
| 3.1 Identification and use of the various tools and equipments. | 3.4 Taper turning |
| 3.2 Classification of lathe and operation of lathe. | 3.5 Treading |
| 3.3 Plane turning | 3.6 Drilling |
| | 3.7 Various attachment used in lathe. |

COURSE OUTCOMES

- Ability to Smithy Skills.
- Ability to Foundry skills, machining skills



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Scheme & Syllabus

(3rd Semester)

Diploma

Mechanical Engineering



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Scheme of Teaching & Examination

III - Semester

S. No.	Code	Subject	Total Credit	Periods per week			Scheme of marks	
				L	T	P	ESE	IM
1	DP300	Mathematics	3	3	0	-	70	30
2	DP311	Mechanical Machine Drawing	3	3	0	-	70	30
3	DP312	Strength of Material	3	3	0	-	70	30
4	DP313	Mechanical Engineering Materials	3	3	0	-	70	30
5	DP314	Manufacturing Technology	3	3	0	-	70	30
6	DP315	Thermal Engineering	3	3	0	-	70	30
7	DP316	Machine Drawing Laboratory	1	-	-	2	30	20
8	DP317	Strength of Material Laboratory	1	-	-	2	30	20
9	DP318	Thermal Engineering Laboratory	1	-	-	2	30	20
10	DP319	Manufacturing Technology Laboratory	1	-	-	2	30	20
Total			22	18	0	8	540	260

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)



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ARANG, RAIPUR (C.G.)



MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Mathematics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT300

COURSE OBJECTIVES

- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I

DIFFERENTIAL CALCULUS

Successive differentiation, Leibnitz Theorem, Rolle's Theorem, Taylor's Theorem with Lagrange's form of remainder, Expansions of functions in Taylor's and McLaurin's series

UNIT II

ORDINARY DIFFERENTIAL EQUATION

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations of first order and higher degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type. Ordinary differential equations of higher order linear differential equations with constant coefficients & variable coefficients, method of variation of parameters, Cauchy-Euler equation, Legendre polynomials and their properties

UNIT III

PARTIAL DIFFERENTIATION

Functions of two variables: Limit, continuity and partial derivatives, derivatives of higher order, Euler's theorem on homogeneous functions, Total derivative, Change of variables, Jacobians, Maxima, minima and saddle points of functions of two variables

UNIT IV

VECTOR CALCULUS

Directional derivative, Gradient, Divergence and Curl, Line, Surface and Volume integrals, Green's, Gauss's & Stoke's theorem (without proof) and applications

UNIT V

MULTIPLE INTEGRAL

Beta and Gamma functions - Elementary properties, Double and Triple Integrals, Change of order of Integration, Application to area and volume.



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COURSE OUTCOMES

- This course equips students to have basic knowledge and understanding in one field of materials, integral and differential calculus.

TEXT BOOKS

1. Higher Engineering Mathematics by B.S.Grewal (42th edition)-Khanna Publisher.
2. Advanced Engineering Mathematics by Erwin Kreyszig (8th edition)-John Wiley & Sons.

REFERENCE BOOKS

1. Differential Calculus by Gorakh Prasad-Pothisala Private Limited.
2. Advanced Engineering Mathematics by R.K.Jain and S.R.K. Iyengar-Narosa Publishing House.
Applied Mathematics by P.N.Wartikar&J.N.Wartikar Vol-II –Pune Vidyarthi GrihaPrakasan, Pune.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Mechanical Machine Drawing
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT311

COURSE OBJECTIVES

- Understand the different steps in producing drawings according to bureau of Indian standards (B.I.S.) as per SP:46 (1988)
- Understand the application of industry standards and techniques applied in Machine Drawing
- Comprehend general projection theory, with an emphasis on the use of orthographic projection to represent three-dimensional objects in two-dimensional views
- Apply auxiliary or sectional views to most practically represent engineered parts
- Assemble important parts used in major mechanical engineering applications.

UNIT I

PROJECTION AND MULTI-VIEW REPRESENTATION

Projection, orthographic projection. First and Third Angle Projection, Superfluous view, choice of views, Auxiliary views-full and partial, Conversion of pictorial views into orthographic views Conventional representation as per IS 696. Sectional Views - Full section, half section, partial or broken section, revolved sections, removed section, offset section. Sectioning conventions, section lines. Hatching Procedure for different materials as per IS code 689-1972. Sectional views of assembled parts choosing from IC engine such as steam engine parts, valves, couplings, clutches, brackets, bearings etc. (use 1st and 3rd angle projections both.)

UNIT II

DIMENSIONING, TOLERANCE, MACHINING AND WELDING SYMBOLS

Types of dimensions (size and location), Dimensioning terms and notation (use of I.S. code 696 and 2709) General rules for dimensioning and practical hints on dimensioning, systems of dimensioning, dimensioning of cylinder, holes, arcs of circle, narrow space, angles, counter sunk hole, screw thread, taper etc. Application of tolerances (use I.S. code 696), machining marks, finish marks, counter sunk, counter boring, spot facing and figures. Representation of characteristics machining (circularity, angularity etc.) (Refer I.S. 696), Representation of welding joints, welding symbols, tolerance of forms and position. Procedure of drawing fits, limits, size, tolerance, etc.

UNIT III

PRODUCTION DRAWING AND PIPE DRAFTING

Detailed drawing, Assembly drawing, scale, finish, tolerances, procedures, notes etc. Title block, tool list, gauge list, style list, parts list zoning, Preparation of production drawing for pattern shop, forging shop, machine shop, Preparation of assembly drawing from detailed drawing. Exploded views, sectional pictorial views. Assembly drawing of Plummer block, flange coupling, stepped pulleys, foot step bearing, universal coupling, stuffing box, eccentric of steam engine, connecting rod, piston of I.C. engine, stop



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valves, feed check valves, dead weight safety valve for boiler, cross heads. Preparation of detailed drawing from assembly drawings and assembled pictorial views, interpretation of production drawings, Various symbols used in pipe line work as per IS code of practice, C.I. flanged joint, socket and spigot joint, gland and stuffing box, expansion joint, pipe fittings, typical pipe bends, pipe supports and accessories. Piping diagram for a small pump house

UNIT IV

GEAR DRAWING

Gear terminology such as pitch, pitch circle diameter, module, addendum, root circle diameter, hole depth, blank diameter etc. Construction of cycloidal, involutes teeth-profiles, Pinion and rack meshing, spur gear meshing. Re-production and Preservation of Drawings, Graphs and Charts - Tracing, Blue printing, Brown print, white print, ammonia printing, xerography, photographic reproduction, micro films. Indexing, folding and codification methods. (Use IS code of practice 696 –1972), Classification of charts, graphs and diagrams, Quantitative and qualitative charts and graphs. Making titles, legends, notes etc. Procedure for making a Graphical Representation in Ink. Logarithmic Graphs, Semi logarithmic Graphs, Bar charts, Area (percentage) charts, Pie Chart, Polar charts, Trainer chart, Pictorial chart, Alignment charts (Nomo graphs)- Forms and construction, construction of functional scale, parallel scale charts for equations of the Form Three-scale alignment chart, Graphical construction of a z-chart, Four variable Relationship parallel scale Alignment chart.

UNIT V

COMPUTER GRAPHICS

Introduction to computer graphics, geometric modeling, Types of commands, Methods of Representing objects in geometric modeling, Automatic Drafting-Generating hard copy engineering drawing direct form CAD base, Graphic features of CAD helpful in automatic drafting. Graphic terminal and other hardware for computer graphics their function and use.

COURSE OUTCOMES

- Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- Do orthographic projection of lines and plane surfaces.
- Draw projection of solids and development of surfaces.
- Prepare isometric and perspective sections of simple solids.
- Demonstrate computer aided drafting.

TEXT BOOKS

1. Elements of Machine Drawing - N.D.Bhatt. AnandCharotkar
2. Machine Drawing- R.K.Dhawan, S. Chand

REFERENCE BOOKS

1. Fundamentals of Engineering Drawing - Warren J Luzadder (Prentice-Hall)
2. Mechanical Drawing - Giesecke, MichellSpecer, Hill (Collier Macmillan Internal Edition)



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Strength of materials
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT312

COURSE OBJECTIVES

- To gain a fundamental understanding of the concepts of stress and strain by analysis of solids and structures.
- To study engineering properties of materials, force-deformation and stress-strain relationship
- To learn fundamental principles of equilibrium, compatibility, and force-deformation relationship, and principle of superposition in linear solids and structures
- To analyze; determinate and indeterminate axial members, torsional members and beams to determine axial forces, torque, shear forces, bending moments, slopes and deflection.
- To determine stress, strain, and deformation of bars, beams and springs.
- To be able to perform structural analysis by hand computations and design axial and torsional members.

UNIT I

SIMPLE STRESSES AND STRAINS

Introduction, Types of loads and deformation, Types of stresses and strains, Hooke's law, stress-strain diagram for ferrous and non-ferrous materials, Elastic Modulus (E , G , K & μ), Stresses in Bars of varying cross sections, composite sections, Thermal stresses and strains, thermal stresses in composite sections.

UNIT II

SHEAR FORCE & BENDING MOMENT DIAGRAMS

Definitions, types of loading, types of beams, Shear force and bending moment, sign conventions, S.F. and B.M. diagrams for Cantilever, Simply supported and subjected to Point loads, Uniformly distributed loads and Point of contraflexure, numerical problems on above. Simple bending of beams.

UNIT III

DEFLECTION OF BEAMS

Introduction, Derivation of equation for slope and deflections of beam in case of cantilever & simply supported beam loaded with point loads, UDL Simple numerical problems.

Torsion of Shaft: Definition of torsion, Relation between stress, strain and angle of twist, Calculation of shaft diameter on the basis of strength and stiffness for given power transmitted, Torsional Rigidity, comparison of solid and hollow shaft.

UNIT IV

SPRINGS

Definition, types and use of springs, Spring classification based on size, shape and load- leaf spring, helical and spiral spring, Stiffness of a spring and maximum Shear stress, Deflection of spring.



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Columns and Struts: Definition, Crippling load, different end conditions, Slenderness ratio, equivalent length, radius of gyration, Euler's theory, Limitation of Euler's formula, Rankine's formula.

UNIT- V

STRESSES IN FRAMES, THIN PRESSURE VESSELS

Definition of frame, perfect, deficient and redundant frames, Bows notation, solution of problems using these methods, Cylindrical and spherical vessels subjected to internal pressure, Hoop stress, longitudinal, Stress, Volumetric strain, change in volume.

COURSE OUTCOMES

- Apply knowledge of mechanics of deformable body for understanding, formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts mechanics of solid in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
- Identify, analysis, and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.

TEXT BOOKS

1. Strength of Material – Dr. Sadhu Singh – Khanna Publishers
2. Elements of Strength of Material – Timo Shenko & Young – EWP Press
3. Strength of Material – R.K. Rajput – Dhanpat Rai & Sons

REFERENCES BOOKS

1. Strength of Material – Rider – ELBS
2. Mechanics of Material – F.P. Bear & E.E. Johnston – McGraw Hill
3. Mechanics of Material – J.M. Gera & Time Shenko – CBS Publishers
4. Introduction to Solid Mechanics – I. H. Shames – PHI



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Mechanical Engineering Materials
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT313

COURSE OBJECTIVES

- To understand various mechanical properties of materials.
- To understand how and why the properties of materials are controlled by its structure at the microscopic and macroscopic levels.
- To understand how and why the structure and composition of a material may be controlled by processing.
- To understand the inter-relationship between composition, structure and properties of engineering materials.
- Get knowledge about different materials, their properties and application.

UNIT I

ENGINEERING MATERIALS & TESTING

Introduction to engineering materials, Classification of engineering materials and their properties, Mechanical properties of materials, 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, grain and grain Boundaries, Structural imperfection -types of imperfections, Point defects, Line defects, screw and mixed dislocations, surface defects, Recovery, Recrystallization and grain growth.

UNIT II

PERMANENT DEFORMATION

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 rule and its applications.

UNIT III

HEAT TREATMENT OF STEELS

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, TTT curves- interpretation and use.

UNIT IV

NON-FERROUS METALS AND ALLOYS

Copper- its properties and uses, copper base alloys- brasses and bronzes, their classification, composition, properties and uses, Aluminum- its, properties and uses, Aluminum alloys- their composition, classification properties and uses (Only commonly used important alloys).



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UNIT V

PRESERVATION, SELECTION & MODERN TRENDS IN MATERIALS ENGINEERING

Corrosion- meaning, various mechanism effect of corrosion, methods of minimizing corrosion, Selection of Materials- selection requirements Modern trends in materials engineering- new materials like FRP, Composites, Synthetic Rubbers, Synthetic wood & Super conductivity.

COURSE OUTCOMES

- Acquire knowledge and hands-on competence in applying the concepts of material science in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering .
- Identify, analysis, and solve mechanical engineering problems useful to the society.

TEXT BOOKS

1. A Textbook of material Science & metallurgy by O.P. Khanna
2. Material Science of Processes by S.K.Choudhary
3. Material Science of Processes by Lauthin- Lakhtin Pub.MIR publisher, Moscow

REFERENCE BOOKS

1. Material of Engineers by MH. A. Kempstyl.
2. Introduction to Material Science and Engineering
3. Physical metallurgy Principles, Read Hill Pub. Affiliated East – West press pvt. Ltd. New Delhi.
Engineering metallurgy by R. Higgins.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Manufacturing Technology
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT314

COURSE OBJECTIVES

- To use concept on fundamental technical sciences integrated with applied technical specialties. 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.
- Learners will effectively use their communication skills in oral, written, visual and graphic modes within interpersonal, team, and group environments.

UNIT I

INTRODUCTION TO MANUFACTURING PROCESSES

Importance of manufacturing processes, classification, economic and technological definitions of manufacturing processes. Foundry Pattern making - Types, material, allowances, colour codes, core – types, materials and its properties. Mould Making - Types of sand moulding, design considerations, moulding machines & moulding procedure, moulding sand – types, properties, composition and applications. Casting - Procedure, Melting furnaces, casting defects. Special Casting Processes - Investment casting, centrifugal casting, shell moulding, CO2 moulding, slush casting, die casting.

UNIT II

WELDING

Principles of Welding, survey and allied processes. Arc Welding Power Source and Consumable, MMAW, TIG and MIG processes and their parameter selection, atomic hydrogen welding, welding of cast iron, welding electrode – types, composition, specification.

Resistance Welding Principle, equipment and processes. Thermit Welding, brazing & soldering, Internal and external welding defects, Inspection & testing of weld.

UNIT III

FORGING

Principle, types, tools and fixture of forging, forging dies, forging machines, forging design, drop forging die design, upset forging die design, forging practice and process capability, forging defects, Inspection and testing of forged parts.

EXTRUSION

Principle, extrusion processes, process parameters, extrusion equipment, extrusion defects.

Rolling - Principle, classification of rolled products, types of rolling, rolling mill train components, roll pass design for continuous mill.



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UNIT IV

MACHINE TOOLS

Lathe Introduction, type, specification, construction, work holding devices & tools, mechanism and attachments for various operations, taper turning, thread cutting operations on Lathe, capstxxonand turret lathe.

Shaper Introduction, type, specification, Quick return Mechanisms, Table feed mechanism, work holding devices, shaper operations

Millingx Introduction, specification, types, mechanisms and attachments for milling, milling operations, Indexing-simple, compound and differential.

UNIT V

Drilling Introduction, drill nomenclature, types of drilling machines, other operations like counter boring, counter sinking, spot facing etc.

Reaming Introduction, description of reamers, type of reaming operations.

Boring Introduction, types of boring machines, boring operations, boring tools

COURSE OUTCOMES

- Ability to identify, formulate and solve technical problems.
- Ability to design and conduct experiments, and to analyze and interpret data.
- Ability to function effectively on teams and within a diverse environment. Ability to use computational methods, skills, computers and modern technical tools in engineering practice

TEXT BOOKS

1. Manufacturing Technology (Vol. – I & II) – P.N. Rao – Tata McGraw Hill Pub. Company, New Delhi
2. A Text Book of Production Technology (Manufacturing Processes) – P.C. Sharma – S.Chand and Company Ltd., New Delhi

REFERENCE BOOKS

1. Manufacturing Science – A. Ghosh & A.K. Mallik – East West Press Pvt. Ltd., New Delhi
2. Production Technology – R.K. Jain – Khanna Publishers, New Delhi



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Thermal Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT315

COURSE OBJECTIVES

- To provide a mature approach to the basic principle of classical thermodynamics and to apply it to system surroundings interactions; involving work and heat transfer with associated property changes.
- To Use classical thermodynamics principles to develop algebraic relationships among key physical parameters and variable based on analysis of a specified system
- Use references that provide tabulated physical data that are useful to mechanical engineers.
- Familiarity with construction and performance parameters of Boilers

UNIT I

DIMENSIONS AND BASIC CONCEPTS OF THERMODYNAMICS

Definition and importance of Thermodynamics, Thermodynamic system open, close and isolated system, Boundary and surroundings, Forms of energy. Point and path functions Properties of system, intensive and extensive properties, definition of work, Heat and work as energies in transitions, thermodynamic equilibrium Zeroth law of Thermodynamic. Quasi-static process, work done during Quasi-static process.

UNIT II

FIRST LAW OF THERMODYNAMICS

Concept of heat reservoir, Heat source and heat sink, Statement of first law-mathematical representation, Application of first law to open and closed system. Concept of internal energy and its calculation, relationship between heat transfer, work transfer and change in internal Energy Steady flow energy equation and its application to various units such as Boiler, Nozzle, Turbine, Compressor, Enthalpy. Ideal gas processes-isobaric, isochoric, isothermal, adiabatic, polytropic, and throttling process as applied to open and close system, representation of these processes on P-V diagram and T-S diagram Computation of net heat transfer and work done and enthalpy.

