



BHARTI VISHWAVIDYALAYA, DURG

Scheme of Teaching and Examination Diploma in Mechanical Engineering (Group-III)

Semester – I

| S. No. | Course Code | Course Titles | Scheme of Studies | | | |
|--------------|-------------|--|-------------------|-----------|-----------|-------------------------|
| | | | L | P | T | Credit (L + T + P/2) |
| 1 | DE00101 | Communication Skills – I | 2 | - | 1 | 3 |
| 2 | DE00102 | Applied Maths – I | 2 | - | 1 | 3 |
| 3 | DE00103 | Applied Mechanics | 2 | - | 1 | 3 |
| 4 | DE00104 | Applied Chemistry | 2 | - | 1 | 3 |
| 5 | DE00105 | Engineering Drawing | 2 | - | 1 | 3 |
| 6 | DE00106 | Workshop Practice (Theory) | 1 | - | - | 1 |
| 7 | DE00107 | Applied Mechanics (Lab) | - | 2 | - | 1 |
| 8 | DE00108 | Applied Chemistry (Lab) | - | 2 | - | 1 |
| 9 | DE00109 | Engineering Drawing (Practical) | - | 2 | - | 1 |
| 10 | DE00110 | Workshop Practice (Practical) | - | 4 | - | 2 |
| 11 | DE00111 | Seminar & Technical Presentation (Listening, Reading & Speaking) Skills | - | 2 | - | 1 |
| 12 | - | Library | - | 2 | - | - |
| 13 | - | Co-curricular & Academic Activity Societies | - | 2 | - | - |
| Total | | | 11 | 16 | 05 | 22 |

L - Lecture

P – Practical

T - Tutorial



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Scheme of Teaching and Examination

Diploma in Mechanical Engineering (Group-III)

Semester – I

| S. No. | Course Code | Course Titles | Scheme of Examination | | | | | |
|--------------|-------------|---|-----------------------|-----------|------------|------------|------------|-------------|
| | | | Theory | | | Practical | | Total Marks |
| | | | ESE | CT | TA | ESE | TA | |
| 1 | DE00101 | Communication Skills – I | 70 | 10 | 20 | - | - | 100 |
| 2 | DE00102 | Applied Maths – I | 70 | 10 | 20 | - | - | 100 |
| 3 | DE00103 | Applied Mechanics | 70 | 10 | 20 | - | - | 100 |
| 4 | DE00104 | Applied Chemistry | 70 | 10 | 20 | - | - | 100 |
| 5 | DE00105 | Engineering Drawing | 70 | 10 | 20 | - | - | 100 |
| 6 | DE00106 | Workshop Practice (Theory) | - | - | 50 | - | - | 50 |
| 7 | DE00107 | Applied Mechanics (Lab) | - | - | - | 35 | 15 | 50 |
| 8 | DE00108 | Applied Chemistry (Lab) | - | - | - | 35 | 15 | 50 |
| 9 | DE00109 | Engineering Drawing (Practical) | - | - | - | 35 | 15 | 50 |
| 10 | DE00110 | Workshop Practice (Practical) | - | - | - | 35 | 15 | 50 |
| 11 | DE00111 | Seminar & Technical Presentation (Listening, Reading & Speaking) Skills) | - | - | - | - | 50 | 50 |
| Total | | | 350 | 50 | 150 | 140 | 110 | 800 |

ESE: End of Semester Exam, CT: Class Test, TA: Teachers Assessment



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| | |
|-------------------------------------|---------------------------------|
| Course Code : | DE00101 |
| Course Title : | Communication Skills – I |
| Pre-requisite Course Title : | |
| Credit : | 3 |
| Max. ESE Marks : 70 | Min. Marks : 28 |

Unit – 1

English Grammar Sentence–Parts types transformation (Affirmative, Negative and interrogative), Determiners, Tenses, Active and Passive Voice, Prepositions, Subject-Verb Agreement.

Unit – 2

Effective Communication objectives of communication. Elements of communication process, Seven Cs of Communication, Different Communication Skills, Listening Speaking Reading Writing, Effective use of listening, listening versus hearing, Process and Purpose of listening. Techniques of effective listening.

Unit – 3

Short Stories, Selfish Giant-Oscar Wilde A Letter to God-Gregario Lapex Y-Fuentes, An astrologer's Day –R.K. Narayan.

Unit – 4

Suggestive passages for Comprehension, Language of Science, Non-conventional sources of Energy, Our Environment and Entrepreneurship.

Books:

1. English Grammar in Use Murphy Raymond Cambridge Publications 4th Edition.
2. Living English Structure Allen Cambridge Publications Fifth edition (2009).
3. Effective English with CD Kumar, E. Suresh; Sreehari, P.; Savithri, J. Pearson Education, Noida, New Delhi 2009 ISBN: 978-81-317-3100-0.
4. English Grammar at Glance Gnanamurali, M. S. Chand and Co. New Delhi, 2011



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5. Communication Skillfor Technical Students Somaiya Publication.
6. Elementary English Agarwal N. K. Goyal Brothers Latest Edition.
7. Grammar and Composition A Study Guide on Communication Skills for Technical Students Dr. Sumi Guha Dr. Shameena Bano Prakashan Vaibhav Prakashan 1^s

Open source software and website address:

1. <https://www.englishgrammar.org/>
2. <http://www.englishgrammarsecrets.com/>
3. <https://www.usingenglish.com/handouts/>
4. <http://learnenglish.britishcouncil.org/en/english-grammar>
5. <https://www.englishclub.com/grammar/>
6. <http://www.perfect-english-grammar.com/>
7. <http://www.englishteachermelanie.com/category/grammar/>
8. <https://www.grammarly.com/blog/category/handbook>
9. <https://www.britishcouncil.in/english/learn-online>
10. <http://learnenglish.britishcouncil.org/en/content>
11. <http://www.talkenglish.com/>
12. [language-labsystem.com](http://www.language-labsystem.com)
13. www.wordsworthelt.com



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|-------------------------------------|--------------------------|
| Course Code : | DE00102 |
| Course Title : | Applied Maths – I |
| Pre-requisite Course Title : | |
| Credit : | 3 |
| Max. ESE Marks : 70 | Min. Marks : 28 |

Unit – 1

Algebra

Concept and principles of determinants. Properties of determinants Computation of Mean and R.M.S. Value General equation of second degree, Nature of roots, Quadratic Equation, Formation of Equation Class- I, II,III, IV.

Unit – 2

Differential Calculus

Basic Trigonometry, Multiple and sub multiple angles, Functions and Limits, Independent and dependent variables, Different types of functions, Concept of Limit and its evaluation, Differentiation of elementary functions, Differentiation of Algebraic, Trigonometric, Exponential and Logarithmic functions, Differentiation of sum, product, quotient of two functions.

Unit – 3

Applications of Differential Calculus

Second order derivatives–Second order derivatives (without examples), Equation of Tangent and Normal, Equation of Tangent and Normal for functions of one variable only
Maxima and minima, Maxima and minima for functions of one variable only.

Unit – 4

Co-ordinate Geometry

Various forms of straight lines, Co-ordinate systems, slopepoint form, two point form, Distance between two points, division of a line segment, Two points intercepts form, general form, Perpendicular distance from a point on the line, perpendicular distance between two parallel lines, *Components of Vector.*



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Conic sections: Definition, standard forms, General equation, Center and radius of a circle, Focus, axis, directory, latusrectum and vertex of parabola and ellipse.

Unit – 5

Fundamentals of Statistics

Frequency distribution and central tendency, Introduction, graphical representation of frequency distribution, Central tendency, mean, median, frequency distribution and mode, Dispersion and deviation, Measure of dispersion, Range, quartile deviation, Standard deviation, root mean square deviation, Variance and coefficient of variance, Variance and coefficient of variance.

Books:

1. Advanced Engineering Mathematics Krezig, Ervin Wiley Publ., New Delhi 2014, ISBN: 978-0-470-45836-5.
2. Advanced Engineering Mathematics H. K. Das S. Chand & Co, New Delhi ISBN: 9788121903455.
3. Higher Engineering Mathematics B. S. Grewal Khanna Publ., New Delhi 2015, ISBN: 8174091955
4. Engineering Mathematics, Volume 1 S. S. Sastry PHI Learning, New Delhi 2009, ISBN: 978-81-203-3616-2
5. Fundamentals of Mathematical Statistics S. C. Gupta S. Chand & Sons 2014

Open source software and website address:

1. www.scilab.org/ -SCI Lab
2. www.dplot.com/ -DPlot
3. www.allmathcad.com/ -MathCAD
4. www.wolfram.com/mathematica/ - MATHEMATICA
5. www.easycalculation.com



| | |
|-------------------------------------|--------------------------|
| Course Code : | DE00103 |
| Course Title : | Applied Mechanics |
| Pre-requisite Course Title : | |
| Credit : | 3 |
| Max. ESE Marks : 70 | Min. Marks : 28 |

Unit – 1

Fundamentals and Resolution of Forces

Definition of Mechanics, Statics, Dynamics- Kinetics, Kinematics. Concept of space, mass, particle, body, rigid body, scalar, vector, fundamental units, derived units. Force- concept, definition, unit, graphical representation. Concept of system of forces-non-coplanar, coplanar, concurrent, non-concurrent and parallel forces. Composition and Resolution of forces. Free body diagrams, law of parallelogram, Varignon's theorem. Equilibrium of Coplanar concurrent forces, parallel forces and non-concurrent forces, Lami's Theorem. Moment of a force and Couple, properties of couple, conditions of equilibrium, applications.

Unit – 2

Centroid and Moment of Inertia

Location of Centroid and Center of Gravity. Centroid of regular plane and compound areas. Center of Gravity of simple solids. Moment of Inertia of plane areas. Perpendicular and Parallel Axis theorems.

Unit – 3

Friction

Rough and Smooth surfaces, concept of friction. Types of friction, Coulomb's laws of friction Co-efficient of friction, angle of friction, angle of repose. Friction on horizontal and inclined plane, Method of reducing friction.

Unit – 4

Kinematics and Kinetics

Kinematics in Cartesian and polar coordinates. Concept of speed, velocity, acceleration, radial



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and transverse velocity, Particle under uniform and non-uniform acceleration, tangential and normal acceleration. Angular displacement, Angular Velocity, Angular Acceleration. Motion under gravity. Kinetics of particle, motion under constant force, Newton's Laws of Motion. Momentum and energy principles, Impulses and angular momentum.

Unit – 5

Work, Power and Energy

Definition and unit of Work done, Power and Energy, Forms of Energy- Kinetic and Potential Energy, Principle of Conservation of power and energy, Power of engine and pumps, mean effective pressure, power measurement, Relation between Heat & Mechanical work, relation between Electrical & Mechanical energy.

Books:

1. Applied Mechanics Khurmi, R.S. S.Chand & Co. New Delhi 2014 ISBN:9788121916431
2. Applied Mechanics S.S.L Patel Dhanpat Rai & Company
3. Foundations and Applications of Applied Mechanics Ram, H. D.; Chauhan, A. K. Cambridge University Press, Thomson Press India Ltd., New Delhi, 2015, ISBN: 9781107499836
4. Engineering Mechanics- Statics, Vol. I Meriam, J. L.; Kraige, L.G. Wiley Publication, New Delhi, ISBN: 978-81-265-4396
5. Engineering Mechanics Ramamrutham, S. S Chand & Co. New Delhi 2008 ISBN:9788187433514



| | |
|-------------------------------------|--------------------------|
| Course Code : | DE00104 |
| Course Title : | Applied Chemistry |
| Pre-requisite Course Title : | |
| Credit : | 3 |
| Max. ESE Marks: 70 | Min. Marks : 28 |

Unit – 1

Atomic Structure and Chemical Bonding

Atomic Structure Electronic structure of atoms, Discovery of electrons, protons and neutrons. Rutherford model and Bohr's – Burry scheme of distributions of electrons. Heisenberg's uncertainty principle, Quantum numbers, subs energy level Distribution of electrons in sub-shells and concept of Electronic configuration of atoms, Auffbaus's rule, Pauli's exclusion principle. Hund's rule of maximum multiplicity. Chemical Bonding, *Types of Chemical Bonding, and it's Application*, Hydrogen bonding.

Unit – 2

Water Treatment

Hardness: Types of Hardness, Determination of hardness using EDTA method, Hard water Boiler Problems, Boiler corrosion, caustic embrittlement, priming and foaming, scales and sludge's. Water softening: lime soda process, Hot lime soda process, Cold lime soda process, Zeolite process, I-ion exchange process, Caution exchange An-ion exchange, *Advance Techniques of Softening*, Municipal Water, Treatment, Sedimentation Coagulation Filtration Sterilization BOD & COD. Polymer: Classification of polymer, Types of rubber, Natural and, synthetic, Processing of natural rubber. *Types of Synthetic rubber*, Properties and applications of Buna-N, Neoprene.

Unit – 3

Electrochemistry and Batteries

Conductance: Nature of solute, Nature of solvent, Temperature, Concentration or dilution, Electrical conductance in metals and electrolytes, specific conductance, equivalent conductance, cell constant. Electrodes: Hydrogen electrode, calomel electrode glass electrode. Batteries: Type of batteries with examples Primary battery, Secondary battery, *Their Uses*,



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Electrical Insulator and thermocouple alloy, Electrical insulators: Classification and example
Thermocouple alloy: Composition and characteristics platinum /rhodium *and its application*.

Unit – 4

Metallurgy

Metallurgy: Mineral, Ore, Gangue, Flux, Slag. *Metallurgical processor iron and Uses*. Metal Alloys: Properties of metals, aluminum, tungsten, platinum nickel. *Uses of Metal Alloys*, Ferrous alloys: Low carbon Medium carbon High carbon steels. Non-ferrous alloy: Brass, Bronze, *Application of Steel*, Tin man Solder Woods metal.

Cement: Portland cement, Constituent Setting and Hardening, *Protection of Cement from Corrosion*.

Unit – 5

Fuels and Combustion

Fuel: Calorific value and ignition temperature, classification. Solid fuels: Coal, Classification and composition, proximate analysis, Ultimate analysis, Bomb Calorimeter. Carbonization of coke by Otto Hofmann's oven. Liquid fuels: Fractional distillation of crude petroleum, Boiling range, Composition and properties. Knocking, Cracking, Octane number and Cetane number. Gaseous fuels: Biogas, LPG, and CNG, *Application of Fuel*. Lubricants, Paints and Varnishes: Lubricant-Types, Liquid, Solid, Semisolid Theory of lubrication, Properties of a good lubricant Flash and Fire Point, Pour point and cloud point. *Application of Lubricant*, Paints and Varnish, Constituents, Properties and uses.