UNIT III

SECOND LAW OF THERMODYNAMICS

Limitations of First law. Statement of second law-Kelvin planck's and clausius Statements, Concept of heat pump, refrigerator and heat engine , Thermal Efficiency, Parameters affecting Thermal efficiency, Means of increasing efficiency ,Equivalence of Kelvin Planck and clausius statements. Thermodynamics reversible and irreversible processes. Factors that make a process irreversible. Reversible cycle, Carnot cycle, its efficiency and limitations, Carnot theorem, clausius inequality, concept of Entropy.



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UNIT IV

TWO PHASE SYSTEM

Pure substance, phase, phase changes, steam as a two phase system, steam formation and its representation on the enthalpy plane, properties changes, Representation of wet, dry and saturated and superheated steam on PV,T-S and h-s planes. Dryness fraction of steam, methods of determination of dryness fraction-separating and throttling calorimeter. Use of steam tables and Mollier's diagram.

UNIT V

STEAM GENERATORS

Definition, classification, Working of Babcock and Wilcox boiler and Lancashire boiler, Boiler mountings and accessories, boiler draught.

COURSE OUTCOMES

- Apply knowledge of classical thermodynamics for formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts of thermal sciences in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
- Identify, analysis, and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.
- Skillfully use modern engineering tools and techniques for mechanical engineering design, analysis and application.
- To continue the study of the applied thermodynamics.

TEXT BOOKS

1. Thermal Engineering by P.L. Ballany - Khanna Publisher's
2. Thermal Engineering – Vol-I & II By R.K.Kapoor, Tata McGraw Hill
3. Thermodynamics and heat Engines - Vol-I, By R Yadav, Central Book Depot, Allahabad

REFERENCES

1. Engineering Thermodynamics- by P.K.Nag, TMH
2. A Course in Thermodynamics and Heat Engines- by Kothanandran, Khajuria and arrora.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Machine Drawing Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	BT316

COURSE OBJECTIVES

- Understand the different steps in producing drawings according to bureau of Indian standards (B.I.S.) as per SP:46 (1988)
- Comprehend general projection theory, with an emphasis on the use of orthographic projection to represent three-dimensional objects in two-dimensional views
- Apply auxiliary or sectional views to most practically represent engineered parts
- Assemble important parts used in major mechanical engineering applications.

List of Experiments

Following shall be list of sheets to be prepared as machine drawing lab.

1. One Sheet on multi view representation
2. Two sheets on sectional views of assembled parts on like I.C.Engine parts and steam engine parts.
One sheet on welding symbols.
3. One sheet on dimensioning, limits and tolerance.
4. Two sheets on detailed drawing like drill jigs, fixtures, screw jack etc.
5. Two sheets on assembly drawing like flange coupling, stepped pulleys, foot step bearing, universal coupling, etc.
6. One sheet on Pipe joints and pipe fittings.
7. Two sheet on production drawing from any of the following using CAD- Hexagonal nut, Spur gear, Stepped pulley, Connecting rod, Stop valve, Stop valve, flange coupling , safety valve Fly wheel

COURSE OUTCOMES

- Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- Do orthographic projection of lines and plane surfaces.
- Draw projections and solids and development of surfaces. perspective sections of simple solids.
- Demonstrate computer aided drafting.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Strength of Material Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	BT317

COURSE OBJECTIVES

- To analyze and study the UTM
- To understand the impact testing.
- To study torsion testing machine and torsion equation.
- To analyze column.
- To analyze thin and thick pressure vessels

List of Experiments

1. To study the Universal Testing Machine.
2. To perform the Tensile Test of Mild Steel on U.T.M and To Draw Stress–Strain Curve.
3. To determine strength of wood on U.T.M (i) Along the Grain (ii) Across the Grain.
4. To determine shear strength of Mild Steel on U.T.M.
5. To observe Flexural Behaviour of Timber specimen and to determine its strength under transverse loading on U.T.M.
6. To study the Impact Testing Machine and test specimen of Izod and Charpy.
7. To determine Izod and Charpy Value of the given mild steel specimen.
8. To study the Fatigue Testing Machine and to discuss the procedure to find out endurance limit of given material.
9. To study the Spring Testing Machine.
10. To determine modulus of rigidity for the material of open and closed Coiled Helical Spring Subjected to Axial Load by spring testing machine.
11. To study the Torsion Testing Machine
12. To determine ultimate shear stress and modulus of rigidity under Torsion.
13. To study the Cupping Test Machine and to determine Erichsen value of Mild Steel sheet.
14. To study the Rockwell Hardness Testing Machine and to determine the Rockwell Hardness of the given material.
15. To study the Brinell Hardness Machine and to determine the Brinell hardness of the given material.
16. To study the Vickers Hardness Machine and to conduct a test on the machine.
17. Buckling of column

COURSE OUTCOMES

- Apply knowledge of mechanics of deformable body for understanding, formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts mechanics of solid in the design and development of mechanical systems.



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- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
- Identify, analysis, and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary designs



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Thermal Engineering Lab
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP318

COURSE OBJECTIVES

- To provide a mature approach to the basic principle of classical thermodynamics and to apply it to system surroundings interactions; involving work and heat transfer with associated property changes.
- To Use classical thermodynamics principles to develop algebraic relationships among key physical parameters and variable based on analysis of a specified system
- Use references that provide tabulated physical data that are useful to mechanical engineers.
- Familiarity with construction and performance parameters of Boilers

List of Experiments

1. To study Mountings & Accessories of a Boiler.
2. To study the Cochran Boiler and it's Accessories and Mountings.
3. To study the Lancashire and it's Accessories and Mountings.
4. To study the Babcock Wilcox and it's Accessories and Mountings.
5. To study a Simple Steam Engine.
6. To study a Simple Steam Engine with D-Slide Valve.
7. To study a Compound Steam Engine.
8. To study Meyer's Expansion Valve of Steam Engine.
9. To study Drop Valve of Steam Engine.
10. To study Two Stroke Petrol Engine.
11. To study Four Stroke Petrol Engine.
12. Determination of vacuum efficiency and condenser efficiency of a surface steam condenser.
13. Performance and testing of steam jet condenser.
14. Study of Steam Turbines
15. Study of Reciprocating Compressor

COURSE OUTCOMES

- Apply knowledge of classical thermodynamics for formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts of thermal sciences in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
- Identify, analysis, and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.

MATS School of Engineering & I.T



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Manufacturing Technology Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP319

COURSE OBJECTIVES

- To use concept on fundamental technical sciences integrated with applied technical specialties. 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.
- Learners will effectively use their communication skills in oral, written, visual and graphic modes within interpersonal, team, and group environments.

LIST OF EXPERIMENTS

1. CARPENTRY

Timber, Definition, Engineering Application, Types of Wood, Seasoning and Preservation, PlyWood, PlyBoards. Practical Work: T Lap Joint End Lap Joint

2. FOUNDRY

Moulding Sands, Constituents and Characteristics, Pattern, Definition Material, Types, Core Prints, Role of Gate runner, riser, core, casting defects like blow holes & cavities. Practical Work: Mould of any pattern Casting of simple pattern

3. WELDING

Welding, Brazing and soldering process and their applications. Oxy-acetylene gas welding process, Type of flame & their application. Manual & Metal arc welding technique and equipment, AC & DC welding, Constituents and functions of electrode coating, welding positions, type of weld joints, Common welding defects. Practical Work: 1. Lap Joint by Gas Welding 2. Square butt joint Arc welding 3. Lap joint by Arc welding 4. Demonstration of brazing.

4. METAL CUTTING

Introduction to machining and common machining operations. Cutting tool material, Definition of machine tools, specification and block diagram of lathe, Shaper Drilling machine and grinder. Common lathe operations such as turning, parting, chamfering and facing. Quick return mechanism of shaper, Difference between drilling and boring, Files-Material classification.

COURSE OUTCOMES

- Ability to apply basic knowledge of mathematics, science and engineering principles to solve technical problems.
- Ability to identify, formulate and solve technical problems.



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- Ability to use computational methods, skills, computers and modern technical tools in engineering practice.
- Ability to design and conduct experiments, and to analyze and interpret data.
- Ability to function effectively on teams and within a diverse environment.



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Scheme & Syllabus

(4th Semester)

Diploma

Mechanical Engineering



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Scheme of Teaching & Examination

IV - Semester

S. No.	Code	Subject	Total Credit	Periods per week			Scheme of marks	
				L	T	P	ESE	IM
1	DP410	Theory of Machines and Mechanisms	3	3	0	-	70	30
2	DP411	Heat Transfer	3	3	0	-	70	30
3	DP412	Fluid Mechanics and Machinery	3	3	0	-	70	30
4	DP413	Metrology and Instrumentation	3	3	0	-	70	30
5	DP414	Theory of Machine Laboratory	1	-	-	2	30	20
6	DP415	Heat Transfer Laboratory	1	-	-	2	30	20
7	DP416	Fluid Mechanics and Machinery Laboratory	1	-	-	2	30	20
8	DP417	Machine Shop – II	1	-	-	2	30	20
9	DPPXXX	Professional Elective I	3	3	0	-	70	30
10	DPOXX	Open Elective I	3	3	0	-	70	30
Total			22	18	0	8	540	260

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	IV Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Theory of Machines and Mechanisms
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	BT410

COURSE OBJECTIVES

- To introduce the approaches and mathematical models used in kinematic and dynamic analysis of machinery.
- To give basic knowledge on kinematic and dynamic design of machinery.
- To give basic knowledge on power transmission.

UNIT I

POWER TRANSMISSION BY BELT AND PULLYS

Open & cross belt drive, velocity ratio, length of belt, tension on tight side & slack side, initial tension, relation between tight side & slack side tension, centrifugal tension, power transmission, problems on flat belt drive, idea of v-belt drive, rope drive, compound drive(no problem)

UNIT II

POWER TRANSMISSION BY GEAR

Types of gear- important terms and definition related to spur gear (pitch, pitch circle, addendum, dedendum, module etc.),velocity ratio, simple gear train, compound gear train, power transmitted by gears, problems on spur gear train, epicyclic gear train, problems

UNIT III

BALANCING OF ROTATING PARTS

Balancing of single rotating mass by another single mass rotating in the same plane, balancing of several rotating masses by a single mass rotating in the same plane (graphical method),balancing of several masses rotating in different planes, problems.

UNIT IV

FLYWHEELS & GOVERNERS

Crank effort diagram, function of flywheel, co-efficient of fluctuation of speed, determination of weight of flywheel for a given crank effort diagram, governors, functions, types, simple watt, porter & hartnel governor, simple problems in relation to simple watt & porter governor.

UNIT V

LINK MOTION

Definition of kinematic link, kinematic pair, kinematic chain mechanism & machines, relative motion, instantaneous centre,4 bar linkage, crank & connecting rod mechanism to determine velocity by relative velocity diagram & instantaneous centre method



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COURSE OBJECTIVES

- Determine the kinematic chain and mobility, and perform the kinematic analysis of a given mechanism,
- Apply the fundamental principles of statics and dynamics to machinery,
- Understand and avoid/suppress certain common dynamical problems a machine may undergo,
- Understand the fundamentals of machine design for desired kinematic or dynamic performance.

TEXT BOOKS

1. Theory of Machines and Mechanisms- Rao & Duggipati
2. Theory of Machines - S.S. Rattan
3. Theory of Machines – R.K. Bansal

REFERENCES

1. Theory of Machines - Thomas Bevan
2. Theory of Machines and Mechanisms- Shigley



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	IV Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Heat Transfer
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 411

COURSE OBJECTIVES

- To provide a fundamental understanding of the principles of heat transfer due to conduction, convection and radiation.
- To achieve an understanding of the basic concepts of phase change processes.
- To understand the principles of mass transfer.
- To learn about the design of heat exchangers.

UNIT I

INTRODUCTION

General equation of conduction in Cartesian and cylindrical coordinates. Various modes of heat transfer, Fourier's, Newton's and Stefan Boltzmann's Law, Combined modes of heat transfer, thermal transfer, thermal diffusivity, overall heat transfer coefficient.

CONDUCTION

The thermal conductivity of solids, liquids and gases, factors influencing conductivity measurement. The general differential equation of conduction. One dimensional steady state conduction, linear heat flow through a plane and composite wall, tube and sphere, critical thickness of insulation, Effect of variable thermal conductivity, Conduction with heat generation in flat and cylinders.

UNIT II

FINS

Analysis of pin fins, conduction through infinite & semi infinite slab and cylinder. Conduction convection system, extended surfaces rectangular, triangular, circumferential and pin fins. General conduction analysis, fins of uniform and non-uniform cross sectional area. Heat dissipated by a fin. Effectiveness and efficiency of fins. Approximate solution. Design of fins for maximum heat transfer. Solution for different boundary condition. Use of fin analysis for measuring temperature error of Thermometer.

TRANSIENT/UNSTEADY STATE HEAT CONDUCTION

System with negligible internal resistance, Lumped capacity method and its Validity. Unsteady state conduction through finite and semi- infinite slab without surface resistance, convection boundary conditions. Solution through Heislers chart.

UNIT III

FORCED CONVECTION

Physical Mechanism of Forced Convection, Dimensional analysis for forced convection, velocity and Thermal Boundary layer, Flow over plates, Flow across cylinders and spheres, Flow in tubes, Reynold's analogy.



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NATURAL CONVECTION- Physical Mechanism of Natural Convection, Dimensional analysis of natural convection; empirical relationship for natural convection.

UNIT IV

HEAT EXCHANGERS

Different types of heat exchangers; Determination of heat exchanger performance, Heat exchanger transfer units, Analysis restricted to parallel and counter flow heat exchanger (LMTD and NTU method) Preliminary design of heat exchangers (i) liquid to liquid (ii) liquid to gas.

UNIT V

THERMAL RADIATION

Introduction, absorption and reflection of radiant energy, Emission, Radiosity and irradiation, Black and non black bodies, Kirchhoff's law; intensity of radiation, radiation exchange between black surface, geometric configuration factor. Grey body relation exchange between surface of unit configuration factors. Electrical analogy to simple problems. Non-luminous gas radiation. Errors in temperature measurement due to radiation.

COURSE OUTCOMES

- Apply knowledge of heat transfer for understanding, formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts of heat and mass transfer in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular
- Identify, analysis, and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.

TEXT BOOKS

1. Heat Transfer – S.P. Sukhatme – TMH
2. Heat & Mass Transfer – D.S. Kumar – S.K. Kataria& Sons
3. Heat transfer- C P Arora, TMH

REFERENCES

1. Heat & Mass Transfer – K. Kannan – Anuradha Agencies
2. Heat Transfer – J.P. Holman – TMH
3. Heat Transfer – A Practical Approach – Yunus A. Cengel – McGraw Hill



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	IV Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Fluid Mechanics and Machinery
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 412

COURSE OBJECTIVES

- Obtaining a solid understanding of the fundamentals of Fluid Mechanics
- The ability to formulate basic equations for Fluid Engineering problems
- The ability to use tables and figures to determine the friction energy loss for various pipes/ducts geometries and Fluid engineering applications
- The ability to perform dimensional analysis and identify important parameters

UNIT I

PROPERTIES OF FLUID

Fluid, ideal and real fluid, properties of fluid : mass density, weight density, specific volume, specific gravity, viscosity, surface tension, capillarity, vapour pressure, compressibility and bulk modulus. Newtonian and non-Newtonian fluids

FLUID STATICS

Pressure, Pascal's law, Hydrostatic law, Pressure measurement, Hydrostatic force on submerged plane and curved surface, Buoyancy.

UNIT II

FLUID KINEMATICS

Description of fluid motion, Lagrangian and Eulerian approach, Type of fluid flow, Type of flow lines-path line, streak line, stream line, stream tube. Continuity equation, acceleration of a fluid particle, motion of fluid particle along curved path, Normal and tangential acceleration, Rotational flow, Rotation and Vorticity, circulation, stream and potential function.

FLUID DYNAMICS

Bernoulli's equation and its practical application, Venturimeter, Orifice meter, Nozzle, Pitot tube. Impulse momentum equation, Momentum of Momentum equation. Vortex flow.

UNIT III

FLOW AROUND SUBMERGE BODIES

Force exerted by flowing fluid on a body: Drag and lift; stream lined and bluff body, Drag on sphere and cylinder, circulation and lift on circular cylinder, lift of an air foil.

IMPACT OF FREE JETS

Impulse momentum principle, force exerted by the jet on stationary flat and curved plate, hinged plate, moving plate and moving curve vanes, jet propulsion of ship.



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UNIT IV

IMPULSE TURBINE

Classification of turbine, impulse turbine, Pelton wheel, Construction working, work done, head efficiency and Cavitations in turbines Design aspects, governing of impulse turbine.

REACTION TURBINE

Radial flow reaction turbine, Francis turbine: construction, working, work done, efficiency, design aspect, advantages& disadvantages over pelton wheel.

UNIT V

AXIAL FLOW REACTION TURBINE

Propeller and Kaplan turbine, bulb or tubular turbine, draft tube, specific speed, unit quantities, cavitation, degree of reaction, performance characteristics, surge tanks, governing of reaction turbine.

CENTRIFUGAL PUMPS

Classification of Pumps, Centrifugal pump, Construction, working, workdone, heads, efficiencies, multistage centrifugal pump, pump in series and parallel, specific speed, characteristic, net positive suction head, cavitation.

COURSE OUTCOMES

- Apply knowledge of Fluid Mechanics formulating and solving engineering problems.
- Acquire knowledge of fluid mechanics for the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
- Identify, analysis, and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.
- Skillfully use modern engineering tools and techniques for mechanical engineering design, analysis and application.

TEXT BOOKS

1. Mechanics of Fluids by Massey BS; Van Nostrand Reinhold Co
2. Fluid Mechanics by Douglas JF, Gasiorek JM, Swaffield JP; Poitman
3. Fluid Mechanics by Streetes VL and Wylie EB; Mcgraw Hill Book Co

REFERENCES

1. Introduction to Fluid Mechanics and Fluid Machines – S.K. Som & G. Biswas – TMH
2. A text of Fluid Mechanics – R. K. Rajput – S. Chand & Company Ltd.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	IV Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Metrology and Instrumentation
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 413

COURSE OBJECTIVES

- Select suitable instrument / gauge / method of inspection for determining geometrical and dimensional measurements.
- Calibrate measuring instruments and also design inspection gauges.
- Understand the advances in Metrology System.
- Select and apply appropriate Quality Control Technique for given application.

UNIT I

SIMPLE INSPECTION

Meaning and application of inspection, daily life example of inspection, concept of inspection as applied to daily life and industries, Effect of absence of inspection in an industry, Classification of inspection function, Differentiation between precision measurement in industry, meaning of standard inspection

GENERAL MEASUREMENT CONCEPT

Limits, fits and tolerance definition, Selection of fit, calculation of fundamental deviation, limit of sizes, selection of limit of sizes, selection of limits, Tolerances and allowances.

UNIT II

LINEAR MEASUREMENTS

Standards of length, Classification and use of slip gauges, wringing process, Gauge block calibration precautions to be observed while using gauge blocks, Construction and working of Vernier caliper, micrometers- outside and inside and depth, vernier height gauge, dial vernier and dial height gauge identification of parts Dial gauge types construction, principle, accuracy and precaution to be observed in handling, field of application, Measuring Machine-type, application limitations, working principle, Interferometer type, working principle, and applications .

ANGULAR MEASUREMENTS

Classification- direct and indirect, Protractor- vernier and optical, universal- working use and limitation, precautions, Angle blocks-set size, accuracy, calibration, method of measuring unknown angle and checking known angle, Sine bar- common types, use in actual practice for finding out known and unknown angle, Spirit level- types, use field of application, sensitivity, Clinometers types, working principle, accuracy, Angle Dekker-type, Principle of working method, field of application.

UNIT III

CONCEPT OF SQUARENESS, FLATNESS, ROUNDNESS

Straight edge method, light gap and feeler gauge method, Wedge method, Precision level method, Auto collimator method, squareness- indicator method, Square tester, Auto collimator method, Determination



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of straightness, flatness, squariness of a given piece, Use of v- block and dial indicator for determining roundness.

SURFACE ROUGHNESS

Definition of primary and secondary texture, Real surface, geometrical surface, effective surface, Real profile, geometrical profile, effective profile, Reference line, lay, traversing length, sampling length, mean time, Types of surface measuring instruments, Method of surface measurement stylus skid, stylus pressure, Mechanical amplification, Tomlinson Mechanical surface finish recorder working principle.

UNIT IV

SCREW THREAD MEASUREMENTS

Type of screw threads, Threads nomenclatures, Errors in screw thread pitch errors, Progressive and periodic instrument, Equipment required for measuring pitch, effective diameter and angle – procedure, advantages, limitation and precautions of each method Limit gauges for screw thread measurement, procedure, Advantages and limitation of catch Gauge, Precautions observed while using a limit gauge.

GEAR MEASUREMENTS

Types of gears, Gear nomenclature, Gear elements requiring measurement, Necessity of measuring gear elements accuracy, Types of gear tests, Different method of inspecting gear tooth from, Gear tooth profile check- involutes testing M/C- principle and uses, Electricity-Tests - Principle and use, Parkerson gear tester principle and use.

UNIT V

LIMIT GAUGES

Definition of gauge and gauging, Necessity of gauging in industrial practice, Gauges types- according to use (shop, Inspection and reference gauge) type fixed limit, indicating and combination, Specific use (Screw pitch, gauge, template, feeler gauge- and their uses, application identification, selection and precautions, Working tolerance of gauges Maximum and minimum metal conditions of tolerances, selection and specification as per IS, 2251, 3455, 3484, Wear allowances and its selection for design.

COURSE OUTCOMES

- Understand the methods of measurement and selection of measuring instruments standards of measurement
- Identify and apply various measuring instruments
- Explain tolerance, limits of size, fits, geometric and position tolerances and gauge design
- Recommend the Quality Control Techniques and Statistical Tools appropriately

TEXT BOOKS

1. Mechanical Measurements and Control – D.S. Kumar – S.K. Kataria & Sons
2. Mechanical Measurements – G. Beckwith Thomas G. – Pearson Education

REFERENCES BOOKS

1. Measurement Systems, Application Design – E.O. Deoblein - McGraw Hill
2. Engineering Metrology – K.J. Hume - MacDonald and Compan



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**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester	:	IV Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Theory of Machine Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 414

COURSE OBJECTIVE

- To develop a solution oriented approach by in depth knowledge of Theory of Machines.
- To address the underlying concepts, methods and application of different machines.

LIST OF EXPERIMENTS

1. To find out the oscillations of simple pendulum with universal vibration apparatus.
2. To find out the oscillations of Compound pendulum with universal vibration apparatus.
3. To find out the radius of gyration of bi-filler suspension with universal vibration apparatus.
4. To find out undamped torsional vibrations of single rotor system with universal vibration apparatus..
5. To find out the frequency of damped torsional vibration of single rotor system with universal vibration vibration apparatus.
6. To measure the frequency of torsional vibrations of single rotor system with universal vibration apparatus.
7. To measure the frequency of torsional vibrations of double rotor system with universal vibration apparatus.
8. To find out free vibration of helical coiled spring with universal vibration apparatus.
9. To study forced damped vibration of a spring mass system and simple supported beam with universal vibration apparatus.
10. To find out the Gyroscopic couple and prove the Gyroscopic law with Gyroscope apparatus.
11. To find out the Power and effort of Proel, Porter & Hartnell Governor with Governor Apparatus.
12. To find out the critical speed for different diameters of shaft by whirling of shaft apparatus. To verify the static and dynamic balancing for different planes and masses by balancing apparatus.
13. To study about the different types of gear and gear train

COURSE OUTCOMES

- The student can identify different areas of Theory of Machines.
- Can find the applications of all the areas in day to day life.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	IV Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Heat Transfer Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 415

COURSE OBJECTIVES

- To provide a fundamental understanding of the principles of heat transfer due to conduction, convection and radiation.
- To achieve an understanding of the basic concepts of phase change processes.
- To understand the principles of mass transfer.

LIST OF EXPERIMENTS

1. To Determine Thermal Conductivity of Insulating Powders.
2. To Determine Thermal Conductivity of a Good Conductor of Heat (Metal Rod).
3. To Measure the thermal Conductivity of Liquid.
4. To determine the transfer Rate & Temperature Distribution for a Pin Fin.
5. To Measure the Emissivity of the Test plate Surface.
6. To Determine Stefan Boltzmann Constant of Radiation Heat Transfer.
7. To Determine the Surface Heat Transfer Coefficient For Heated Vertical Cylinder in Natural Convection.
8. Determination of Heat Transfer Coefficient in Drop Wise & Film Wise condensation.
9. To Determine Critical Heat Flux in Saturated Pool Boiling.
10. 10.To Study Performance of Simple Heat Pipes.
11. To Study and Compare LMTD and Effectiveness in Parallel and Counter Flow Heat Exchangers.
12. To Find the Heat transfer Coefficient in Forced Convection in a tube.
13. To determine the total thermal conductivity and thermal resistance of the given compound resistance in series.
14. To find out the thermal conductivity of given slab material.
15. To determine the individual thermal conductivity of different lagging in a lagged pipe.
16. To study the rates of heat transfer for different materials and geometries
17. To understand the importance and validity of engineering assumptions through the lumped heat capacity method.
18. Testing and performance of different heat insulators.

COURSE OUTCOME

- Apply knowledge of heat transfer for understanding, formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts of heat and mass transfer in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	IV Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Fluid Mechanics and Machinery Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 416

COURSE OBJECTIVES

- Obtaining a solid understanding of the fundamentals of Fluid Mechanics.
- The ability to formulate basic equations for Fluid Engineering problems.
- The ability to use tables and figures to determine the friction energy loss for various pipes/ducts geometries and Fluid engineering applications.
- The ability to perform dimensional analysis and identify important parameters.

LIST OF EXPERIMENTS

1. To determine the meta-centric height of a ship model.
2. To verify Bernoulli's Theorem.
3. To verify Impulse Momentum Principle.
1. To calibrate a Venturimeter and study the variation of coefficient of discharge.
4. To calibrate an orifice-meter.
5. Performance characteristics of Pelton wheel turbine.
6. Performance characteristics of Francis turbine.
7. Performance characteristics of Kaplan turbine.
8. Performance characteristics of variable speed centrifugal pump.
9. Performance characteristics of rated speed centrifugal pump.
10. Performance characteristics of multistage centrifugal pump.

COURSE OUTCOMES

- Apply knowledge of Fluid Mechanics formulating and solving engineering problems.
- Acquire knowledge of fluid mechanics for the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.



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**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester	:	IV Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Machine Shop-II
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 416

COURSE OBJECTIVES

- This course gives ME undergraduates the opportunity to engage in machine shop operation under the supervision of qualified machine shop personnel.
- Students learn to operate the lathe, milling and drilling machines.
- The course may be repeated for credit multiple times, either on different topics (e.g., CNC coding) or on a single research project spanning multiple semesters.

LIST OF EXPERIMENTS

1. Introduction to Machining operations & tools (Lathe machine.)
2. Introduction to Machining operations & tools (Shaper machine)
3. Machining of plain turning and facing
4. Machining of taper turning & step turning
5. Machining of knurling operation
6. Machining of drilling operation
7. Machining of boring operation
8. Machining of internal thread cutting
9. Machining of external thread cutting
10. Machining of eccentric turning
11. Machining of hexagon in shaping machine
12. Machining of square in shaping machine
13. Cutting of gear teeth using milling machine
14. Grinding operations using grinding machine.

COURSE OUTCOME

- Integrate the concept of machine design with fabrication.
- Critically analyze the feasibility of manufacturing specific pieces.



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Scheme & Syllabus

(5th Semester)

Diploma

Mechanical Engineering



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Scheme of Teaching & Examination

V - Semester

S. No.	Code	Subject	Total Credit	Periods per week			Scheme of marks	
				L	T	P	ESE	IM
1	DP510	Advance Manufacturing Process	3	3	-	-	70	30
2	DP511	Refrigeration & Air conditioning	3	3	0	-	70	30
3	DP512	Automobile Engineering	3	3	-	-	70	30
4	DP513	Refrigeration & Air conditioning Laboratory	1	-	-	2	30	20
5	DP514	Machine Design Laboratory	1	-	-	2	30	20
6	DP515	Automobile Engineering Laboratory	1	-	-	2	30	20
7	DP516	Project - 1	3	-	-	6	70	30
8	DPPXXX	Professional Elective II	3	3	0	-	70	30
9	DPOXX	Open Elective II	3	3	0	-	70	30
Total			21	15	0	12	510	240

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	V Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Advance Manufacturing Process
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 510

COURSE OBJECTIVES

- To use concept on fundamental technical sciences integrated with applied technical specialties. academic experience from projects, laboratory experimentation, classroom lectures.
- Demonstrations, and applied 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.
- Learners will effectively use their communication skills in oral, written, visual and graphic modes within interpersonal, team, and group environments.

UNIT I

Competitive Aspects of Manufacturing Processes Selection of Material, product, design and quality of material, substitution of material, selection of manufacturing process, process capabilities, manufacturing considerations. Heat treatment of steel, Designation of steel.

UNIT II

Casting Alloys: Ferrous, Non ferrous, properties, processes – Ingot, shapes, expendable mould – permanent pattern, expendable mould – expendable pattern, permanent, centrifugal, melting practices, design considerations, quality assurance, foundry mechanization.

UNIT III

Bulk Deformation Process Rolling - Classification, products, processing sequence, mill types, mill line equipments, accessories for flat and shape rolling, variables, load, torque, power calculations, rolling mill controls, defects – causes and remedies. Forging - Types, tools and dies, equipment, recent trend in forging, design considerations, defects, causes and remedies. Press working - Material properties – Formability's, yield point phenomenon, Anisotropy, metals, shearing process – types, forces, finish blanking, equipments, bending-stresses and spring back, methods, flanging and necking, special processes – spinning, bulging, peen forming, stretch forming, deep drawing dies, design considerations in metal working. Extrusion - Process, tooling, analysis and variables. Wire and tube drawing - Operations and Analysis.



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UNIT IV

Joining Process Welding – Solid state bonding – cold, diffusion, forge friction, liquid state – Joint, weldability, weld quality, material, resistance, arc, thermal, high energy beam. Liquid solid – brazing soldering. Recent development in welding – under water, high pressure vessel etc. Inspection & testing of welded joints. Adhesive bonding – Types of adhesive, adhesive systems, surface preparation, application, design, process capability, welding of plastics, thermal cutting.

UNIT V

Advanced Machining Processes Nontraditional machining – Processes, Process parameters and comparative study of AJM, ECM, USM, EDM, LBM, EBM, PAM processes. Rapid Prototyping – Processes, process parameters, capability and products, application of various methods. Fabrication of Micro electronic devices – Process sequence, basic techniques, thick and thin film techniques, application.

COURSE OUTCOMES

- Ability to apply basic knowledge of mathematics, science and engineering principles to solve technical problems.
- Ability to identify, formulate and solve technical problems.
- Ability to use computational methods, skills, computers and modern technical tools in engineering practice.
- Ability to design and conduct experiments, and to analyze and interpret data.
- Ability to function effectively on teams and within a diverse environment.

TEXT BOOKS

1. Manufacturing Engineering Technology – S. Kalpakjian & S.C. Schmid – Pearson Education – New Delhi
2. Introduction to Manufacturing Processes – J.A. Schey – McGraw Hill, New York

REFERENCE BOOKS

1. Manufacturing Science – A. Ghosh & A. Mallik – Affiliated East West Press, Delhi.
2. Mechanical Metallurgy – G.E. Dieter – McGraw Hill, New York
3. Principles of Manufacturing Material and Processes – J.S. Cambell – TMH, New Delhi



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**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester	:	V Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Refrigeration & Air conditioning
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 511

COURSE OBJECTIVES

- Analyze vapour compression cycles.
- Analyze alternative systems such as gas cycle refrigeration and vapour absorption etc.
- Understand psychrometry and psychrometric processes
- Select/ design equipment for refrigeration and air-conditioning systems.
- Carry out air conditioning calculations.

UNIT I

INTRODUCTION

Introduction to Refrigeration. Methods of refrigeration as Ice refrigeration, steam jet refrigeration, Concept of heat pump, Refrigerator, Concept of COP. Refrigerating effect, Units of refrigeration. Reversed Carnot Cycle and its representation on PV & TS diagram. Vapour Compression Cycle - VCC - Principle, components, representation on PV, TS & PH diagrams. Wet /Dry –compression-Reasons for not using Wet /Dry compression. Actual VCC, calculation of COP, Effect of superheating & under-cooling. Multistage vapour compression cycle, need for multistage compression system, cascade refrigeration & its application.

UNIT II

VAPOUR ABSORPTION SYSTEM

Principle /components & working of Ammonia vapour absorption system, Lithium Bromide absorption system, Electrolux Refrigerators, Comparison with vapour compression system. Refrigerants -Types of refrigerants as primary / secondary. Properties of the Commonly used refrigerants such as – CO₂, Ammonia, SO₂, Freon 11, Freon 12, Freon 22, Freon 500, 503, 502. & eco-friendly refrigerants. Concept of Ozone layer and its destruction. Selection of refrigerants for particular application with reasons.

UNIT III

AIR CONDITIONING & PSYCHROMETRIC PROCESSES

Definition, Necessity of Air conditioning. Concept of body comfort. Properties of air as DBT, WBT, DPT, Air as mixture of different gases & water vapour Dalton's law of partial pressures, Concept of Humidity of air, absolute humidity, relative Humidity, Psychrometers and their types, Enthalpy of air, Sp. Volume of air, DPT of moist air, Psychrometric charts & tables, Psychrometric processes such as sensible heating & cooling, latent heat of air, latent heating & cooling, heating & humidification,



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cooling & dehumidification , evaporative cooling , sensible heat factor , By-pass factor ,apparatus dew point ,[representation on psychrometric charts]

UNIT IV

COOLING LOAD CALCULATION

Concept of heat load, Heat sources as outdoor , walls , roofs in filtration & indoor sources , types of cooling loads like—glass , walls , roofs , ventilation , people, electrical equipment, motors etc. Calculations of total heating & cooling load estimation & determination of refrigeration capacity.

UNIT V

AIR DISTRIBUTION SYSTEMS

Elements of air distribution system such as types of fans, Ducts, Duct system as –graduate trunk, loop perimeter, Extended Platinum, Over head trunk, over head radial duct systems, Selection & Losses in duct systems. Air distribution outlets supply outlets, return outlets, sealing diffusers, grills , resistors, fixed /adjustable louvers , low /high wall outlets , floor baseboard & sealing outlets .