Books:

1. Engineering Chemistry, Agarwal, Shikha, Cambridge university press; New Delhi, 2015.
2. Engineering Chemistry Dara, S. S. and Dr. S. S. Umare S. Chand Publication, New Delhi, 2015.
3. Engineering Chemistry, Jain & Jain, Dhanpat Rai and sons; New Delhi, 2015.
4. Engineering Chemistry Dr. Vairam, S. Wiley, India Pvt. Ltd., New Delhi, 2013.
5. Chemistry for Engineers, Agnihotri Rajesh, Wiley India Pvt.Ltd. 2014.



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Open source software and website address :

1. www.chemguide.co.uk/atommenu.html (Atomic structure and chemical bonding)
2. www.visionlearning.com (Atomic structure and chemical bonding)
3. www.chem1.com (Atomic structure and chemical bonding)
4. <https://www.wastewaterelearning.com/elearning/> (Water Treatment)
5. www.chem1.com/acad/webtext/elchem/ec6.html (Electrochemistry and batteries)
6. [www.em-ea.org/guide%20books/book 2/2.1%20fuels%20and%20combustion.pdf](http://www.em-ea.org/guide%20books/book%202/2.1%20fuels%20and%20combustion.pdf)
(Fuel and Combustion)
7. www.chemcollective.org (Metals, Alloys)
8. www.wqa.org(Water Treatment)



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|-------------------------------------|----------------------------|
| Course Code : | DE00105 |
| Course Title : | Engineering Drawing |
| Pre-requisite Course Title : | |
| Credit : | 3 |
| Max. ESE Marks : 70 | Min. Marks : 28 |

Unit – 1

Basics of Engineering Drawing

Introduction to Engineering Drawing, importance and uses, drawing equipments, instruments and their uses, Indian standard practices of laying out and folding of drawing

Lettering and numbering as per BIS 9609, Lines- Different types of lines *Dimensioning system as per BIS and Methods of dimensioning and their rules.*

Scales - full scale, reduced scale and enlarged scale.

Unit – 2

Constructions of conic curves

Conic Sections- Definition of locus, focus, directrix, axis, Vertex and eccentricity.

Definition: ellipse, parabola and hyperbola. Ellipse: Construction of ellipse by concentric circle method, Oblong method, Arc of circle method and Eccentricity method.

Parabola: Construction of parabola by rectangle method, parallelogram method Tangent method and eccentricity method or General Method. Hyperbola: Construction of hyperbola by rectangular method and eccentricity method.

Unit – 3

Projections of points, lines and planes

Projection of points: Concept of quadrant, first angle and third angle projection. Projection of points – points on different quadrants and on the reference planes.

Projection of straight lines: Projection of straight lines – Line in the first quadrant and on the reference Planes, perpendicular to one plane and parallel to other plane, inclined to one plane and parallel to the other plane, parallel to both the planes and inclined to both the planes. **Projection of Planes:** Concept of planes, Projection of planes parallel to one of



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the reference plane. Projection of plane inclined to one reference plane and perpendicular to another. Projection of plane inclined to both the reference planes.

Unit – 4

Orthographic projection and Section of solids

Introduction, First angle projection, Third angle projection, Symbols and comparison of first and third angle projections. **Projection of simple objects** – front view/ top view/ right/ left side view. Concept of sectioning planes, Auxiliary planes, types of sections and true shape of section. **Projections of Solids** -Types of solids, projections of solids in simple position, projections of solids with axes inclined to one of the reference planes and parallel to the other, projections of solids with axes inclined to both H.P. and the V.P. **Section of solids** - Practice problems for drawing projections and section of solids.

Unit – 5

Isometric Projection

Isometric axis, lines, and planes, isometric scale, isometric projection, isometric drawing. Isometric projection of objects containing rectangular, circular, cylindrical shapes and slots on sloping and plane Surfaces.

Books :

1. Engineering Drawing N.D. Bhatt Charotar Publisher
2. Engineering Drawing R.B. Gupta Satya Prakashan
3. Engineering Drawing Gujral & Shende Khanna Publisher
4. Engineering Drawing R.K.Dhawan S.Chand
5. Engineering Drawing P.J.Shah S.Chand
6. Engineering Drawing M.B.Shah, B.C.Rana Pearsons
7. Engineering Graphics with AutoCAD A.K.Sarkar, A.P.Rastogi, D.M. Kulkarni PHI
8. Engineering Drawing and Graphics using AutoCAD T. Jeyapoovan Vikas



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|-------------------------------------|-----------------------------------|
| Course Code : | DE00106 |
| Course Title : | Workshop Practice (Theory) |
| Pre-requisite Course Title : | |
| Credit : | 1 |
| Max. ESE Marks : | Min. Marks : |

Unit – 1

Measurement, Hand tools and workshop safety.

Engineering Measurement: definition, importance and Types of measurements. Measuring instruments: linear measurement and angular measurement instruments. Measuring devices: Linear measurement and angular measurement devices. Workshop hand tools: List the various hand tools used in workshops. Workshop Safety –Safety Practices, Causes of accidents, General safety rules, Safety signs and symbols. Firefighting equipment, fire extinguishers, and their types and First Aid

Unit – 2

Wood Working Shop

Types of woods and artificial woods and their applications. wood working tools –bench vice, hammers, chisel, files, hacksaw, wood saw, surface planer, punch, v block, try square , steel rule , twist drill, marking block, reamers, tap set, mallet and their specification. Wood working operations –Marking ,Cutting , reaming , filing, drilling, joining, Types of wood working joint – Butt joint , lap joint, Bridle joint, Dowel joint, Mitre joint , finger joint , dovetail joint , Dado joint, Groove joint, Cross lap, splice joint. Applications of various joints.

Unit – 3

Joining Methods :

Joining methods- Various types of Joining Methods and their field application and types of welding joint. Arc welding Arc welding process, equipment with necessary accessories, Welding electrode, tools and consumables Personal protective equipment like safety glasses, welding gloves etc and safe practices in welding shop. Gas welding Gas welding process, Equipment with necessary accessories, Types like Carburizing, oxidizing and



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neutral flame. Soldering and brazing: specification, filler material, flux, heating methods, temperature range, advantages, and comparison.

Unit – 4

Fitting and Sheet metal Shop.

Fitting tools – Hand tools used in fitting shop, holding tools, Marking and measuring tools, cutting tools. Fitting Operation – Sawing, Chipping, Filing, Taping, Reaming and Drilling. Sheet metal tools-list of sheet metal tools used. Sheet metal operation- Shearing, Bending, Drawing, Squeezing, Snipping, riveting, Grooving.

Unit – 5

Lathe Machine

Concept, Working principle, constructional details and major components of lathe machine with their functions. Job and tool holding devices and lathe attachments – head stock, tail stock, tool post, Lathe tools, chucks (3 and 4 Jaw), name and advantages of lathe attachment. Lathe operations – Plain turning, Facing, taper turning, Knurling, Threading etc.