AIR CONDITIONING SYSTEMS- Window air conditioning unit. Construction, Working, type of refrigeration system used, capacity. Split air conditioners construction , working ,Type of refrigeration system used , capacity Package / Summer / Winter & Year – round air Conditioner systems construction , working ,type of refrigeration system used capacity

COURSE OBJECTIVES

- Acquire knowledge and hands-on competence in the design and development of refrigeration and air conditioning system.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.
- Demonstrate an understanding of Multiple Evaporator and compressor system.
- Demonstrate a basic understanding of Vapour Compression Refrigeration System

TEXT BOOKS

1. Refrigeration & Air Conditioning – Ahmadid, Amean - PHI
2. Refrigeration and Air Conditioning –C. P. Arora - TMH.

REFERENCE BOOKS

1. Refrigeration and Air Conditioning – Manohar Prasad – Newage International Pub
2. Refrigeration and Air Conditioning – Arora & Domkundwar – Dhanpat Rai & Sons
3. Refrigeration and Air Conditioning – P.L. Ballaney – Khanna Pub.
4. Refrigeration and Air Conditioning – W.F. Stoker



MATS UNIVERSITY

ARANG, RAIPUR (C.G.)



**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester	:	V Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Automobile Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP 512

COURSE OBJECTIVES

- Understand the basic structure of an automobile.
- Understand construction of suspension system.
- Understand transmission system and its elements.
- Understand braking system, steering system and electrical system.

UNIT I

INTRODUCTION (VEHICLE LAYOUTS AND TYPES)

Introduction to an automobile, History of the automobile, Types of automobiles, Layout of an automobile, Major components of the automobile, Functions of the automobile components, Layout of chassis and frames, classification of chassis. Automobile Engines (Power Plant) Types of Automobile Engines:- Petrol Engine, Diesel Engine, Gas Turbine, Rotary piston Engine Electric motor, Fuel cell (Hydro/Hydro methanol fuel cell)

ENGINES LOCATIONS - front, rear and transverse under floor with their advantages and disadvantages Engine Constructional features :- Engine block, engine heads, crank case oil pan, cylinder liners, Gasket, combustion chambers with their types, piston, piston pin, gudgeon pin, connecting rod, crank shaft, cam shaft, valve & valve mechanism. valve timing , port timing diagram, timing gears, Inlet & exhaust manifolds, Exhaust mufflers, flywheel, inlet & exhaust ports of two stroke engine, concept of firing order in multi-cylinder engine.

ENGINE PERFORMANCE AND TESTING – engine measurements, factors affecting engine power, engine rating and related factors, methods of determining the engine horse power, engine efficiency.

UNIT II

FUEL SYSTEMS FOR PETROL ENGINE

Introduction & fuel system for petrol engine, Gravity feed system, Fuel pump, Properties of air-fuel mixture, Mixture control devices, Simple carburettor & its limitations, modern carburettor like : Carter, Solex carburettor, S.U. Carburettor, Concept of Petrol Injection & MPFI Petrol injection systems, [such as direct injection systems, port injection systems, throttle body injection etc, Mechanical and Electronic injection systems], Concept of supercharging & types of superchargers. Fuel System for Diesel Engine- Mixture requirements of diesel engine, Fuel injection systems such as Common rail fuel injection system, Individual pump fuel injection system, Construction and working of Fuel feed pump, Fuel injection pump, Fuel injector, Distributor type, rotary fuel injection pump.



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UNIT III

AUTO-ELECTRIC SYSTEM

Main Components of the Electrical System, Starter Generator, Alternator Type Generator, Ignition System, Distributor, Ignition Coil, Ignition Timing, Ignition Advance, Spark Plug, Electronic Ignition System, Operation of Electronic Ignition System, Electronic Switching Systems, Automobile Battery, Low-maintenance and Maintenance-free Batteries. Transmission & Propeller Shaft - Need and functions of transmission system, Concept of various road resistances such as wind, Gradient, Resistance, Total resistance, Tractive-effort, Types of transmission, Types of gear boxes e.g. sliding mesh, constant mesh, synchromesh gear boxes, mathematical analysis of gear boxes, Gear shifting mechanisms. Epicyclic gear box, five speed gear box, .

UNIT IV

FINAL DRIVE & REAR AXLE

Introduction, Function & need of differential, Types of gears used in differential, Differential trouble diagnosis, Final drive, Construction and details of rear axle and forces acting on rear axle, Types such as semi floating, fully floating, Three quarter floating, Rear axle drives such as Hotchkiss type, torque tube type etc.

STEERING & FRONT AXLE- Function of the steering system, Steering gears & Steering mechanism used in some Indian vehicles, Steering wheel & column, Front axle-Function & construction, Steering heads & steering geometry, Wheel alignment, Adjusting the steering angles, Ackerman linkage, Power steering, Under steering & over steering, Steering lock, Turning radius, Steering trouble shooting.

UNIT V

BRAKES

Need & principle of braking system., Brake efficiency and stopping distance, Types of brakes as Mechanical brakes - drum and disc brakes, Hydraulic Brakes, Tandem Master cylinder, wheel cylinder, braking linkages, Self energized brakes, Floating-caliper brakes, Power brakes, Air brakes, Air hydraulic brakes, Emergency & Parking Brakes, Brake trouble shooting. Wheels and Tyres Types of Automobile Wheels, Tyres & its Types, Tyre Tread, Tyre Selection, Tyre Service Parameters, Tyre Maintenance

COURSE OUTCOME

- Demonstrate a basic understanding of vehicle design, function and performance.
- Acquire knowledge and hands-on competence in the design and development of mechanical systems.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.
- Demonstrate an understanding of braking system and gearing system

TEXT BOOKS

1. Automobile Engineering – Kripal Singh – Standard Publications
2. Automobile Engineering – G.B.S. Narang – Khanna Publishers

REFERENCE BOOKS

1. Automobile Engineering - Dr. N. K. Giri – Khanna Publishers
2. Automobile Engineering – K. R. Govindan – Anuradha Agencies



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ARANG, RAIPUR (C.G.)



MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Refrigeration & Air Conditioning Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 513

COURSE OBJECTIVES

- Analyze vapour compression cycles.
- Analyze alternative systems such as gas cycle refrigeration and vapour absorption etc.
- Understand psychrometry and psychrometric processes
- Select/ design equipment for refrigeration and air-conditioning systems.
- Carry out air conditioning calculations.

LIST OF EXPERIMENTS

1. Study of Domestic or Household Refrigerator
2. Study of Refrigeration Compressor
3. Study of Leak Detection, Evaluation and Charging of Refrigerants procedure
4. Study of Refrigerating Controls
5. Trial on Refrigeration Test Rig
6. Trial on Air Conditioning Test Rig
7. Trial on Mechanical Heat Pump
8. Trial on Ice Plant Test Rig
9. Technical report on visit to Refrigeration and Air Conditioning establishments.

COURSE OUTCOMES

- Acquire knowledge and hands-on competence in the design and development of refrigeration and air conditioning system.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.
- Demonstrate an understanding of Multiple Evaporator and compressor system.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Branch	:	Diploma in Mechanical Engineering
Subject	:	Machine Design Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 514

COURSE OBJECTIVES

- To design and analyze basic elements of machine e.g. key, shaft and axle.
- To design and analyze various type of joints for members with axial load
- To design and analyze couplings and clutches for members in torsion
- To design and analyze threaded fastener and power screws
- To design and analyze riveted and welded joint

LIST OF EXPERIMENTS

Each student shall submit two-assembly design report along with the drawing for assembly/sub assembly for any mechanical system consisting of not less than four machine elements included in the syllabus.

COURSE OUTCOMES

- Apply knowledge of machine design for understanding, formulating and solving engineering problems.
- Acquire knowledge and hands-on competence in applying the concepts in the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Branch	:	Diploma in Mechanical Engineering
Subject	:	Automobile Engineering Laboratory
Total Theory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP 515

COURSE OBJECTIVES

- Understand the basic structure of an automobile.
- Understand construction of suspension system.
- Understand transmission system and its elements.
- Understand braking system, steering system and electrical system.

LIST OF EXPERIMENTS

1. Dismantling & assembly of 4 stroke petrol engine (Jeep/Car)
2. Dismantling & assembly of 4 stroke diesel engine.(Jeep/Car).
3. Dismantling and assembly of 2 stroke engine like Scooter/Moped/Motorcycle engine.
4. Disassembly and assembly of following carburettors with their correct tuning.
(1) Solax Carburettor (2) Scooter Carburettor, (3) 4 stroke motor cycle carburettor.
5. Disassembly and assembly of plunger type of fuel pump, rotary fuel pump & fuel injector with their correct tuning.
6. Study of Air & water-cooling systems of a motorcycle and car engine.
7. Dismantling & assembly of battery ignition system.
8. Study of Alternator, dynamo and Startor Bendix drive by dismantling & assembly.
9. Study of Gear box by dismantling & assembling of Sliding mesh, constant mesh & Synchromesh gear boxes.
10. Dismantling & assembling of single plate clutch, Diaphragm clutch, Centrifugal Clutch.
11. Dismantling assembly of steering gear of rack and pinion type of Maruti Car.
12. Study hydraulic braking system of Car / truck.
13. Study Air Braking system of truck.
14. Study of front axle and steering system of a car
15. Study independent & conventional Suspension system (Maruti/Jeep/Indica)
16. To balance wheels on Dynamic wheel balancing machine.
17. Conduct trial on petrol & diesel gas Analyzer & analyze results.
18. Tune up petrol & diesel engine for minimum Emission level.

COURSE OUTCOME

- Demonstrate a basic understanding of vehicle design, function and performance.
- Acquire knowledge and hands-on competence in the design and development of mechanical systems.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.
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MATS UNIVERSITY

ARANG, RAIPUR (C.G.)



**MATS University, Raipur (C.G.)
School of Engineering & I.T.**

Branch : Diploma in Mechanical Engineering
Subject : Project-I
Total Credits : 02
Code : DP516

COURSE OBJECTIVE:

- To develop the ability of solving a specific problem right from its identification
- To train the students in preparing project reports and to face reviews and viva voce examination.
- To produce scientific content in the form of report writing as per the standard norms

SUMMARY/ PROCEDURE OF PROJECT-I

1. The objective of the Project-I is to make use of the knowledge gained by the student at various stages of the degree course.
2. Students are permitted to form group of likeminded colleagues (not more than 4 members) for working on a particular project/topic.
3. Students will also be permitted to undertake industrial/consultancy project Work, outside the department, in industries/Research labs.
4. There shall be four assessments during the semester by a review committee.
5. The student shall make four presentations on the progress made before the committee at various stages of the Project work.
6. The Head of the Department shall constitute the review committee for each branch of study.
7. There will be a viva-voce examination at the end of the Project work, conducted by one internal examiner and one external examiner.
8. The total marks secured will be the sum of marks secured in the Project reviews and Viva Voce Examination.
9. Each student is required to submit a Project report on the project assigned to him/group by the department.
10. The report should be based on the information available in the literature or data obtained by the student by way of experiments conducted in the laboratory/industry.

COURSE OUTCOME:

- On Completion of the project -1, students will be in a position to conduct experimental or Computational investigations relevant to practical problems by formulating proper methodology.
- To be able to formulate a practical problem in real life to explore for its possible solution after suitable review of literature.
- To be able to synthesize the outcome of the problem and validate findings on the basis of experimentation
- To produce scientific content in the form of report writing as per the standard norms

MATS School of Engineering &I.T



MATS UNIVERSITY
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Scheme & Syllabus

(6th Semester)

Diploma

Mechanical Engineering



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Scheme of Teaching & Examination

VI - Semester

S. No.	Code	Subject	Total Credit	Periods per week			Scheme of marks	
				L	T	P	ESE	IM
1	DP610	Internship - 1	6	-	0	-	70	30
2	DP611	Project - 2	6	3	0	-	90	60
3	DPPXXX	Professional Elective III MOOCs	3	3	0	-	70	30
4	DPOXX	Open Elective III MOOCs	3	3	0	-	70	30
Total			18	9	0	0	300	150

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester : VI Diploma
Branch : Mechanical
Subject : Internship-I
Total Credits : 06
Code : DP 610

COURSE OBJECTIVE

- It gives career alternatives prior to graduation.
- Provides a platform to Integrate theory and practice.
- Assess interests and abilities in their field of study.
- Develop communication, interpersonal and other critical skills in the job interview process.
- Acquire employment contacts leading directly to a full-time job following graduation from college

DESCRIPTION

1. A 4-6 week industry internship-I is a compulsory course requirement during winter vacation.
2. It is compulsory for every student to submit their daily report once the back to campus after completing the internship period.
3. Every student of the course is expected to work in the industry for a period of 4-6 weeks, during the months of December-January, after completing seventh semesters of the Academic program.
4. The Industry Internship placement process is held to help the Students find internships and at the same time, help recruiters find students to intern with their firms challenging projects.
4. Evaluation marks to be carried over to present Semester.

COURSE OUTCOME

- Develop work habits and attitudes necessary for job success
- Identify, write down, and carry out performance objectives (mutually agreed upon by the employer and the student) related to their job assignment.
- Application of theory into practice develop confidence and improve understanding
- Job/work environment help student for interview and job opportunity



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Semester	:	VI Diploma
Branch	:	Mechanical
Subject	:	Project-II
Total Credits	:	06
Code	:	DP 611

COURSE OBJECTIVE

- Final Year Projects offer the opportunity to apply and extend material learned throughout the engineering
- Assessment is by means of a seminar presentation, submission of a thesis, and a public demonstration of work undertaken.
- In contrast to the majority of courses studied elsewhere in the program, projects are undertaken individually or in small groups.
- The projects undertaken span a diverse range of topics, including theoretical, simulation and experimental studies, and vary from year to year.

SUMMARY/PROCEDURE OF PROJECT-II

1. The objective of the project-II work is to enable the students to work in a group of likeminded colleagues on a project involving theoretical and experimental studies related to the branch of study.
2. Students will also be permitted to undertake industrial/consultancy project Work, outside the department, in industries/Research labs.
3. Students are permitted to form group of likeminded colleagues (not more than 3 members) for working on a particular project/topic.
4. Students can opt for the co-guide from industries/ other colleges to get the necessary supervision.
5. There shall be four assessments during the semester by a review committee.
6. There will be a viva-voce examination at the end of the Project-III work, conducted by one internal examiner and one external examiner.
7. The total marks secured will be the sum of marks secured in the Project reviews and Viva Voce Examination.
8. Every project work shall have a guide who is the member of the faculty of the institution.
9. Each student/group shall finally produce a comprehensive report in the form of Thesis covering background information, literature survey, problem statement, project work details and conclusion.
10. This final report shall be typewritten form as specified in the guidelines.

COURSE OUTCOME

- Demonstrate a sound technical knowledge of their selected project topic
- Undertake problem identification, formulation and solution
- Design engineering solutions to complex problems utilizing a systems approach
- Communicate with engineers and the community at large in written and oral forms.



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Syllabus

(Professional Electives)

Diploma

Mechanical Engineering



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LIST OF PROFESSIONAL ELECTIVE SUBJECTS:-

S.No.	Code	Professional Elective
1	DPP101	Plant Maintenance and Safety
2	DPP102	Mechatronics
3	DPP103	Industrial Management
4	DPP104	Tool Engineering
5	DPP105	Welding Technology
6	DPP106	CAD CAM & Automation
7	DPP107	Alternative Energy sources and Management
8	DPP108	Measurement and Control
9	DPP109	Energy studies
10	DPP110	Disaster Management
11	DPP111	Power Plant Engineering
12	DPP112	Entrepreneurship Development
13	DPP113	Industrial Fluid Power
14	DPP114	Material Handling System
15	DPP115	Estimation and Costing



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Plant Maintenance And Safety
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 101

COURSE OBJECTIVES

- To ensure the desired plant availability at an optimum cost within the safety prescription.
- Student able to know about the objectives of maintenance.
- To minimize the total cost of unavailability and resources.
- Explain the repair methods of beds and slide ways. Discuss various condition monitoring techniques.

UNIT I

Organisation of Plant Engineering

Principles of Plant management functions. Classification of maintenance work-Routine maintenance, emergency work, service work, preventive maintenance. Project work, Corrective work, Assessment of maintenance work. Performance and productivity measurement; problem solving techniques. Statistical processes. Parato chart. Manpower planning and training for maintenance and safety staff.

UNIT II

Plant Facilities and Layout Planning

Basic Plant facilities- (a) Building: Types of Building structures, Ventilation and lighting, Roads and parking. (b) Electrical power generation, distributions, utilisation, stand by units. (c) Heating, ventilation and Air conditioning. (d) Water supply, Purification, use and disposal. (e) Sanitation. (f) Planning and estimation of auxiliary services, such as water, steam, compressed air.

Layout of facilities-Types of layouts, selection of layout. Group technology aspect. P. Q. Analysis, PQRST analysis, material flow, REL charts, space requirements, space diagram. Use of computer for optimization of layouts.

UNIT III

Maintenance Management Practice

Various types of maintenance-breakdown, preventive, periodic or predictive, condition based maintenance as predictive preventive maintenance. Online or off-line, concept of health as well as usage monitoring. Quantitative decision making for selection of maintenance system & management classification of material, MICLASS, CUSDD, Software for Classification and Coding. Maintenance problems occurring in product and process type industries and Power plants and their management.

Spare Parts Management- Simulation and Software needed for spare parts management and inventory planning.



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UNIT IV

Preventive Maintenance and Life Cycle Costing

Periodic Preventive Management - Scheduled maintenance and period for P.M. Life cycle cost taking into consideration maintenance, reliability, hazard function etc. Life cycle costing: Rigorous models, mathematical formulation etc.

UNIT V

Plant Safety issues and Energy conservation

Plant safety-fire protection and prevention, safety against mechanical hazards, chemical hazards, accident prevention practices and codes. Pollution control-Waste disposal, existing limiting norms. Recycling of waste. Energy conservation, management and audit. Material handling equipments.

COURSE OUTCOME

- Recognize troubles in mechanical elements.
- Assemble, dismantle and align mechanisms in sequential order.
- Carry out plant maintenance using tri-bology, corrosion and preventive maintenance.

TEXT BOOKS

1. A. K. Gupta, "*Terotechnology & Reliability Engineering* ",McMillan Co.
2. Sushikumar Srivastava, "*Industrial Maintenance Management* ",S.Chand and Co.Ltd., New Delhi.
3. R.C. Rosaler-Handbook of Plant Engineering-McGraw Hill.ISBN 0070521646

REFERENCE BOOKS

1. B.Bhadury and S.K. Basu, "*Terotechnology: Reliability Engineering and Maintenance Management* ",Asian Books, New Delhi 2002.
2. A. K. S. Jardine, "*Maintenance, Replacement & Reliability*" HMSO, London.
3. R.A. Collacatt, "*Mechanical fault Diagnosis and Condition Monitoring*",Chapman and Hall Ltd.ISBN 0412129302
4. Higgin-Handbook of Maintenance Engineering- McGraw Hill.
5. Rudenko-Material, Handling equipment-MIR:- Publication.
6. Jacob Fruchlboum-Bulk Material Handling, Handbook; CBS Publisher & distributor, ISBN 8123905416
7. H.P. Garg -Industrial Maintenance, S. Chand and Co. New Delhi, ISBN8121901685
8. Edward Srivastava-Maintenance Management.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Mechatronics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 102

COURSE OBJECTIVES

- Understand key elements of Mechatronics system, representation into block diagram.
- Understand concept of transfer function, reduction and analysis.
- Understand principles of sensors, its characteristics, interfacing with DAQ microcontroller.
- Understand the concept of PLC system and its ladder programming, and significance of PLC systems in industrial application

UNIT I

MECHATRONICS, SENSORS AND TRANSDUCERS

Introduction to Mechatronics Systems – Measurement Systems – Control Systems

Microprocessor based Controllers. Sensors and Transducers – Performance Terminology – Sensors for Displacement, Position and Proximity; Velocity, Motion, Force, Fluid Pressure, Liquid Flow, Liquid Level, Temperature, Light Sensors – Selection of Sensors

UNIT II

ACTUATION SYSTEMS

Pneumatic and Hydraulic Systems – Directional Control Valves –

Rotary Actuators. Mechanical Actuation Systems – Cams – Gear Trains – Ratchet and pawl – Belt and Chain Drives – Bearings. Electrical Actuation Systems – Mechanical Switches – Solid State Switches – Solenoids – Construction and working principle of DC and AC Motors – speed control of AC and DC drives, Stepper Motors-switching circuitries for stepper motor – AC & DC Servo motors

UNIT III

SYSTEM MODELS AND CONTROLLERS

Building blocks of Mechanical, Electrical, Fluid and Thermal Systems, Rotational Transnational Systems, Electromechanical Systems Hydraulic Mechanical Systems. Continuous and discrete process Controllers – Control Mode – Two – Step mode – Proportional Mode – Derivative Mode – Integral Mode – PID Controllers – Digital Controllers – Velocity Control – Adaptive Control – Digital Logic Control – Micro Processors Control.



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UNIT IV

PROGRAMMING LOGIC CONTROLLERS

Programmable Logic Controllers – Basic Structure – Input / Output Processing – Programming – Mnemonics – Timers, Internal relays and counters – Shift Registers Master and Jump Controls – Data Handling – Analogs Input / Output – Selection of a PLC.

UNIT V

DESIGN OF MECHATRONICS SYSTEM

Stages in designing Mechatronics Systems –

Traditional and Mechatronic Design Possible Design Solutions. Case studies of Mechatronics systems - Pick and place Robot- Autonomous mobile robot-Wireless surveillance balloon- Engine Management system- Automatic car park barrier.

COURSE OUTCOMES

- Identification of key elements of mechatronics system and its representation in terms of block diagram.
- Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O.
- Interfacing of Sensors, Actuators using appropriate DAQ micro-controller.

TEXT BOOKS

1. Bolton, W, “Mechatronics” , Pearson education, second edition, fifth Indian Reprint, 2003
2. Smaili, A and Mrad, F , "Mechatronics integrated technologies for intelligent machines", Oxford University press, 2008

REFERENCE BOOKS

1. Rajput, R.K, A textbook of mechatronics, S. Chand & Co, 2007
2. Michael B. Hirst and David G. Alciatore, “ Introduction to Mechatronics and Measurement Systems”, McGraw-Hill International Editions, 2000.
3. Bradley D. A., Dawson D., Buru N.C. and Loader A.J, “Mechatronics”, Chapman and Hall, 1993.
4. Dan Neculescu, “Mechatronics”, Pearson Education Asia, 2002 (Indian Reprint).
5. Lawrence J. Kamm, “Understanding Electro – Mechanical Engineering”, An Introduction to Mechatronics, Prentice – Hall of India Pvt., Ltd., 2000.
6. Nitaigour Premchand Mahadik, “Mechatronics”, Tata McGraw-Hill publishing Company Ltd, 2003



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Industrial Management
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 103

COURSE OBJECTIVES

- To help the students gain understanding of the functions and responsibilities of managers.
- To provide them tools and techniques to be used in the performance of the managerial job.
- To enable them to analyze and understand the environment of the organization.
- To help the students to develop cognizance of the importance of management principles

UNIT I

Principles of management

Definition of management, Administration organization, Functions management, Planning, Organizing, Co-ordination and control, Structure and function of industrial organizations, Leadership- Need for leadership, Factors to be considered for accomplishing effective leadership, Communication -Importance, Processes, Barriers to communication, Making communication, Effective, formal and informal communication, Motivation - Factors determining motivation, Positive and negative motivation, Methods for improving motivation, Incentives, Pay promotion and rewards, Controlling - Just in time, Total quality management, Quality circle, Zero defect concept. Concept of Stress.

UNIT II

Human Resource Management

Nature and Scope of Human Resource Planning, Training and Development, Recruitment and Selection, Career Growth, Grievances, Motivation and its types, Need for Motivation, Reward and Punishment, Need, wants, satisfaction chain. Maslow hierarchy of needs. Quality of working life, job enrichment and job enlargement.

UNIT III

Marketing Management

Marketing Environment: Consumer Markets and Buyer Behavior, Marketing Mix, Advertising and Sales Promotion, Channels of Distribution.

Financial Management

Book keeping, financial statement Analysis, Financial Ratios, Capital Budgeting, Break-Even Analysis.

Material Management :

Objective of a good stock control system - ABC analysis of inventory, Procurement and consumption cycle, Reorder level, Lead time, Economic order quantity, Purchasing procedure, Stock keeping, Bin card.



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UNIT IV

Management Information System

Role of information in decision making, Definition of MIS, computer based user machine system, integrated system, MIS v/s Data processing, subsystem of an MIS, MIS DSS and expert system. Evolution and effectiveness of Information system.

UNIT V

Flexibility in Management

Definition, connotation of flexibility, systematic concept of flexibility, foundation of flexible system management, types of flexibility and its applications in management of modern organizations.

LABOUR, INDUSTRIAL AND TAX LAWS

Importance and necessity of industrial legislation, Types of labour laws and dispute, Factory Act 1948, Payment of Wages Act 1947, Employee State Insurance Act 1948, Various types of taxes - Production Tax, Local Tax, Trade tax, Excise duty, Income Tax.

COURSE OUTCOMES

- Understand the concepts related to Business.
- Demonstrate the roles, skills and functions of management.
- Analyze effective application of PPM knowledge to diagnose and solve organizational problems and develop optimal managerial decisions.
- Understand the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities.

TEXT BOOKS

1. Essential of Management: H. Koonz and h. Weihrich
2. Marketing Management - Kotler Philip- Prentice Hall of India
3. MIS conceptual foundation, structure and development, G B Davis & M H Olson.
4. Flexibility in Management, Sushil, Vikas publication, New Delhi

REFERENCE BOOKS

1. Human Resource Management - Luthans Fred - McGraw Hill, Inc.
2. Organizational Behavior Concepts, Controversies Applications - Stephen, P. Robbins- Prentice Hall, Englewood Cliffs, New Jersey
3. Financial Management – M.Y. Khan and P.K. Jain - Tata Mc-Graw Hill
4. Competitive Advantage - Porter Michael - The Free Press
5. Competitive Strategy - Porter Michael - The Free Press, 1985
6. Fundamentals of Business Organizations and Management – Y.K. Bhusan – S. Chand and Sons
7. Industrial Management – K.K. Ahuja - Khanna Publishers



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Tool Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 104

COURSE OBJECTIVES

- The course provides students with fundamental knowledge and principles in material removal processes.
- In this course, the students apply the fundamentals and principles of metal cutting to practical applications through multiple labs using lathes, milling machines, grinding machines, and drill presses, Computer Numerical Control etc.
- To demonstrate the fundamentals of machining processes and machine tools.
- To develop knowledge and importance of metal cutting parameters.
- To develop fundamental knowledge on tool materials, cutting fluids and tool wear mechanisms.

UNIT I

Introduction & Metal Cutting

Need of machine tool technology and its use, Material removal processes, Types of machine tools, Stages in cutting, factors affecting cutting, Types of chips, Continuous, discontinuous & built up edge(BUE), BUE formation condition and its effect upon surface finish Definition of cutting force, feed force, radial force power requirement for each type of force, Tool geometry and influence of tool angles, Desirable properties of cutting tool. Material and their influences on the choice of tools materials. Primary and secondary function of cutting fluids and properties of cutting fluids commonly used, Types of cutting fluids. Cutting variables, tool wear and tool life, Tools life specifications, Taylor's tool life equation Cutting speed calculation, Economics of metal cutting.

UNIT II

Grinding and Finishing Processes

Definition of grinding and action in grinding, Types of abrasive materials and their properties, Bonding materials, Grinding wheel classification, Condition for selection of grinding wheels, Balancing of grinding wheels, Glazing, loading dressing and Trueing. Principles of working of grinding machines and functions of main parts, Types of grinding processes, Function of tool and work holding devices, feed arrangement, Table drive in surface and cylindrical grinders, Types of lubricants and coolants used in Grinding, Grinding defects, their remedy and safety practices, Definition of micro finishing, honing, lapping, super finishing methods, Equipments involved, materials used, Tolerances obtained and limitations, Application of honing and lapping processes.



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UNIT III

Machine Tools and Machine Tool Drives

Definition and Classification of machine tools, Requirement of machine tools, Drive systems stepped and step-less, drives, Advantages and limitations of the gear box drive, Function of feed box, types of feed gear boxes and advantages, Working principles of straight line motion, Control systems- multi handle, single lever and pre selective control systems.

UNIT IV

Installation and Testing of Machine Tools

Need for leveled concrete foundation, Effect of foundation on accuracy of the product and life of the machine, Effect of weight of machine, soil bearing capacity and loading pattern upon foundation, Industrial safety, Selection of proper lifting devices for levelling of machines after grouting, Instruments and aids required for testing the accuracy of machine, Load testing and product testing, Understanding of test chart and check list.

UNIT V

Jigs and Fixtures

Definition and functions of jigs and fixtures, Location of components by dowel pins and buttons, bushes and restrainers screws, Design criteria for simple jigs and fixtures, Selections criteria for method of preparation of jigs and fixtures. Unconventional Machining : Need for unconventional methods, Limitation of conventional machining, Scope of the Electro chemical Machining process and limitations, Scope and limitation of ultra sonic machining process.

COURSE OUTCOMES

- Understand the cutting tool geometry, mechanism of chip formation and mechanics of orthogonal cutting.
- Identify basic parts and operations of machine tools including lathe, shaper, planer, drilling, boring, milling and grinding machine.
- Design locating and clamping devices to produce a component.
- Select a machining operation and corresponding machine tool for a specific application in real time.
- Select a measuring instrument to inspect the dimensional and geometric features of a given component.

TEXT BOOKS

1. Machine Tool Engineering – G.R. Nagpal – Khanna Publishers, New Delhi
2. Fundamentals of Metal Cutting & Machine Tool – B.L. Juneja, G.S. Sekhan, Nitin Sethi – New Age Publishers – New Delhi

REFERENCE BOOKS

1. Production Engineering – P. C. Sharma – S. Chand & Company – New Delhi
2. Production Technology – R.K. Jain – Khanna Publisher – New Delhi
3. Principle of Metal Cutting - G.C. Sen, A. Bhattacharya – New Central Book Agency (P) Ltd., Calcutta
4. Machine Tool Practices – Kibbe Richard R – PHI, New Delhi
5. Principles of Machine Tool – G.C. Sen, A. Bhattacharya – New Central Book Agency, Calcutta



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Welding Technology
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 105

COURSE OBJECTIVES

- Identify some common hazards in welding.
- Explain and identify proper personal protection used in welding.
- Explain some of the causes of accidents.
- Explain safety techniques for storing and handling cylinders.
- Explain how to avoid electric shock.
- Identify and explain the use of oxy fuel cutting equipment.
- Perform oxy fuel cutting • Perform set-up and run leads on shielded metal arc welding.

UNIT I

Introduction- Welding as a production process – its advantages and limitations. Gas welding process, Types of fuels, Acetylene, Indane, Butane etc. Gas welding equipment, Gas welding technique. Electric arc welding – Manual metal arc welding – Power supplies, cables and other accessories for arc welding, Welding technique - atomic, hydrogen welding, Thermit welding, soldering, brazing and braze welding.

UNIT II

Special Welding Processes- Power sources, equipments and accessories, application, limitation and other characteristics of: (a) Gas tungsten arc (TIG) welding (b) Gas metal arc (MIG) welding (c) Submerged arc welding (d) Electro slag welding processes. Resistance welding processes- principle-Types (spot, seam, projection, percussion, flash), Equipment required for each application.

UNIT III

Modern Welding Processes-Electron beam welding, Laser beam welding, Plasma arc welding, Friction welding, Explosive welding, Ultrasonic welding, Stud welding, Under water welding, Diffusion bonding, Cold welding, Welding of dissimilar metals.

UNIT IV

Weldment Testing- Defects in welding in various processes-Causes and remedies; Destructive testing of weldments - Strength, hardness, ductility, fatigue, creep properties etc. Non-destructive testing of weldments; Ultrasonic dye penetrant, magnetic particle inspection. X ray testing procedures and identification of defects – case studies. Weld thermal cycle – Residual stressed distortion in welding stress relieving techniques.

UNIT V

Weldability-Automation And Design In Welding-Weldability –definition. Temperature distribution in welding –heat affected zone weldability of steel, cast iron. Aluminum, Pre heating and post heating of



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weldments. Estimation of transition temperature. Automation in welding – Seam tracking vision and arc sensing welding robots. Design of weldments-Welding symbols positions of welding joint and groove design. Weld stress –Calculations – Design of weld size.

COURSE OUTCOME

- Describe proper safety procedures in welding environments
- Identify the use and applications of welding equipment
- Describe the use, and applications of blueprints in welding
- Perform mathematical calculations commonly used in a welding
- Create parts using information provided in blueprints to the given specifications.

TEXT/REFERENCE BOOKS

1. Abbott, J., & Smith, K. M. Welding Technology: Texas State Technical College Publishing.
2. Radhakrishnan.V.M. Welding Technology and Design, New Age International Pub. Ltd.,
3. Little R.L., Welding Technology Tata McGraw-Hill
4. Partner R.S. Welding Process and Technology, Khanna Publishers



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	CAD/CAM & Automation
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 106

COURSE OBJECTIVE

- To introduce the student to be familiar with CAD/CAM terminology & its capabilities. To become familiar with CAD/CAM software, Graphical user interface & basic tools.
- To recognize geometric and graphical elements of engineering design problems.
- To apply a “hands-on” understanding of the basic concepts of computer-aided manufacturing and prototyping through group and individual projects
- To study Basic features of CAM so as to be capable of accepting professional responsibilities and to understand the associatively between design and manufacturing.
- Integrate the CAD system and the CAM system by using the CAD system for modelling design information and converting the CAD model into a CAM model for modelling the manufacturing information.

UNIT I

Introduction of CAD

Computer Aided Drafting Concept, List of various CAD Software, Components of Auto CAD 2000 window such as Tool bar, standard tool bar, menu bar.

Drawing using AUTO CAD - Setting drawing units, limits, Grid, and snap searing the life opening on existing file, Drawing basic activities like Line, Circle, Arc, and Polygon etc, Using object Snap like END POINT, MID POINT, INTERSECTION, and CENTER POINT etc.

UNIT II

Editing Viewing Drawing

Selecting objects selection set with its option Like, Pick box, Window, Crossing, Previous, Add Remove, Editing commands like Erase, Copy, Array, Mirror, Break, Fillet etc., Display Command like Zoom All, 400 Previous 400 Extents etc., Concept of Layers. Concept of Block..

Dimensioning-Types of dimension Linear, Horizontal, Vertical, Aligned, and Rotated, Text Style, Selecting Font Size, Alignment, TEXT:- Style key Line text, Multilane text, Text Style, Selecting font size, Alignment

UNIT III

Working with Three Dimensional Entities using Auto CAD

Right hand rule. Specifying coordinates using x,y,z Co-ordinates, using x,y,z filters, Entering cylindrical Co-ordinates, Entering Spherical Co-ordinates, Defining user-do ordinate system, world Co-ordinate system.