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| | |
|-------------------------------------|-------------------------------|
| Course Code : | DE00107 |
| Course Title : | Applied Mechanics(Lab) |
| Pre-requisite Course Title : | |
| Credit : | 1 |
| Max. ESE Marks : 35 | Min. Marks : 14 |

List of practical:

1. Measure resultant force using law of Triangle of forces setup.
2. Measure resultant force using law of Parallelogram of forces setup.
3. Measure resultant force using law of Polygon of forces setup.
4. Measure resultant force using Lami's Theorem using Jib crane setup.
5. Use Funicular diagram to demonstrate Non-concurrent, Non-Parallel forces.
6. Measure resultant moment using Law of Moments setup.
7. Determine C.G. of a given lamina of any shape using any computer aided drafting software.
8. Determine M.I of a given lamina any shape using any computer aided drafting software.
9. Determine coefficient of friction for surfaces of different materials on a Horizontal Plane with given setup.
10. Determine coefficient of friction for surfaces of different materials with Inclined Plane apparatus.
11. Plot Velocity -Time diagrams for different combinations of Uniform and non-uniform velocities.
12. Use dynamometer to calculate power in any rotating shaft/drum/pulley/wheel.
13. Use tachometer to calculate speed of any rotating shaft/drum/pulley/wheel.



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| | |
|-------------------------------------|------------------------------|
| Course Code : | DE00108 |
| Course Title : | Applied Chemistry Lab |
| Pre-requisite Course Title : | |
| Credit : | 1 |
| Max. ESE Marks : 35 | Min. Marks : 14 |

List of practical:

1. Electronic balance, Scale range of 0.001g to 500g. pan size 100 mm; Response time 3-5 sec.; power requirement 90- 250 V, 10 watt.
2. Nephelometer, Auto-ranging from 20-200 NTU,+/- 2% of reading plus 0.1 NTU, power 220 Volts +/- 10% AC 50 Hz.
3. Conduct meter, Range 0-199.9ms; resolution 0.1ms/0.01ms/0.001ms/0.1 μ s/0.01 μ s; accuracy \pm 0.5% \pm 2 digits.
4. pH meter, Working range 0-14; resolution 0.1/0.01 pH; temperature compensation 0-1000 C.
5. Electric oven, inner size 18''x18''x18''; temperature range 100 to 2500 C. with the capacity of 40lt.
6. Muffle furnace, Temperature up to 9000C, digital temperature controller with an accuracy of +/- 30C.
7. Bomb calorimeter, Measurement unit J/kg, cal/gm, BTU/lb; temp. resolution 0.00010C or better; combustion bomb- halogen and acid resistant stabilized stainless steel; resolution 0.001kcal/gm; measurement range up to 40,000 J/gm.
8. Redwood viscometer-1, Suitable to operate at 220 volts AC mains with tap; stainless steel jet; cup cover; thermometer; electronic digital indicator ; controller etc.
9. Cleveland open cup, apparatus, Energy regulator-to regulate the rate of rise in, temperature; 220V; 50 Hz; single phase; AC supply.
10. Cloud and pore point apparatus, Energy regulator ,to regulate the rate of rise in, temperature,200V,50Hz, single phase, AC supply etc.
11. Fractional distillation assembly, Capacity 1.5 lt.



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|-------------------------------------|--|
| Course Code : | DE00109 |
| Course Title : | Engineering Drawing (Practical) |
| Pre-requisite Course Title : | |
| Credit : | 1 |
| Max. ESE Marks : 35 | Min. Marks : 14 |

List of practical:

1. Draw Lettering, types of lines, methods of dimensioning and one problem from Plain scale & Diagonal scale each on a single drawing sheet.
2. Draw Parabola, Ellipse and Hyperbola by general and Special methods on a drawing sheet.
3. Draw the problems on projection of points and lines on a drawing sheet.
4. Draw the projection of given Planes on a drawing sheet.
5. Draw the Orthographic projections of a given object with and without section on a drawing sheet.
6. Draw the projections of a solids and section of given solids on a drawing sheet.
7. Draw isometric views of simple machine elements.
8. Draw minimum two drawings using AutoCAD software.



| | |
|-------------------------------------|--------------------------------|
| Course Code : | DE00110 |
| Course Title : | Workshop Practice (Lab) |
| Pre-requisite Course Title : | |
| Credit : | 1 |
| Max. ESE Marks : 35 | Min. Marks : 14 |

List of practical:

1. Measuring tools available in workshop.
2. Marking and hand tools in a given situation.
3. Mock drill session for extinguishing fire.
4. Preparation of simple wooden job.
5. Preparation of two wooden joints.
6. Operate gas welding apparatus.
7. Preparation of lap joint using gas welding.
8. Preparation of butt joint using arc welding.
9. Mounting of electronic components on PCB.
10. Joining of aluminum sheet by using brazing.
11. Preparation of simple fitting job.
12. Preparation of simple male –female type fitting job.
13. Preparation of sheet metal job.
14. Preparation of simple turning job.
15. Preparation of simple drilling/ knurling /threading using lathe.



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| | |
|-------------------------------------|--|
| Course Code : | DE00111 |
| Course Title : | Seminar & Technical Presentation (Personality Development & Leadership)Skills |
| Pre-requisite Course Title : | |
| Credit : | 1 |
| Max. ESE Marks : 35 | Min. Marks : 14 |

Unit – 1

Concept and meaning of personality, Characteristics/Qualities, Factors influencing personality, Need for desirable personality, Posture and Health, Good Health diet, Exercise, Personal Cleanliness, Sleep and Rest, Use of Cosmetics, Dress Code, Eye-Contact.

Unit – 2

Skills for a good Leader, Different Leadership Styles: Autocratic, Democratic, Ethical, Transformational, Team Leadership, Necessity of Team Work, Personally, Socially, Professionally and Educationally.

Unit – 3

Weighing Positives & Negatives in Group Discussion, Do's and Don'ts of Group Discussion, Initiating, continuing and concluding a Group Discussion, Principles of Time Management, Criteria governing Time Management, Prioritizing work.

Books:

1. How to achieve success and happiness, Beau Norton, Create Space Independent, Publishing Platform, Latest edition.
2. Living English Structure, Allen, Cambridge Publications, Fifth edition(2009).
3. The Quick and Easy Way to Effective Speaking, Dale Carnegie, Amazing Reads, 23 January 2018.
4. English Grammar at Glance, Gnanamurali, M., S. Chand and Co. New Delhi, 2011 ISBN:



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9788121929042.

5. Elementary English Grammar and Composition, Agarwal N. K., Goyal Brothers Prakashan, Latest Edition
6. Covey Sean, Seven Habit of Highly Effective Teens, Covey Sean, Fireside Publishers, 1998.
7. How to win Friends and Influence People, Carnegie Dale, Simon & Schuster, New York 1998.
8. Thomas A Harris, I am ok, You are ok, Thomas A Harris, New York-Harper and Row, 1972
9. Emotional Intelligence, Bantam Book, 2006, Daniel Coleman, Bantam Book, 2006
10. Chanakya's 7 Secrets of Leadership, Pillai Radhakrishnan, Jaico Publishing House, ISBN: 9788184954012, 8184954018

Open source software and website address:

1. <https://www.englishgrammar.org/>
2. <http://www.englishgrammarsecrets.com/>
3. <https://www.usingenglish.com/handouts/>
4. <http://learnenglish.britishcouncil.org/en/english-grammar>
5. <https://www.englishclub.com/grammar/>
6. <http://www.perfect-english-grammar.com/>
7. <http://www.englishteachermelanie.com/category/grammar/>
8. <https://www.grammarly.com/blog/category/handbook>
9. <https://www.britishcouncil.in/english/learn-online>
10. <http://learnenglish.britishcouncil.org/en/content>
11. <http://www.talkenglish.com/>
12. [language-labsystem.com](http://www.language-labsystem.com)
13. www.wordsworthelt.com



Scheme of Teaching and Examination

Diploma in Mechanical Engineering (Group-III)

Semester – II

| S. No. | Course Code | Course Titles | Scheme of Studies | | | |
|--------------|-------------|---|-------------------|-----------|-----------|-------------------------|
| | | | L | P | T | Credit (L + T + P/2) |
| 1 | DE00201 | Communication Skills-II | 2 | - | 1 | 3 |
| 2 | DE00202 | Applied Maths-II | 2 | - | 1 | 3 |
| 3 | DE00203 | Environmental Engineering & Sustainable Development | 2 | - | 1 | 3 |
| 4 | DE00204 | Applied Physics | 2 | - | 1 | 3 |
| 5 | DE00205 | Basic Non – Conventional Energy Sources | 1 | - | 1 | 1 |
| 6 | DE00206 | Computer Fundamentals & Applications | 2 | - | - | 2 |
| 7 | DE00207 | Applied Physics (Lab) | - | 2 | - | 1 |
| 8 | DE00208 | Basic Non-Conventional Energy Sources (Lab) | - | 2 | - | 1 |
| 9 | DE00209 | Computer Fundamentals & Applications (Lab) | - | 4 | - | 2 |
| 10 | DE00210 | Seminar & Technical Presentation (Listening, Reading & Speaking) Skills | | 2 | | 1 |
| 11 | | Library | - | 2 | - | - |
| 12 | | Co-curricular & Academic Activity Societies | | 2 | | |
| Total | | | 11 | 14 | 05 | 21 |

L - Lecture,

T - Tutorial,

P – Practical



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Scheme of Teaching and Examination

Diploma in Mechanical Engineering (Group-III)

Semester – II Session - 2022-23

| S. No. | Course Code | Course Titles | Scheme of Examination | | | | | Total Marks |
|--------------|-------------|---|-----------------------|-----------|------------|------------|-----------|-------------|
| | | | Theory | | | Practical | | |
| | | | ESE | CT | TA | ESE | TA | |
| 1 | DE00201 | Communication Skills-II | 70 | 10 | 20 | - | - | 100 |
| 2 | DE00202 | Applied Maths-II | 70 | 10 | 20 | - | - | 100 |
| 3 | DE00203 | Environmental Engineering & Sustainable Development | 70 | 10 | 20 | - | - | 100 |
| 4 | DE00204 | Applied Physics | 70 | 10 | 20 | - | - | 100 |
| 5 | DE00205 | Basic Non – Conventional Energy Sources | - | - | 50 | - | - | 50 |
| 6 | DE00206 | Computer Fundamentals & Applications | 70 | 10 | 20 | - | - | 100 |
| 7 | DE00207 | Applied Physics (Lab) | - | - | - | 35 | 15 | 50 |
| 8 | DE00208 | Basic Non-Conventional Energy Sources (Lab) | - | - | - | 35 | 15 | 50 |
| 9 | DE00209 | Computer Fundamentals & Applications (Lab) | - | - | - | 35 | 15 | 50 |
| 10 | DE00210 | Seminar & Technical Presentation (Listening, Reading & Speaking) Skills | - | - | - | - | 50 | 50 |
| Total | | | 350 | 50 | 150 | 105 | 95 | 750 |

ESE: End of Semester Exam, CT: Class Test, TA: Teachers Assessment



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| | |
|-------------------------------------|----------------------------------|
| Course Code : | DE00201 |
| Course Title : | Communication Skills – II |
| Pre-requisite Course Title : | |
| Credit : | 3 |
| Max. ESE Marks : 70 | Min. Marks : 28 |

Unit – 1

English Grammar, Auxiliary Verbs, Modifiers & Adverbial Phrases, Degree, Narration.

Unit – 2

Non-Verbal Communication Static features of Non Verbal Communication – Distance, Posture, Physical contact etc. Dynamic features of Non-Verbal Communication – Mannerism, Head & Hand movement, Eye to Eye contact, Facial expressions, Gestures.

Unit – 3

Paragraph & Letter Writing Paragraph writing. Letter writing Purposes of Letters Characteristics of a Letter Types of Business Letters -Applications for Job & Resume Writing-Letter of Enquiry-Letter for Order Placement-Letter of Complaints.

Unit – 4

Technical Report Writing: Report Writing, Characteristics of a Good Report, Types of Technical Report, General outline of Project Report, Progress Report of any assumed work,
Notice: Purposes of Notices, Qualities of Notices, Format of Notice, Mail, Purposes of Mail and Format of Mail.

Books:

1. English Grammar in Use, Murphy Raymond, Cambridge Publications, 4th Edition
2. Living English Structure, Allen, Cambridge Publications, Fifth edition(2009)



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3. Effective English with CD, Kumar, E. Suresh; Sreehari P.; Savithri, J., Pearson Education, Noida, New Delhi, 2009 ISBN: 978-81-317-3100-0
4. English Grammar at Glance, Gnanamurali M., S. Chand and Co. New Delhi, 2011 ISBN:9788121929042
5. A Course in Technical English, TTTI Bhopal
6. Elementary English Grammar and Composition, Agarwal N. K., Goyal Brothers Prakashan
7. Latest Edition.
8. A Study Guide on Communication Skills for Technical Students, Dr. Sumi Guha, Dr. Shameena Bano, Vaibhav Prakashan, 1st Edition, 2020 ISBN-978-93-89989- 25-0

Open source software and website address:

1. <https://www.englishgrammar.org/>
2. <http://www.englishgrammarsecrets.com/>
3. <https://www.usingenglish.com/handouts/>
4. <http://learnenglish.britishcouncil.org/en/english-grammar>
5. <https://www.englishclub.com/grammar/>
6. <http://www.perfect-english-grammar.com/>
7. <http://www.englishteachermelanie.com/category/grammar/>
8. <https://www.grammarly.com/blog/category/handbook>
9. <https://www.britishcouncil.in/english/learn-online>
10. <http://learnenglish.britishcouncil.org/en/content>
11. <http://www.talkenglish.com/>
12. [language-labs.com](http://www.language-labs.com/)
13. www.wordsworthelt.com



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| | |
|-------------------------------------|---------------------------|
| Course Code : | DE00202 |
| Course Title : | Applied Maths – II |
| Pre-requisite Course Title : | |
| Credit : | 3 |
| Max. ESE Marks : 70 | Min. Marks : 28 |

Unit – 1

Integral Calculus

Simple Integration: Rules of integration and integration of standard functions, Methods of Integration: Integration by substitution, Integration by parts and Integration by partial fractions.

Unit – 2

Applications of Integral Calculus

Definite Integration, Simple examples, Properties of definite integral (without proof) and simple examples, Applications of integration: Area under the curve, Area between two curves.