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Solid Modeling -Concept of solid modeling, Creating predefined solid primitives such as box, core, cylinder, sphere, tours, and wedge, Construction a region using Region Command, Creasing and extruded solid, creasing reveled solid, Creating Composite solids using union, intersection and interfere commands, Creating cross sections of solid with section command. Using solid EDIT command with its option, Creating filets and chamfers on solids

UNIT IV

Printing Plotting Drawing

Selecting various parameters such as paper size, paper units, Drawing orientation, Plot Scale. Plot Offset, Plot area, and Print preview.

Introduction to Conventional Numerical Control - Introduction, Basic components of NC system, The NC procedures, NC coordinates systems, NC motion control systems, Applications of Numerical control and potential applications of NC machine tools.

UNIT V

Part Programming through Numerical Control

Purpose of part programming, steps of part-programming, Difference between manual and computer assisted part programming, Difference between language based and CAD package based part programming.

Computer Based Numerical Control Systems-Classification of NC Controller technology as: - Computer numerical control. Direct numerical control. Adoptive control machining systems.

COURSE OUTCOME

- Understand the various CAD/CAM and CNC processes.
- Generate and verify the tool path and NC programs for milling and drilling manufacturing processes.
- Recognize various types of Curves, surface and Solid and their application as used in geometric modeling.
- Appreciate the concept of parametric modeling which is the mainstay of most of the 3D modeling system.
- Write and prove sample part programs for CNC machining centres in planar milling operations using the word address format.

TEXT BOOKS

1. CAD/CAM Principles & Applications – P.N. Rao – TMH Publication
2. CAD/CAM Computer Aided Design & Manufacturing – Mikell P. Groover,
3. Concept and application of Finite element analysis, R D Cook, John Wiley

REFERENCES BOOKS

1. CAD/CAM Theory & Practice – Ibrahim Zied – TMH Publication
2. CAD/CAM – Surendra Kumar & A.K. Jha – Dhanpat Rai & Company
3. Finite element analysis



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Alternative Energy Sources And Management
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 107

COURSE OBJECTIVE

- This course introduces students to environment concerns. Students are expected to learn about environment, factors affecting it.

UNIT I

Energy Sources

Major sources of energy - Renewable and Non-renewable - Primary and Secondary energy sources - Energy scenario - Need of alternate energy sources. Energy Conservation Techniques. Distribution of energy consumption - Principles of energy conservation. - Energy audit – classifications Cogeneration – application - Combined cycle system. Concept of energy management. Energy management techniques - Analysis of input - Reuse of waste - recycling of waste – Energy education - Conservative technique - energy audit.

UNIT II

Solar Energy

Solar radiations at earth's surface - solar radiation geometry – declination - hour angle - altitude angle - incident angle - zenith angle - solar azimuth angle - principle of conversion of solar energy into heat and electricity - construction and working of typical flat plate collector and solar concentrating collectors – applications - solar energy - applications - space heating – cooling - photovoltaic electric conversion - solar distillation solar cooking - furnace - solar pumping - green house - agriculture industrial process heat.(No derivations and numerical) - solar power stations - solar desalination plants – limitations.

UNIT III

Wind Energy -Wind power - wind power formulation - power coefficient - maximum power - principle of wind energy conversion - considerations in selecting a site for wind mills - advantages - limitations – classification horizontal wind mills - vertical axis wind mills - construction – working – comparison - applications -power generation WEG - wind farm.

UNIT IV

Energy from Biomass

Common species recommended for biomass - methods – pyrolysis - gasification - hydrogenation. Applications of gasifier - Bio diesel production – applications - agriculture waste as a biomass - biomass Digester.



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UNIT V

Geothermal Energy

Geothermal energy - dry rock - wet rock - geo thermal power plant –function - principal parts - Limitations. Applications of MHD system - magneto hydro dynamic –principle - common gases – MHD power plant - components - limitations – applications, Fuel Cells - H₂- O₂ fuel cell Advantages - limitations – applications.

COURSE OUTCOMES

- Describe a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

TEXT BOOKS

1. Non conventional Energy resources - Dr.B.H.Khan(Tata McGraw Hill)
2. Energy Resource Management – Krupal Sing Jogi(Sarup & sons)

REFERENCE BOOKS

1. Non conventional Energy sources - G.D.Rai (Khanna Publication)
2. Solar Energy - S.P.Sukhatme (Tata McGraw Hill)
3. Solar Energy - H.P,Garg (Tata McGraw Hill)
4. Power Plant Engineering - Arora, Domkundwar (Dhanpat Rai & Co.)



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Measurement and Control
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 108

COURSE OBJECTIVE

- Select suitable instrument / gauge / method of inspection for determining geometrical and dimensional measurements.
- Calibrate measuring instruments and also design inspection gauges.
- Understand the advances in Metrology such as use of CMM, Laser, Machine Vision System for Metrology etc.
- Select and apply appropriate Quality Control Technique for given application.
- Select and Apply appropriate Quality Management Tool and suggest appropriate Quality Management System (QMS).

UNIT I

Simple Inspection-Meaning and application of inspection, daily life example of inspection, concept of inspection as applied to daily life and industries, Effect of absence of inspection in an industry, Classification of inspection function, meaning and advantages of each concept of inspection applied to metrology. Definition/ meaning of precision, its accuracy and error, Differentiation between precision measurement in industry, meaning of standard inspection and specification, relationship between cost and accuracy, Interchange ability and selective assembly.

General Measurement Concept-Limits, fits and tolerance definition, Selection of fit, calculation of fundamental deviation, limit of sizes, selection of limit of sizes, selection of limits, Tolerances and allowances.

UNIT II

Linear Measurements-Standards of length, Classification and use of slip gauges, wringing process, Gauge block calibration precautions to be observed while using gauge blocks, classification of linear measuring instrument direct and indirect, Construction and working of Vernier caliper, micrometers-outside and inside and depth, vernier height gauge, dial vernier and dial height gauge identification of parts, finding least count, precautions of each type, types of errors, Dial gauge types construction, principle, accuracy and precaution to be observed in handling, field of application, 108 Comparators principle, type, working, use field of application of Mechanical, Electrical, Optical and Pneumatic comparators selection specific work , Measuring Machine-type, application limitations, working principle, Interferon meters type, working principle, and applications .

Angular Measurements-Classification- direct and indirect, Protractor- vernier and optical, universal-working use and limitation, precautions, Angle blocks-set size, accuracy, calibration, method of measuring unknown angle and checking know angle, Sine bar- common types, use in actual practice for finding out known and unknown angle, Sprit level- types, use field of application, sensitivity,



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Clinometers types, working principle, accuracy, Angle Dakar-type, Principle of working method, field of application.

UNIT III

Concept of squareness, flatness, Roundness-Straight edge method, light gap and feeler gauge method, Wedge method, Precision level method, Auto collimator method, squareness- - indicator method, Square tester, Auto collimator method, Determination of straightness, flatness, squareness of a given piece, Use of v- block and dial indicator for determining roundness.

Surface Roughness- Definition of primary and secondary texture, Real surface, geometrical surface, effective surface, Real profile, geometrical profile, effective profile, Reference line, lay, traversing length, sampling length, mean time, Center line of profile, “M” and “S” system of surface assessment, Salient features, merits and demerits of each basic unit of indication surface roughness- CL No. R.M.S., Ten point height, Interpretation of units graphically and mathematically, Types of surface measuring instruments, Method of surface measurement stylus skid, stylus pressure, Mechanical amplification, Tomlinson Mechanical surface finish recorder working principle.

UNIT IV

Screw Thread Measurements-Type of screw threads, Threads nomenclatures, Errors in screw thread pitch errors, Progressive and periodic instrument, Equipment required for measuring pitch, effective diameter and angle – procedure, advantages, limitation and precautions of each method Limit gauges for screw thread measurement, procedure, Advantages and limitation of catch Gauge, Precautions observed while using a limit gauge.

Gear Measurements-Types of gears, Gear nomenclature, Gear elements requiring measurement, Necessity of measuring gear elements accuracy, Types of gear tests, Different method of inspecting gear tooth from, Measurement of chordal thickness & constrict chord using vernier tooth caliper, Gear tooth profile check- involutes testing M/C- principle and uses, Electricity-Tests - Principle and use, Parkerson gear tester principle and use.

UNIT V

Limit Gauges-Definition of gauge and gauging, Necessity of gauging in industrial practice, Gauges types- according to use (shop, Inspection and reference gauge) type fixed limit, indicating and combination, Specific use (Screw pitch, gauge, template, feeler gauge- and their uses, application identification, selection and precautions, Working tolerance of gauges Maximum and minimum metal conditions of tolerances, Calculation maximum and minimum metal conditions from given tolerances, tolerance frames and their use, selection and specification as per IS, 2251, 3455, 3484, Wear allowances and its selection for design.

COURSE OUTCOME

- Identify and apply various measuring instruments
- Explain tolerance, limits of size, fits, geometric and position tolerances and gauge design.
- Recommend the Quality Control Techniques and Statistical Tools appropriately

TEXT BOOKS

1. Mechanical Measurements and Control – D.S. Kumar – S.K. Kataria & Sons
2. Mechanical Measurements – G. Beckwith Thomas G. – Pearson Education



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REFERENCES BOOKS

1. Measurement Systems, Application Design – E.O. Deoblein - McGraw Hill
2. Engineering Metrology – K.J. Hume - MacDonald and Compan



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Energy Studies
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 109

COURSE OBJECTIVES

- To understand the construction and operation of various jet and rocket engine
- To analyze jet engine and rocket engine from fluid and thermodynamic principle
- To study important non-conventional energy resources and the technologies for harnessing these.

UNIT I

Energy Sources - Fossil fuels, Nuclear fuels, hydel, solar, wind and bio fuels in India, Energy conservation, Nuclear energy through fission and fusion processes.

UNIT II

Energy Conversion- Energy conversion from source to utility, Solar, Nuclear, Geothermal, Tide and Wind Energies.

UNIT III

Classical sources of energy crisis and search for alternative sources of energy. Solar energy, earth sun angles, resolution, solar measurement, collection of solar energy, flat plate and focusing collector analysis, calculations and same design parameters. Applications of solar energy. Introduction to Photovoltaic cell energy conversion techniques. Derivation for collector efficiency for flat plate collector.

UNIT IV

Gasifiers, Gobar Gas plant, types of applications, Biomass conversion technologies, biogas Generation. Basic principles of wind energy conversion, wind energy estimation, site selection consideration, basic components of wind energy conversion system, classification, advantages & disadvantages of WECS.

UNIT V

Energy Policy: Energy policy issues at global level, national level and state level, Energy conservation act 2001, Electricity act 2003, Energy pricing and its impact on global variations.

COURSE OUTCOMES

- Demonstrate a basic understanding of jet and rocket engine design, function and performance.
- Acquire knowledge and hands-on competence in the design and development of mechanical systems.
- Compare different non-conventional energy resources and choose the most appropriate based on local conditions
- Perform simple techno-economical assessments of non-conventional energy resources



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- Perform and compare basic environmental assessments of non-conventional energy resources and conventional fossil fuel systems

TEXT BOOKS

1. Jose Goldenberg, Thomas Johanson, and Reddy, A.K.N., Energy for Sustainable World, WileyEastern, 2005.

REFERENCE BOOKS

1. Charles E. Brown, World Energy Resources, Springer Publication, New York, 2002.
2. Solar Energy – Garg & Prakash – TMH Pub.



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Disaster Management
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 110

COURSE OBJECTIVES

- Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
- Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
- Identify the organizations that are involved in natural disaster assistance
- Describe the four sets of tools available to disaster managers.

UNIT I

Introduction- Concepts and definitions: disaster, hazard, vulnerability, risk, capacity, impact, prevention, mitigation.

UNIT II

Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunamis, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills etc); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

UNIT III

Disaster impacts (environmental, physical, social, ecological, economical, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate-change and urban disasters.

UNIT IV

Disaster Risk Reduction (DRR), Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post-disaster environmental response (water, sanitation, food safety, waste management, disease control); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

UNIT V

Disasters, Environment and Development, Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land-use



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changes, urbanization etc.), sustainable and environmental-friendly recovery; reconstruction and development methods.

COURSE OUTCOMES

- It promotes a multi-stakeholder and inter-sectoral angle to risk management.
- It highlights the root causes of risks by identifying underlying risk factors.
- It offers a comprehensive overview of capacities and conditions and steps needed in order to pursue more comprehensive DRR and CCA strategies.
- It identifies aspects of development processes and institutional structures that need to be addressed in risk management.

TEXT BOOKS

1. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.

REFERENCE BOOKS

1. Singh B.K., 2008, Handbook of Disaster Management: techniques & Guidelines, Rajat Publication.
2. Ghosh G.K., 2006, Disaster Management ,APH Publishing Corporation.



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SCHOOL OF ENGINEERING & I.T.**

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Power Plant Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 111

COURSE OBJECTIVES

- To impart knowledge on sources of energy and types of power plants
- To understand construction and working of Steam Power Plants, Hydro Electric power station, diesel power station, and Nuclear Power Station.
- To impart knowledge about various performance characteristics and its analysis
- To impart knowledge about variable load problem
- To impart knowledge about terms and factors associated with power plant economics

UNIT I

Steam Power Plant

Energy conversion in Thermal Power Station, Limitation and conversion of heat into work, Direct conversion devices, Types of power station such as central power station, industrial power station, captive power station – advantages, classification of power station on the basis of prime-movers. Elements of power plant function of each element-generating unit, Prime mover, an auxiliary equipment, and turbo generator. Revision & improvement of thermal efficiency of Rankine cycle by lowering exhaust pressure, increasing boiler pressure and superheating of steam Simple problems on Rankine efficiency. Reheat cycle-representation on T-S and H-S Planes, flow diagram and advantages. Simple regenerating cycle – flow diagram, representation on T-S and H-S plants, bleeding and feed power heating and pumping: advantages of regenerative cycle.

UNIT II

Steam Generators

Classification according to working pressure. Accessories – superheater, economizer, preheater and draft equipment. Superheat control methods, Pulverised fuel – necessity, storing systems. High pressure boilers in modern steam power plants such as Velox, Benson, La-mont, leoffler.

Steam Prime mover Steam nozzle-types, Velocity of steam at outlet, Weight of discharge, Area of cross section at throat and outlet, Critical pressure ratio, Nozzle efficiency, Concept of prime mover, Steam turbine – working principle , method of compounding and governing, losses in steam turbines, Lubrication system of steam turbines.



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UNIT III

Condensing Unit

Functions of Steam condenser and its types– jet and surface, Limitations and advantages of steam condenser, Elements of condensing unit, Cooling towers. Steam Power Station Control and Safety. Effect of load variation on soft speed, steam admission, valve opening, steam flow rate, steam pressure and combustion control system. Necessity of controlling factors in load variation, Control system (area system, centralised control system) Basic elements of control system, controls and instruments located in modern control station. Control room, Records and their purpose, log sheets or log books.

UNIT IV

Nuclear Power Station

Nuclear reactions – fission, fusion, mass defect, binding energy, chain reaction, Types of nuclear materials – fissile materials, fertile materials, process of conversion of fertile materials, breeding, moderation. Nuclear reactor – function, elements of nuclear reactor, reactor core, moderator, thermal shielding, reflector, reactor vessel, fuel, coolant flow, control rods, biological shielding, coolant (gaseous, non-boiling liquid, boiling liquid). Hazards in nuclear power station – units of radiations, safe and dangerous doses of radiations, safety precautions in nuclear power station Effects of nuclear materials, nuclear radiation and nuclear waste disposal. Diesel Engine Power Plants- Diesel power plant layout ,Functions & components of diesel power plant , Diesel power plant systems such as -Cooling and lubrication system, fuel injection system – basic requirements, solid injection system – common rail system, individual pump system, distribution system, data recording, performance.

UNIT V

Gas Turbine Power Plants

Advantages of gas turbines , Brayton or Joule Cycle, Open and close cycle, representation of cycle on P.V. and T.S. diagram. Thermal efficiency in terms of terminal temperature and pressure, effect of pressure ratio on thermal efficiency, Advantages and disadvantages of open and close cycle gas turbines, Important components of gas turbine power plant, Methods of improving thermal efficiency,

Hydro Electric Plants - Types of Hydro Electric Plants Comparison of low, medium and high head plants, Elements of hydro power plants, Governing of turbine, Performance of water turbines, Site selection.

COURSE OUTCOMES

- Demonstrate a basic understanding of various types of power plants.
- Acquire knowledge and hands-on competence in the design and development of mechanical systems associated with power plants.
- Compare different energy resources and choose the most appropriate based on local conditions.
- Perform simple techno-economical assessments of energy resources.
- Design power plant that meets specific energy demands that are economically feasible and have a minimal impact on the environment

TEXT BOOKS

1. A Text Book of Power Plant Engineering – R.K. Rajput – Laxmi Publications
2. A Course in Power Plant Engineering – Arora, Domkundwar – Dhanpat Rai & Co.,2005



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REFERENCE BOOKS

1. Power Plant Engineering, 2nd Edn. – P.K. Nag – Tata McGraw-Hill Pub. Com., New Delhi, 2004
2. Power Plant Engineering – P.C. Sharma – S.K. Kataria & Sons, 2003



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Entrepreneurial Development
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 112

COURSE OBJECTIVES

- To promoting self-employment/entrepreneurship as career option thereby creating more job providers
- To focuses on inputs required for students to undertake entrepreneurial activities as career option

UNIT I

Entrepreneurial Development

Definition of entrepreneurship, Characteristics of entrepreneurs, Factors influencing entrepreneurship, Need for promotion of entrepreneurship and small business , Entrepreneurial Environment, Environmental analysis. Government policies for setting up new small enterprises, Opportunities in service industries.