Unit – 3

Differential equations

Differential equations of first order and first degree, Concept of differential equation, Order, degree and formation of differential equation, Solution of differential equation, Variable separable form, Homogeneous Differential Equations, Linear differential equation.

Unit – 4

Numerical Solutions of Equations

Introduction of algebraic and transcendental equations, Bisection method, Regula Falsi method, Newton Rapson's method.



Unit – 5

Numerical Integration

Introduction to Numerical integration, Trapezoidal rule, Simpson's one third rule, Simpson's three eighth rules.

Books :

1. Advanced Engineering Mathematics, Krezig, Ervin Wiley Publ., New Delhi, 2014, ISBN: 978-0-470-45836-5.
2. Advanced Engineering Mathematics, H. K. Das, S. Chand & Co, New Delhi, ISBN: 9788121903455.
3. Higher Engineering Mathematics, B. S. Grewal, Khanna Publ., New Delhi, 2015, ISBN: 8174091955.
4. Engineering Mathematics, Volume – 1, S. S. Sastry, PHI Learning, New Delhi, 2009, ISBN: 978-81-203-3616-2.
5. A text book of Engineering Mathematics, Dutta, D, New age International publications, New Delhi, 2006, ISBN: 978-81-24-1689-3.
6. GettingStarted with MATLAB-7, Pratap Rudra, Oxford University Press, New Delhi, 2009, ISBN: 0199731241.

Open source software and website address-

1. www.scilab.org/ -SCI Lab
2. www.dplot.com/ -DPlot
3. www.allmathcad.com/ -MathCAD
4. www.wolfram.com/mathematica/ - MATHEMATICA
5. www.easycalculation.com



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| | |
|-------------------------------------|--|
| Course Code : | DE00203 |
| Course Title : | Environmental Engineering and Sustainable Development |
| Pre-requisite Course Title : | |
| Credit : | 3 |
| Max. ESE Marks : 70 | Min. Marks : 28 |

Unit – 1

Water pollution and Air pollution

Introduction to environment and environment pollution, Water pollution Introduction, sources of water pollution, *Hydrosphere, Natural water* classification of water pollutants and adverse effect of water pollution, control of water pollution, Physical and chemical standard of domestic water as per Indian standard. Air pollution Introduction, *Atmospheric composition, Energy balance* Sources of air Pollutants, classification of air Pollutants, Effect of air pollution on human, plant, and animal, Air monitoring system and air pollution control.

Unit – 2

Soil, Noise, Thermal and Nuclear pollution

Soil and soil profile, soil pollution introduction, *Lithosphere*, sources of soil pollution, adverse effect of soil pollution, control measures of soil pollution, Noise pollution introduction, measurement of noise and acceptable noise level, sources of noise pollution, effect of noise pollution, control of noise pollution. *Difference between sound and noise* Thermal pollution introduction, effects of thermal pollution causes and control. Radioactive pollution introduction, sources of radioactive pollution, adverse effects of radioactive pollution, control of radioactive pollution.

Unit – 3

Sustainable Development and Clean technologies

Sustainable Development: Concept of sustainable development, *Elements of sustainable development* Natural resources, a-biotic and biotic resources, Principles of conservation of energy and management, Need of Renewable energy, Growth of renewable energy in India. Clean Technologies Introduction: Clean technology, Types of Energy, Conventional Energy Sources, Non-conventional Sources of Energy, Recycling pollution control.



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Solar Power: Features of solar thermal and PV systems, Types of solar cookers and solar water heaters, Hydel Energy and its advantages, Wind energy –advantages. Biomass energy, Types of Biomass Energy Sources, Energy content in biomass of different types of Biomass conversion processes.

Unit – 4

Environment Impact Assessment (EIA)

Public Participation in EIA, *Object of EIA*, *Component of EIA*, EIA documentation, Case studies on EIA, EIA scope & steps, EIA process, EIA report *and documentation*, EIA Gazette notification, EIA action plan, EIA implementation, EIA directives follow-ups.

Unit – 5

Social Issues and the Environment

Water conservation, *Objective of water conservation*, *Methods*, Rain water harvesting, Watershed management, Acid rain *Causes and sources* and its effect, Climate change, Greenhouse effect, Depletion of Ozon layer, and effect of Ozon layer depletion, Global warming and measures against global warming.

Solid waste management: causes, effects and control measures of urban and industrial waste, importance of 3R's in waste management. *Pyrolysis* Environment protection Act 1986: importance and objective

Books :

1. Environmental studies, Dr. Suresh K. Dhameja, S. K. Kataria and sons, 2012.
2. Energy, Environment Ecology & Society, Dr. Surinder Deswal, Dhanpat Rai & sons, 2014.
3. Environment & Ecology, Dr. PIyush Kant Pandey, Sun India Publication, 2009.
4. Energy and sustainable development, P. S. Ramakrishnan, National Book Trust, 2014.
5. Our Environment (Hindi Textbook), M. K. Goyal, Agrawal publications, Agra, 2013.

Open source software and website address:

1. www.nptel.ac.in
2. <https://swayam.gov.in>
- 3.



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| | |
|-------------------------------------|------------------------|
| Course Code : | DE001204 |
| Course Title : | Applied Physics |
| Pre-requisite Course Title : | |
| Credit : | 3 |
| Max. ESE Marks : 70 | Min. Marks : 28 |

Unit – 1

Units, Measurement and Error analysis

Unit of physical quantity, Fundamental and derived unit, Unit system, CGS, MKS and SI, Advantages/ disadvantages of SI unit system, Seven basic and Supplementary units. Dimensional Analysis, Dimensional formula and equations. Applications of Dimensional equations. Numerical problems on Dimensional analysis. Measurement, Accuracy, Precision and Errors, Absolute, Relative and percentage Error. Significant figures and rounding off.

Unit – 2

Motion, Force and General Properties of matter

Motion, Newton's Law of Motion, Equation of Motion, Force, Types of Forces, Conservative and non- conservative forces, Frictional Forces, Limiting static and dynamic friction. Centripetal and centrifugal force and Their illustration. Gravitational Force 'G' and 'g' and their interrelation, Factors affecting 'g', Elasticity, Hooke's law, Elastic limit and elastic fatigue, Moduli of elasticity's, Young's modulus, Bulk Modulus, Shear modulus of rigidity, Surface Tension, Molecular force, Surface energy, effect of temperature, Cohesive and adhesive force Excess pressure and its illustration, rise of liquid in capillary tube, Viscosity Coefficient of viscosity, Newton's law of viscosity Streamline and turbulent flow, Reynolds number, Poiseuille's equation (no derivation of formula), Stoke's law and their applications.

Unit – 3

Optics, optical instruments and optical fibers

Reflection, Reflection of Light, Types of Reflection, Refraction Laws of, Refraction Lenses and combination of lenses, Absolute and relative, refractive index, Refraction through prism, Angle of minimum deviation and its relation, Total internal reflection of light, Critical angle. Applications of TIR, Optical fiber, NA of Optical fiber, Optical instruments,



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Simple and Compound microscope, Spectrometer, Electromagnetic Spectrum, Pure and Impure spectrum, Visible Range.