Forms of Business Organization - Forms of ownership , Sole Proprietorship , Partnership Cooperative society ,Joint – stock company , Private Limited Companies , Public Limited Companies

UNIT II

Institutional support to SSI

Institutional set up , Industries centres, Industrial estates Institutional support at National level , Institutional support at State level, Commercial banks and financial institutions

Planning a SSI - What is planning? Types of planning , Importance of planning , Steps in planning , Steps in planning a SSI , Technical dimensions for setting up an enterprise

UNIT III

Management of Small Business Firm

Functional areas of small business firm ,Fundamentals of Management , Managerial effectiveness , Essential data for effective control of small business Resource management , Office management , Employees Welfare & safety , Factory rules and Labour Laws related to SSIs, Sales Tax and Income Tax laws related to SSIs.

Project selection, Formulation & Appraisal Project selection & formulation , Scope of project report , Content & Format of Project report , Need of Project Appraisal , Steps of Project Appraisal

UNIT IV

Problems of Small industries

- Power shortages
- Project planning
- Finance
- Raw material



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- Production constraints
- Marketing
- Personal constraints
- Regulations

UNIT V

SUGGESTED INSTRUCTIONAL STRATEGIES:

- Lecture Method.
- Industrial visits.
- Simulation
- Role play, Interaction with successful entrepreneurs, Demonstration. Games

COURSE OUTCOMES

- Students are expected to understand and learn the subject well and use it in practicality
- Students are able to understand how to Manage Small Business Firm & Resource management.
- To acknowledge the Facilities and incentives available from various support agencies

TEXT BOOKS

1. Starting your own Business, A step-by-step Blue print for the First-time Entrepreneur - Stephen C. Harper, Mc Craw-Hill
2. Harward Business Review on Entrepreneurship - Harvard Business School Press

REFERENCES BOOKS

1. Entrepreneurship : Strategies & Resources - Abrams Grant Pass, Oregon: Oasis Press
2. The Business Planning Guide - David H. Bangs Upstart Publishing Company, In Chicago



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Industrial Fluid Power
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 113

COURSE OBJECTIVES

- Obtaining a solid understanding of the fundamentals of Fluid Mechanics
- The ability to formulate basic equations for Fluid Engineering problems
- The ability to use tables and figures to determine the friction energy loss for various pipes/ducts geometries and Fluid engineering applications
- The ability to perform dimensional analysis and identify important parameters

UNIT I

Introduction to fluid power systems- components, advantages and applications. Transmission of power at static and dynamic states. Pascal's law and its applications. Fluids for hydraulic system: types, properties, and selection. Additives, effect of temperature and pressure on hydraulic fluid. Seals, sealing materials, compatibility of seal with fluids.

UNIT II

Pumps and actuators Pumps- Classification of pumps, Pumping theory of positive displacement pumps, construction and working of Gear pumps, Vane pumps, Piston pumps, fixed and variable displacement pumps, Pump performance characteristics, pump selection factors, problems on pumps. Accumulators: Types, and applications of accumulators. Types of Intensifiers, Pressure switches /sensor, Temperature switches/sensor, Level sensor. Actuators: Classification cylinder and hydraulic motors, Hydraulic cylinders, single and double acting cylinder, mounting arrangements, cushioning, special types of cylinders, problems on cylinders. Construction and working of rotary actuators such as gear, vane, piston motors, and Hydraulic Motor. Theoretical torque, power, flow rate, and hydraulic motor performance; numerical problems. Symbolic representation of hydraulic actuators (cylinders and motors)

UNIT III

Components and hydraulic circuit design Components-Classification of control valves, Directional Control Valves-symbolic representation, constructional features of poppet, sliding spool, rotary type valves solenoid and pilot operated DCV, shuttle valve, and check valves.

Pressure control valves - types, direct operated types and pilot operated types.

Flow Control Valves -compensated and non-compensated FCV, needle valve, temperature compensated, pressure compensated, pressure and temperature compensated FCV, symbolic representation.



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Hydraulic Circuit Design- Control of single and Double -acting hydraulic cylinder, regenerative circuit, pump unloading circuit, counter balance valve application, hydraulic cylinder sequencing circuits, hydraulic circuit for force multiplication; speed control of hydraulic cylinder- metering in, metering out and bleed off circuits. Pilot pressure operated circuits.

UNIT IV

Introduction to Pneumatic systems-Pneumatic power system, advantages, limitations, applications, Choice of working medium. Characteristics of compressed air and air compressors. Structure of pneumatic control System, fluid conditioners-dryers and FRL unit.

Pneumatic Actuators: Linear cylinder – types of cylinders, working, end position cushioning, seals, mounting arrangements, and applications. Rotary cylinders- types, construction and application, symbols.

Pneumatic Control Valves-DCV such as poppet, spool, suspended seat type slide valve, pressure control valves, flow control valves, types and construction, use of memory valve, Quick exhaust valve, time delay valve, shuttle valve, twin pressure valve, symbols.

UNIT V

Simple Pneumatic Control-Direct and indirect actuation pneumatic cylinders, speed control of cylinders - supply air throttling and exhaust air throttling.

Signal Processing Elements-Use of Logic gates - OR and AND gates in pneumatic applications. Practical examples involving the use of logic gates.

Multi- Cylinder Application-Coordinated and sequential motion control, motion and control diagrams. Signal elimination methods, Cascading method- principle, Practical application examples (up to two cylinders) using cascading method (using reversing valves).

Electro- Pneumatic Control-Principles - signal input and output, pilot assisted solenoid control of directional control valves, use of relay and contactors. Control circuitry for simple signal cylinder application.

COURSE OUTCOMES

- Apply knowledge of Fluid Mechanics formulating and solving engineering problems.
- Acquire knowledge of fluid mechanics for the design and development of mechanical systems.
- Demonstrate creativeness in designing new systems components and processes in the field of engineering in general and mechanical engineering in particular.
- Identify, analysis, and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary designs. Skillfully use modern engineering tools and techniques for mechanical engineering design, analysis and application.

TEXT BOOKS

1. Hydraulic Machines including fluidics – Dr. Jagdish lal, Metropolitan Book Company pvt. Ltd., New Delhi
2. Introduction to Fluid Power – Sahastrabadhe – Nirali Prakashan, Pune

REFERENCE BOOKS

1. Industrial Hydraulics – Pipenger & Hicks, Mc Graw Hill Company, New York



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Material Handling System
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 114

COURSE OBJECTIVES

- To Know safety philosophy and principles of accident prevention
- To know the safety rules, regulations, standards and codes
- To achieve an understanding of principles of safety management.
- To learn about various functions and activities of safety department.
- To study various mechanical machines and their safety importance.

UNIT I

Types of intraplant transporting facility, principal groups of material handling equipments, choice of material handling equipment, hoisting equipment, screw type, hydraulic and pneumatic conveyors, general characteristics of hoisting machines, surface and overhead equipments, general characteristics of surface and overhead equipments and their applications. Introduction to control of hoisting equipments.

UNIT II

Flexible hoisting appliances like ropes and chains, welded load chains, roller chains, selection of chains hemp rope and steel wire rope, selection of ropes, fastening of chains and ropes, different types of load suspension appliances, fixed and movable pulleys, different types of pulley systems, multiple pulley systems. Chain and rope sheaves and sprockets.

UNIT III

Load handling attachments, standard forged hook, hook weights, hook bearings, cross piece and casing of hook, crane grab for unit and piece loads, carrier beams and clamps, load platforms and side dump buckets, electric lifting magnets, grabbing attachments for loose materials, crane attachments for handling liquid materials.

UNIT IV

Arresting gear, ratchet type arresting gear, roller ratchet, shoe brakes and its different types like electromagnetic, double shoe type, thruster operated, controller brakes, shoe brakes, thermal calculations of shoe brakes and life of linings, safety handles, load operated constant force and variable force brakes general theory of band brakes, its types and construction.

UNIT V

Different drives of hoisting gears like individual and common motor drive for several mechanisms, traveling gear, traveling mechanisms for moving trolleys and cranes on runway rails, mechanisms for trackless, rubber-tyred and crawler cranes motor propelled trolley hoists and trolleys, rails and traveling wheels, slewing, jib and luffing gears. Operation of hoisting gear during transient motion, selecting the



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motor rating and determining braking torque for hoisting mechanisms, drive efficiency calculations, selecting the motor rating and determining braking torque for traveling mechanisms, slewing mechanisms, jib and luffing mechanisms . (Elementary treatment)

COURSE OUTCOMES

- Ability to understand the functions and activities of safety engineering department.
- Apply knowledge of safety engineering specialization for hazard identification, risk assessment and con occupational hazards.
- Communicate effectively on health and safety matters among the employees and with society at large.

TEXT BOOK

1. Materials Handling Equipment – N. Rudenko , Envee Publishers, New Delhi
2. Materials Handling Equipment – M.P. Alexandrov. Mie publications, Maskow

REFERENCE BOOKS

1. The Definitive Guide to Warehousing: Managing the Storage and Handling of Materials and Products in the Supply Chain” by CSCMP and Scott B Keller



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	Professional Elective Diploma
Branch	:	Diploma in Mechanical Engineering
Subject	:	Estimation And Costing
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP 115

COURSE OBJECTIVES

- Summarize the basic principal and standard methods for working out quantities in estimating.
- Demonstrate the detailed estimate of buildings and workout rate analysis of the various items of work.
- Understand the material requirements as per specified norms and standards.
- Assess the valuation of buildings and provide practical knowledge of standard specifications of items of buildings construction.

UNIT I

Utility, value, wealth, consumption, wants, necessities, comforts and luxuries. laws of demand, elasticity of demand.

UNIT II

Production, agents of production, laws of returns. Forms of business organization. Single trader, partnership and public limited company.

UNIT III

Price determination in perfect competition, monopoly and imperfect competition. Rent, interest, money, cheques, bills of exchange.

UNIT IV

Costing- Cost concepts, Elements of cost, Methods of distribution of overhead costs. Unit costing, Job costing and process costing.

UNIT V

Break- Even analysis, Depreciation methods, Preparation of profit and loss account and balance sheet (Outlines only).

COURSE OUTCOMES

- Understand the preparation of an Abstract Estimate and detailed estimate of building.
- Determine earth work quantity for roads and canals.
- Understand preparation of Notice inviting tender document for bidding, tendering process and examining rate analysis of civil works.



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- Design bar bending schedule for reinforcement works, Identify specifications and tendering process for contracts and create various tender documents for bidding purpose.
- Evaluate the valuation of building for different specifications and create new technologies to develop concrete estimating methods.

TEXT BOOK

1. Engineering Economics, Vol.1, Tara Chand.

REFERENCE BOOK

1. A Text book of Economic Theory by Dhingra and Garg.
2. Cost Accounts by Shukla and Grewal.



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Course	:	Diploma
Branch	:	Common To All Branches
Subject	:	Alternative Sources Of Energy
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO01

COURSE OUTCOMES

- Identify renewable energy sources and their utilization.
- Understand basic concepts of solar radiation and analyze solar thermal systems for its utilization.
- Understand working of solar cells and its modern manufacturing technologies.
- Understand concepts of Fuel cells and their applications
- Identify methods of energy storage.
- Compare energy utilization from wind energy, geothermal energy, biomass, biogas and hydrogen.

UNIT I

INTRODUCTION TO RENEWABLE ENERGY TECHNOLOGIES

Energy Storage: Introduction; Necessity of Energy Storage; Energy Storage Methods
Solar Energy: Fundamentals; Solar Radiation; Estimation of solar radiation on horizontal and inclined surfaces; Measurement of solar radiation data

UNIT II

SOLAR THERMAL SYSTEMS

Introduction; Basics of thermodynamics and heat transfer; Flat plate collector; Evacuated Tubular Collector; Solar air collector; Solar concentrator; Solar distillation; Solar cooker; Solar refrigeration and air conditioning; Thermal energy storage systems
Solar Photovoltaic systems: Introduction; Solar cell Fundamentals; Characteristics and classification; Solar cell: Module, panel and Array construction; Photovoltaic thermal systems.

UNIT III

WIND ENERGY

Introduction; Origin and nature of winds; Wind turbine siting; Basics of fluid mechanics; Wind turbine aerodynamics; wind turbine types and their construction; Wind energy conversion systems

UNIT IV

FUEL CELLS

Overview; Classification of fuel cells; operating principles; Fuel cell thermodynamics Biomass Energy: Introduction; Photosynthesis Process;
Biofuels; Biomass Resources; Biomass conversion technologies; Urban waste to energy conversion; Biomass gasification.

UNIT V

OTHER FORMS OF ENERGY

Introduction: Nuclear, ocean and geothermal energy applications; Origin and their types; Working principles Learning Resources:

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COURSE OUTCOMES

- Describe a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

TEXT BOOKS

1. Non-conventional Energy Resources, B.H.Khan, Tata McGraw Hill, New Delhi, 2017, 3rd edition
2. Solar Energy-Principles of Thermal Collection and Storage, S.P.Sukhatme and J.K.Nayak, TMH, 2008, 3rd edition

REFERENCE BOOKS

1. Solar Energy Thermal Processes, J.A.Duffie and W.A.Beckman, John Wiley, 2010, 2nd edition
2. Energy Technology: Non-Conventional, Renewable and Conventional, S.Rao and B.B.Parulekar, Khanna Publishers, 2010, 1st Edition.

Online Resources:

1. Non-conventional Energy Resources by Prof. Prathap Haridoss (IIT Madras), NPTEL Course (Link: <https://nptel.ac.in/courses/121/106/121106014>)



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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Course	:	Diploma
Branch	:	Common To All Branches
Subject	:	Advance Numerical Methods
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO02

COURSE OBJECTIVES

- Student will learn various types of Numerical Solution.
- Student will learn how to obtain Numerical Solution of Algebraic and Transcendental Equations.
- Student will understand Numerical Differentiation and Integration.
- Student should understand the curve fitting method.

UNIT I

NUMERICAL SOLUTIONS OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Bisection Method, Regula-Falsi Method, Newton-Raphson Method, Secant Method, Birge-Vieta Method, Bairstow's Method.

UNIT II

NUMERICAL SOLUTIONS OF SIMULTANEOUS LINEAR EQUATIONS

Direct Methods: Gauss Elimination, Gauss-Jordan & Crout's Triangularisation Method. Iterative Methods: Jacobi's, Gauss-Siedal & Successive Over Relaxation Method.

UNIT III

NUMERICAL DIFFERENTIATION AND INTEGRATION

Finite Differences, Derivatives using Forward, Backward and Central Difference Formulae, Newton-Cote's quadrature formula, Trapezoidal rule, Simpson's rules, Weddle's rule.

UNIT IV

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Picards Method, Taylor's Series Method, Euler's Method, Euler's Modified Method, Range-Kutta Methods, Predictor-corrector Methods, Milne's Method, Adams-Bashforth Method.

UNIT V

CURVE FITTING AND METHOD OF LEAST SQUARES

Method of Least Squares, Fitting of a Straight Line, Parabola, Curves of the form $y = abx$ and $y = axb$.

COURSE OUTCOMES

- Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
- Apply numerical methods to obtain approximate solutions to mathematical problems.

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- Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
- Analyse and evaluate the accuracy of common numerical methods.

TEXT BOOKS

1. Numerical Methods in Engineering and Science by Dr. B.S. Grewal, Khanna Publishers.
2. Numerical Methods for Scientific and Engineering Computation by M .K. Jain, S. R. K. Iyengar & R. K. Jain, Wiley.

REFERENCE BOOKS

1. Numerical Methods and Applications, E. Ward Cheney , David R Kincaid, Cengage Learning India Edition.
2. Numerical Methods, by Noble ben, New York, International Publications New York 1964.
3. Numerical Methods for Scientists and Engineers by K. Shankar Rao, Prentice Hall of India.
4. Numerical Methods with C++ Programming, by Somasundaram & Chandrasekaran, Prentice Hall of India.
5. Numerical Methods, by S. S. Shastry, Prentice Hall Inc. India 1998.

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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Course	:	Diploma
Branch	:	Common To All Branches
Subject	:	Web Design Fundamentals
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO03

COURSE OBJECTIVE

- Design and develop static and dynamic web pages.
- Familiarize with Client-Side Programming,
- Learn web page validations.
- To design and implement web page.

UNIT I

WEB PROGRAMMING INTRODUCTION

WWW: Understanding the WWW and the Internet, Emergence of Web, Web Servers, Web Browsers, Protocols, Building Web Sites. Planning for designing Web pages, Model and structure for a Website, Developing Websites.

Architecture of a website. Different technologies used to develop websites.

UNIT II

INTRODUCTION TO HTML

About HTML, History of HTML, Steps need to do to get going and make HTML page, HTML tags and attributes. HTML Tags Vs Elements. HTML Attributes. Creating HTML document, Markup Tags, Heading -paragraphs, line breaking tag, HR tag.

UNIT III

HTML BASIC FORMATTING TAGS

HTML Basic Tags, HTML Formatting Tags, HTML Color coding, HTML Grouping : using DIV and Span Tags, HTML Lists: Unordered List, Ordered List, Definition List, HTML Image: img tag and image mapping, HTML Hyperlink: Anchor Tag, Internal Link, Link with other Web pages. URL: Uniform Resource Locator, URL Coding.

UNIT I

HTML TABLES AND FORMS, FRAMES TAGS

Working with Table, Form and Frame tag of HTML, Table Tag: <table>,< th >,< tr >,< td >,< caption > with example.

HTML -form: < input >,< textarea >,< button >,< select >,< label > tags. Define frameset tag in HTML, frameset elements of HTML, use of rows and cols attribute of frameset tag in HTML. Frame's name and target attributes.