Unit – 4

Electrostatics, Magnetism and Current Electricity

Electrostatics: - Electric Charge, Coulomb's Law, Electric Field, Potential, Potential Difference between Two Points, Equip- potential Surfaces, Types of dielectrics and dielectric Strength Capacity, Units, Principle of Capacitor, Factors Affecting Capacity, type of capacitors,

Magnetism: - Magnetic lines of force, lines of induction.

Current Electricity, Resistance, Specific resistance, Series and parallel combination of resistance, Internal resistance of a cell, Potential difference and emf of a cell, Combination of cells in series and in parallel. Simple applications of Wheatstone bridge, Meter Bridge and Potentiometer, Electrical power.

Unit – 5

Modern Physics

Photoelectric effect, Laws of photoelectric emission, Photoelectric equation and threshold frequency, Photo cell, X-rays Production of X rays, properties & uses, Laser, Spontaneous and stimulated emission, population inversion, pumping scheme and active system Ruby Laser and semiconductor laser, Ultra-sonics, Frequency range, Methods of production Magnetostriction & Piezo electric method, Properties of ultra- sonics, Applications of ultra-sonics.

Books:

1. Fundamentals of Physics Halliday, David; Resnik, Robert and Walker, Jearl John Wiley and sons Tenth edition 2013.
2. The Feynman Lectures on Physics Feynman P. Richar, B. Leighton Robert Sands Matthew Pearson Education India First edition 2012.
3. University physics Young Hugh, Freedman Roger Pearson Education India Thirteenth Edition 2013

Open source software and website address:

1. Some relevant Experiments: <http://cdac.olabs.edu.in>



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2. Vernier Calipers: <http://www.tutorvista.com/physics/animations/vernier-callipers-animation>
3. Screw gauge: www.notesandsketches.co.uk/Measuring_Tools_Small.swf
4. <http://www.stefanelli.eng.br/en/virtual-vernier-caliper-simulator-05-millimeter>.
5. Photoelectric effect: <http://vlab.amrita.edu/?sub=1&brch=195&sim=840&cnt=1>.
6. Deflection magnetometer: http://emvau.vlabs.ac.in/Deflection_Magnetometer/.
7. Laser: <https://spaceplace.nasa.gov/laser/en/>



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| | |
|-------------------------------------|--|
| Course Code : | DE00205 |
| Course Title : | Basic Non-Conventional Energy Sources |
| Pre-requisite Course Title : | |
| Credit : | 2 |
| Max. ESE Marks : 70 | Min. Marks : 28 |

Unit-1

Energy sources

Conventional and non- Conventional energy sources. Energy consumption as a measure of Nation's development; strategy for meeting the future energy requirements Global and National scenarios. Non-conventional energy- Seasonal variations and availability. Renewable energy – sources and features. Hybrid energy systems, Distributed energy systems and dispersed generation (DG). Prospects and Achievements of renewable energy sources in India in general and Chhattisgarh state in particular. Issues related to power generation through renewable energy sources.

Unit-2

Solar energy

Solar radiation: Beam and diffuse radiation, Solar constant, earth sun angles, attenuation and measurement of Solar radiation, local Solar time, derived Solar angles. Flat plate collectors, concentrating collectors, elements, working and maintenance. Solar air heaters-types, Solar driers, elements, working and maintenance. Storage of Solar energy- thermal storage, Electrical storage, Chemical storage. Solar water heaters, Solar distillation, Solar still, Solar cooker, elements, working and maintenance. Photo voltaics - Solar cells & its applications, Solar panels, Solar PV pump, Solar Home lighting systems, Solar street lights, elements, working and maintenance.

Unit-3

Wind energy

Principle of Wind energy conversion; Basic components of Wind energy conversion systems. Wind mill components, various types and their constructional features. Maintenance of Wind



mills and turbines.

Unit-4

Energy from Biomass

Biomass conversion, technologies, Biogas generation plants, classification, advantages and disadvantages. Constructional details, site selection, filling a digester for starting, maintaining Biogas production, Fuel properties of Bio gas, and applications of Biogas. Maintenance of Biogas plants.

Unit-5

Geothermal, Micro Hydel, Ocean Thermal Energy Conversion and Tidal Energy

Geothermal plant. Micro Hydel plant. Ocean Thermal Electric Conversion (OTEC) systems like open cycle, closed cycle. Energy from tides, basic principle of tidal power, single basin and double basin tidal power plants, advantages, limitation.

Books:

1. Non-conventional Energy Sources G D RAI Khanna Publishers New Delhi
2. Non-conventional Sources of Energy (Hindi) S.S.L. PATEL Standard Publishers and Distributors
3. Non-conventional Energy Sources BH KHAN Tata McGraw Hill Publications
4. Renewable and Conventional energy S Rao Khanna Publishers New Delhi



| | |
|-------------------------------------|---|
| Course Code : | DE00206 |
| Course Title : | Computer Fundamentals and Applications |
| Pre-requisite Course Title : | |
| Credit : | 2 |
| Max. ESE Marks : 70 | Min. Marks : 28 |

Unit – 1

Basics of Computer System

Basic building block of Computer. Central Processing Unit (CPU), Control Unit, Arithmetic logic Unit (ALU), Memory Unit, Input Output Units, Word, ASCII, BCD, EBCDIC, UNICODE Concept of Hardware and Software, System software & Application Software, Operating system Concepts, Purpose and its Functions Operations of Windows OS, Operations of Windows OS, *Operation on* file and folders, Copy file, Rename and Delete of files and folders, Search files and folders, Install Application, Create shortcut of application on the desktop Windows OS Utilities Windows accessories Utilities Control Panel, Taskbar.

Unit – 2

Word Processing

Overview of Word processor, Basics of Font, Case changing options, working with Text, *Opening and closing documents*, Formatting Paragraphs Lists Setting, Line spacing Page settings, Margins Setting, Header and Footer Spelling and Grammatical checks, Table and its options, Merging and Splitting cells, Inserting Pictures from Files.

Unit – 3

Spread sheet/Data Analysis & Chart Presentation

Introduction to data, cell address, Excel, Data Types, Concept of hyperlink Introduction to Formatting Number, Text, Formatting Date & Time, Formatting Concept of Workbook, *Forward and functions*, Common Excel Functions, Math & Trig Functions such as Sum, Round, Sqrt, Powered. Statistical Function such as Average, Min, Max, etc. Date & Time. Logical Functions such as IN, AND, OR etc. Text Function such as Upper, Lower Types of



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Graphics, Word Art, Auto Shapes, Images, Introduction to charts, Overview of different types of Charts. Printing in spreadsheet, Print Area, Header & Footer, Page Setup options.

Unit – 4

Multimedia Graphic Presentation

Introduction to Multimedia *and* Graphics. Starting a New Presentation Files, Saving work, Creating new Slides Work with textboxes, Adjusting line spacing, Formatting text boxes, Create new Slides, Introduction to Formatting, Change a slides Layout, Applying a theme, Changing the background, Formatting bulleted and numbered list, Styles Work with Fonts, Change the font, font size, font color, Creating and managing custom font theme & Color, Slides Master, Slide Sorter, Word Arts, Selecting, deleting, moving, copying, resizing and arranging objects, working with drawing tools, Find and replace text, Correcting your spelling, Use Tables Creating a new Table, Work with Video, Link to a video, Size a video, Use Animation, Sound & Effects, Creating hyperlinks, using action buttons.