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UNIT V

INTRODUCTION OF CSS AND JAVA SCRIPT

Concept of CSS(Cascading style sheets), Creating Style Sheet: External Style Sheets, Internal Style Sheets, Inline Style, CSS2-Selectors: ID Selectors, Class Selectors, CSS Styling(Background, Text Format, Controlling Fonts)

JAVA SCRIPT: Programming Fundamentals, Statements, Expressions, Operators, Popup Boxes, Control Statements Conditional statements, Arrays, Functions, JavaScript and HTML, Data entry and Validation.

COURSE OUTCOMES

- To design web sites utilizing multiple tools and techniques.
- To demonstrate the ability to create dynamic pages that are easy to navigate and easy to update.
- To utilize entry - level system analysis and design principles to solve business problems.
- Apply the validation and verification of data at client end.

TEXT BOOKS

1. Fundamentals of Computer, V. Rajaraman, Prentice-Hall of India
2. Web Warrior Guide to Web Design Technologies, Don Gosselin, Joel Sklar & others, Cengage Learning

REFERENCE BOOKS

1. Web Technology and Design by Xavier, C, New Age International
2. HTML, DHTML, Java Script, Perl & CGI by Ivan Bayross, BPB Publication.
3. Internet and Web Design by Ramesh Bangia, New Age International Element of Discrete Mathematics, C. L. Liu.



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**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester	:	Diploma
Branch	:	Common To All Branches
Subject	:	Pumps & Pumping System
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO 04

COURSE OBJECTIVES

- Obtaining a solid understanding of the fundamentals of Fluid Mechanics
- The ability to formulate basic equations for Fluid Engineering in the field of pumps.
- The ability to use tables and figures to determine the friction energy loss for various pipes/ducts geometries and Fluid engineering applications.
- The ability to perform checks, maintenance for various pumps.

UNIT I

INTRODUCTION

Fluid, ideal and real fluid, properties of fluid, Bernoulli's equation and its practical application, Impulse momentum equation, Momentum of Momentum equation. Pumps, types of pumps.

UNIT II

CENTRIFUGAL PUMPS

Classification of Pumps, Centrifugal pump, Construction, working, workdone, heads, efficiencies, multistage centrifugal pump, pump in series and parallel, specific speed, characteristic, net positive suction head, cavitation.

UNIT III

RECIPROCATING PUMPS

Classification of Pumps, Reciprocating pump, Positive Displacement and other Pumps, Reciprocating pump theory, Slip, Indicator diagram, Effect of acceleration, air vessels, Comparison of centrifugal and reciprocating pumps, Performance characteristics. Construction, working, work done.

UNIT IV

OTHER PUMPS

Submersible pumps, deep well pumps, ejector pump, mud pump, chemical pumps. Problems and testing of submersible pump as per BIS.

UNIT V

PUMPING SYSTEM BASICS

Pumping System Components, Pumping System Principles, Common Pumping System Problems, Indications of Oversized Pumps, Piping Configurations to Improve Pumping System Efficiency, Basic Pump Maintenance, Impeller Trimming, Controlling Pumps with Adjustable Speed Drives.

COURSE OUTCOMES

- Apply knowledge of Fluid Mechanics formulating and solving engineering problems.
- Acquire knowledge of pumps and its classification for the design and development of mechanical systems.

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- Identify, analysis, and solve mechanical engineering problems useful to the society.
- Work effectively with engineering and science teams as well as with multidisciplinary designs.
- Skillfully use modern engineering tools and techniques for mechanical engineering design, analysis and application.

TEXT BOOKS

1. Mechanics of Fluids by Massey BS; Van Nostrand Reinhold Co
2. Fluid Mechanics by Douglas JF, Gasiorek JM, Swaffield JP; Poitman
3. Fluid Mechanics by Streetes VL and Wylie EB; Mcgraw Hill Book Co

REFERENCE BOOKS

1. Introduction to Fluid Mechanics and Fluid Machines – S.K. Som & G. Biswas – TMH
2. A text of Fluid Mechanics – R. K. Rajput – S. Chand & Company Ltd.



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**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester	:	Open Elective Diploma
Branch	:	Diploma
Subject	:	Introduction to Robotics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO 05

COURSE OBJECTIVES

- Analyze Robotic Sensors and Vision.
- Analyze alternative systems such as Understand Coordinate Frames, Mapping and Transforms.
- Select/ design equipment for Robotic Sensors and Vision systems.
- Carry out calculations of Robot Applications.

UNIT I

INTRODUCTION TO ROBOTICS

Evolution of Robots and Robotics, Laws of Robotics, What is and What is not a Robot, Progressive Advancement in Robots, Robot Anatomy, Human Arm Characteristics, Design and Control Issues, Manipulation and Control, Sensors and Vision, Programming Robots, The Future Prospects, Notations.

UNIT II

COORDINATE FRAMES, MAPPING AND TRANSFORMS

Coordinate Frames, Description of Objects in Space, Transformation of Vectors, Inverting a Homogeneous Transform, Fundamental Rotation Matrices

UNIT III

SYMBOLIC MODELING OF ROBOTS – DIRECT KINEMATIC MODEL

Mechanical Structure and Notations, Description of Links and Joints, Kinematic Modeling of the Manipulator, Denavit – Hartenberg Notation, Kinematic Relationship between Adjacent Links, Manipulator Transformation Matrix. Introduction to Inverse Kinematic model.

UNIT IV

ROBOTIC SENSORS AND VISION

The Meaning of Sensing, Sensors in Robotics, Kinds of Sensors used in Robotics, Robotic vision, Architecture of Robotic Vision Systems, Image Acquisition, Description of Other components of Vision System, Image Representation, Image Processing.

UNIT V

ROBOT APPLICATIONS

Industrial Applications, Material Handling, Processing Applications, Assembly Applications, Inspection Application, Robot Safety, Non-Industrial Applications, Robotic application for sustainable Development.

COURSE OUTCOMES

- Acquire knowledge and hands-on competence in the design and development of Transformation of 2. Vectors, Inverting a Homogeneous Transform, Fundamental Rotation Matrices .

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- Work effectively with engineering and science teams as well as with multidisciplinary designs.
- Demonstrate an understanding of Robotic application for sustainable Development.
- Demonstrate a basic understanding of Symbolic Modeling of Robots.

TEXT BOOKS

1. Robotics & Control – R.K. Mittal & I.J. Nagrath – TMH Publications
2. Robotics for engineers - Yoram Korean- McGrew Hill Co.
3. Industrial Robotics Technology programming and Applications - M.P.Groover, M.Weiss, R.N.Nagel, N.G.Odrey.

REFERENCE BOOKS

1. Robotics Control Sensing, Vision and Intelligence - K.S.Fu, R.C.Gonzalex, C.S.G.Lee- McGrew hill Book co.
2. Kinematics and Synthesis of linkages - Hartenberg and Denavit - McGrew Hill Book Co
3. Kinematics and Dynamics of Machinery - J.Hirchhorn - McGrew HillBook.
4. Kinematics and Linkage Design - A.S. Hall - Prentice Hall



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**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Course	:	Diploma
Branch	:	Common To All Branches
Subject	:	Organization Development
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO06

COURSE OBJECTIVES

- To Learn OD process that applies a broad range of behavioral science knowledge and practices to help organizations
- To build their capacity to change and to achieve greater effectiveness, including increased financial performance, customer satisfaction, and organization member engagement”.

UNIT I

GENERAL INTRODUCTION TO ORGANIZATION DEVELOPMENT

Organization Development Defined, Growth and Relevance of Organization Development Short History of Organization Development, Evolution in Organization Development

UNIT II

THE NATURE OF PLANNED CHANGE

Theories of Planned Change, General Model of Planned Change, Different Types of Planned Change Critique of Planned Change

UNIT III

THE OD PRACTITIONER

Who is the OD practitioner, Competencies of an Effective OD Practitioner, The Professional OD Practitioner, Professional Values, Professional Ethics.

UNIT IV

STRATEGIC CHANGE INTERVENTIONS

Continuous Change Self-Designing Organizations, Learning Organizations Built-to-Change Organizations

UNIT V

EVALUATING AND INSTITUTIONALIZING ORGANIZATION DEVELOPMENT INTERVENTIONS

Evaluating Organization Development Interventions
Institutionalizing Organizational Changes

COURSE OUTCOMES

- In this course, the students know the theoretical models and the process of OD.
- Students will also learn how to improve individual, group/team and organizational performance through the use of OD techniques or interventions like group dynamics, training, culture change, and work-life balance.

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TEXT BOOKS

1. The Fifth Discipline: The Art & Practice of The Learning Organization by Peter M. Senge
2. Crucial Conversations: Tools for Talking When Stakes Are High by Kerry Patterson, Joseph Grenny, Ron McMillan, Al Switzler, Stephen R. Covey

REFERENCE BOOKS

1. Cummings, T. G. & Worley, C. G. (2009). Organization development and change (9th edition).



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**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Course	:	Diploma
Branch	:	Common To All Branches
Subject	:	Entrepreneurship Development
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO07

COURSE OBJECTIVES

- To promoting self-employment/entrepreneurship as career option thereby creating more job providers
- To focuses on inputs required for students to undertake entrepreneurial activities as career option

UNIT I

GENERAL

Definition of entrepreneurship, Characteristics of entrepreneurs, Entrepreneurship environment, Characteristics of entrepreneurs, Environmental analysis, Government policies for setting up new small enterprises, Opportunities in service industries.

UNIT II

FORMS OF BUSINESS ORGANIZATION

Forms of ownership, Sole Proprietorship, Partnership, Cooperative society. Joint stock company, Private Limited Companies, Public Limited Companies.

UNIT III

INSTITUTIONAL SUPPORT TO SSI

Industries centers, Industrial estates, Institutional support at National level
Institutional support at State level, Commercial banks and financial institutions.

UNIT IV

PLANNING ASSI

Introduction of planning, Types of planning, Importance of planning, Steps in planning Steps in planning a SSI, Technical dimensions for setting up an enterprise.

UNIT V

MANAGEMENT OF SMALL BUSINESS FIRM

Functional areas of small business firm, Fundamentals of Management, Managerial effectiveness, Essential data for effective control of small business, Resource management, Office management, Employees Welfare & safety, Factory rules and Labour Laws related to SSIs, Sales Tax and Income Tax laws related to SSIs.

COURSE OUTCOMES

- Students are expected to understand and learn the subject well and use it in practicality
- Students are able to understand how to Manage Small Business Firm & Resource management.

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- To acknowledge the Facilities and incentives available from various support agencies

TEXT BOOKS

1. Starting your own Business, A step-by-step Blue print for the First-time Entrepreneur - Stephen C. Harper, Mc Craw-Hill
2. Harward Business Review on Entrepreneurship - Harvard Business School Press

REFERENCES BOOKS

1. Entrepreneurship : Strategies & Resources - Abrams Grant Pass, Oregon: Oasis Press
2. The Business Planning Guide - David H. Bangs Upstart Publishing Company, In Chicago



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**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester	:	Open Elective Diploma
Branch	:	Diploma
Subject	:	Finite Element Method
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO 08

COURSE OBJECTIVES

- To learn basic principles of finite element analysis procedure .
- To learn the theory and characteristics of finite elements that represent engineering structures.
- To learn and apply finite element solutions to structural, thermal, dynamic problem to develop the knowledge and skills needed to effectively evaluate finite element analyses.

UNIT I

FORMULATION OF FINITE ELEMENT EQUATION

Formulation of Finite Element Equation starting from governing differential equation, Domain residual and minimization, Weighted residual method, Weak form of weighted residual method.

UNIT II

ONE DIMENSIONAL FINITE ELEMENT ANALYSIS

One dimensional finite element analysis, generic form of total potential for one dimensional case, determination of shape functions for linear bar finite element and quadratic bar finite element, stiffness matrix, one dimensional problems of structure mechanics and heat conduction.

UNIT III

SHAPE FUNCTIONS AND ELEMENT MATRICES

Stiffness matrix formulation for beam and frame element, Determination of shape functions and element matrices, Application problems

UNIT IV

TWO DIMENSIONAL FINITE ELEMENT ANALYSIS

Two dimensional finite element analysis, simple three node triangular elements, four node rectangular element, six node triangular element, natural coordinates, simple two dimensional problems.

UNIT V

APPLICATION OF FINITE ELEMENT ANALYSIS

Finite element analysis for plane stress and plane strain problem, Strain displacement matrix for 2-D elements, two-dimensional integrals. Application problems, Scalar field problems including heat conduction and flow problems.

COURSE OUTCOMES

- Understand the concepts behind formulation methods in FEM.
- Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
- Develop element characteristic equation and generation of global equation.
- Able to apply suitable boundary conditions to a global equation for bars, trusses, beams,

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circular shafts, heat transfer, fluid flow, axi symmetric and dynamic problems and solve them displacements, stress and strains induced.

TEXT BOOKS

1. Textbook of Finite Element Analysis – Seshu P – Prentice Hall of India.
2. Fundamentals of Finite Element Analysis - David Hutton – TMH, Delhi

REFERENCE BOOKS

1. Finite Element Method: Basic concepts & Applications- Alavala – PHI, Delhi
2. Finite Element in Engineering - T.R. Chandrupatla and Belegundu, Pearson, Singapore
3. Concepts and Applications of Finite element analysis - Cook, Robert – John Wiley
4. The Finite Element Method, A Practical Course - Liu and Quek. – McGraw Hill
5. The Finite Element Method in Engineering - S.S. Rao.
6. An Introduction to the Finite Element Method – J.N. Reddy – TMH, Delhi
7. Finite Element Method – Zienkiewicz. O C - TMH, Delhi
8. Finite Element Analysis: Theory And Programming – Krishnamoorthy C.S.- TMH, Delhi



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**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Course	:	Diploma
Branch	:	Common To All Branches
Subject	:	Disaster Management
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO09

COURSE OBJECTIVES

- To improve knowledge about nature of disaster, Environmental impact assessment, construction of technology for mitigation of damage of structures.

UNIT I

NATURE OF DISASTER

Nature of disasters – natural and other disasters, Earthquakes, floods, draught, cyclones, fire and other environmental disasters

UNIT II

BEHAVIOR OF STRUCTURES

Behavior of structures in disaster prone areas, Disaster zoning, Hazard assessment, Environmental Impact Assessment

UNIT III

Methods of mitigating damage during disasters, disaster preparedness.

UNIT IV

Management systems during disasters, Construction Technology for mitigation of damage of structures

UNIT V

Short-term and long-term relief measures.

TEXT BOOKS

Design of Earthquake Resistant Buildings–Minoru Wakabayashi (McGraw Hill Publication)
Dynamics of Structures: Theory and Application to Earthquake Engineering (2nd edition)– Anil K Chopra (Pearson Education Publication)

REFERENCE BOOKS

1. Fundamentals of Vibrations – Anderson, R.A. (McMillan)
IS – 1893 (Part I): 2002, IS – 13920: 1993, IS – 4326: 1993, IS-13828: 1993
2. Earth quake engineering damage assessment and structural design – S.F. Borg Disasters and development –
Cuny F (Oxford University Press Publication)

COURSE OUTCOMES

- It promotes a multi-stakeholder and inter-sectoral angle to risk management.
- It highlights the root causes of risks by identifying underlying risk factors.

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**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Course	:	Diploma
Branch	:	Common To All Branches
Subject	:	Environmental Pollution And Legislation.
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPO10

COURSE OBJECTIVE

- To promoting self-employment/entrepreneurship as career option thereby creating more job providers
- To focuses on inputs required for students to undertake entrepreneurial activities as career option

UNIT I

INTRODUCTION

Environmental Pollution, Fundamentals of air pollution: Composition and physics of atmosphere, Stationary and mobile sources; combustion process, fugitive emission; primary and secondary pollutants; POPs, Effects of air pollution on human being, animals, plants; Air pollution episodes – causes and consequences; indoor air quality.

UNIT II

INDUSTRIAL POLLUTION

Industrial Air Pollution Control: Dust control and abatement measures in mines; role of green belts. Thermal power plants: Control principle to improve overall thermal efficiency, Fuel and flue gas desulphurization, FBC, control of NO_x, control of mercury, concept of Integrated Gasification Combined Cycle (IGCC) and Carbon Capture and Storage (CCS). Control of motor vehicle emissions.

UNIT II

NOISE POLLUTION

Fundamentals of Noise: Sound power, Sound intensity and Sound pressure levels. Effects of noise - Presbycusis, Acoustic Trauma. Characterization of Noise from Construction, Mining, Transportation and Industrial Activities. Permissible noise levels in different zones.

UNIT IV

MONITORING AND QUALITY CONTROL

Air quality monitoring: Air quality sampling network design; analysis and interpretation of data. Air pollution standards and indices, emission factor, emission inventory and emission standards, Prediction of effective stack height- plume rise concept and algorithm, e.g., Holland's equation, Briggs equation, etc.

UNIT V

ENVIRONMENTAL LEGISLATION & POLICY

Evolution of environmental legislation in India, Legal provisions for environmental protection; various Acts, Rules and Regulations. Notifications issued under various Acts and Rules.

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COURSE OUTCOMES

- To Understand the dispersion of air pollutant and prediction through various pollutants
- Students will have fundamental knowledge of past-present-future course of legal system for environment protection and conservation of natural resources

TEXTBOOKS

1. Gilbert M. Masters, “Introduction to Environmental Engineering and Science”, 2nd Edition, Pearson Education, 2004.
2. Benny Joseph, “Environmental Science and Engineering”, Tata McGraw-Hill, New Delhi, 2006.

REFERENCE BOOKS

1. De Nevers, N., Air Pollution Control Engineering, 3rd edition
2. Handbook of Environmental laws, Acts, Guidelines, Compliances & Standards Policy, Trivedy, BS Publishers



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