Unit – 5

Basics of Internet & Cloud Computing

Types of Networks LAN, MAN, WAN Intranet, *Concept of Internet, application of Internet, www, Web browser software, VPN, Wi-Fi, Bluetooth, switches* Brief of Internet Connectivity Devices and Services Dial up, Leased line, DSL Broadband, Modem, Chat, Video conferencing, File Transfer Protocol, Web Browsers URL, Web Site, Search Engines Introduction to Virus & Antivirus Virus & its type, Antivirus Firewall Overview of Cloud Computing and *troubleshooting*.

Books:

1. Computer Fundamentals Goal, Anita, Pearson Education, New Delhi, 2014, ISBN-13: 978-8131733097.
2. Computer Course, Ravi Kant Taxali, Tata McGraw Hills. New Delhi. Year 2014 or latest.
3. Fundamentals of computers, V. Raja Raman, Neeharika Adabala, PHI 6th Edition 2014 or latest.
4. Computer Basics Absolute Beginner's Guide, Windows 10 Miller, Michael, QUE Publishing; 8th edition August 2015, ISBN: 978-0789754516 or latest.
5. The Internet Book, Douglas Comer Prentice Hall, Year 2007 or latest.



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6. Microsoft Office 2010: On Demand Johnson, Steve Pearson Education, New Delhi India, - 2010. ISBN: 9788131770641 or latest.
7. OpenOffice.org for Dummies Leets, Gurdy, Finkelstein Ellen, Mary Leets Wiley Publishing, New Delhi, 2003 ISBN: 9780764542220 or latest.

Open source software and website address:

1. Fundamentals of computers- V. Raja Raman,
Neeharika Adabala https://books.google.co.in/books?id=rGjkBQAAQBAJ&dq=Fundamentals+of+++ompu+ters&source=gbs_navlinks_s
2. Computer course, Ravi Kant Taxali-
https://books.google.co.in/books/about/COMPUTER_COURSE.html?id=PfHftdSmNBkC&redir_esc=y
3. Computer Fundamentals Tutorials- https://www.arstecb.com/book_argument/com_fun.pdf
4. Computer fundamentals, P. K. Sinha <http://www.edutechlearners.com/computer-fundamentals-p-k-sinha-free-pdf/>
5. Microsoft office set by step Joan Lambert and Curtis Frye
<https://ptgmedia.pearsoncmg.com/images/9780735699236/samplepages/9780735699236.pdf>
6. Open Office Suit- <http://www.openoffice.us.com/download-openoffice-free.php>
7. MS Office: <https://www.microsoft.com/en-in/learning/office-training.aspx>
8. Open Office Training: <http://www.tutorialsforopenoffice.org/>
9. Star Office- https://s3-ap-southeast-1.amazonaws.com/r4ltue295xy0d/Special_Edition_Using_StarOffice_6_0.pdf
10. Typing Master 10 in English for Windows: <http://www.typingmaster.com/typing-tutor/free-download.html>
11. Hindi Typing Tutor and Master <http://www.hinditypingtutor.com/>



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| | |
|-------------------------------------|----------------------------|
| Course Code : | DE00207 |
| Course Title : | Applied Physics Lab |
| Pre-requisite Course Title : | |
| Credit : | 1 |
| Max. ESE Marks : 35 | Min. Marks : 14 |

List of Practical:-

1. Vernier calipers: Stainless steel body, Range: 0-150 mm, Resolution: 0.1 mm
2. Screw gauge: Stainless steel spindle and ratchet top brass body with satin chrome finish. Graduated to read up to 25 mm in 0.01 mm divisions with screw pitch of 0.5 mm, ratchet lock nut
3. Speedometer: Brass double disc superior quality, stainless steel legs and screw 1/100 mm pitch each.
4. Pendulum apparatus for determination of 'g': 200 mm diameter metal wheel mounted with fixed stand and a meter scale, stop watch to measure time. steel case fly back action least count 1/10th or 1/5th of second
5. Stoke's Law apparatus: Glass tube (~1-inch diameter and length ~ 1 m) with stand, timer, steel sphere, glass beads
6. Surface tension set up: Travelling microscope with horizontal and vertical movement (LC 0.001 cm), capillary tube, beaker, pin fixed on adjustable stand
7. Glass slab: Rectangular, all sides polished, made from slightly greenish glass free from bubbles, 75*50*18 mm
8. Glass Prism: Equilateral or right angled, from bubble free boro crown glass 38 x 38
9. Ohm's law apparatus: Box type with D.C meter to verify ohm's law with fitted ammeter & voltmeter
10. Post Office Box: Complete set in polished wooden box, Split brass contact blocks holding precision cut, interchangeable plug having molded black fluted tops. Coils of constantan wire with 4 pair of ratio
11. Arms.
12. Meter Bridge (Wheatstone Bridge): Sun mica top, two gap type having lock type terminals with pencil jockey.
13. Deflection magnetometer: Wooden base length~ 1 m, magnetic compass, meter scale and magnets
14. Bar magnet: Alnico size 3"- 4"



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15. Potentiometer: 10K Ohm 500mW Linear Slide Potentiometer. About 10 m wire of Manganin and constantan with high resistivity and low temperature coefficient stretched on a wooden board attached with a meter scale and pencil jockey.
16. Photoelectric apparatus: Includes photo cell, light sources, voltmeter, ammeter
17. Diode laser: Power 5 mW, randomly polarized



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| | |
|-------------------------------------|--|
| Course Code : | DE00208 |
| Course Title : | Basic Non-Conventional Energy Sources (Lab) |
| Pre-requisite Course Title : | |
| Credit : | 1 |
| Max. ESE Marks : 35 | Min. Marks : 14 |

List of Practical:

1. Study of Solar Radiation by using Pyranometer
2. Study of Solar Distillation or Solar Still.
3. Study the photovoltaic cells available in the lab.
4. Demonstration/ study of solar water heater.
5. Demonstration/ study of solar cooker.
6. Study of solar water heating system of 120 liter/day capacity for the institute's hostel
7. Study of working of Solar pump and calculate its discharge.
8. Demonstration/ study of the working of a windmill.
9. Visit to biogas plants, domestic community/institution for study and demonstration of biogas plant.
10. Working principle of geothermal power plant.
11. Scope of Mini and Micro-hydro power plants in your state.



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| | |
|-------------------------------------|---|
| Course Code : | DE00209 |
| Course Title : | Computer Fundamental and Application (Lab) |
| Pre-requisite Course Title : | |
| Credit : | 2 |
| Max. ESE Marks : 35 | Min. Marks : 14 |

List of Practical:

1. Computer Network, LAN Cable, Router, Switch 30*2/Hub
2. Printer, Scanner, Plotter, Modem, Laser Printer, Scanner, Plotter, Modem
3. MS Back Office 2016 or latest, Office suit
4. Typing Master in English for Windows(Free download) Hindi Typing Tutor and Master (Free download), <http://www.typingmaster.com/typing-tutor/free-download.html>
<http://www.hinditypingtutor.com/>
5. Open Office Suit Latest, Office suit
6. Internet Connectivity, Broad band/Leased Line
7. Anti-Virus Software & Firewall, Antivirus software And Firewall



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| | |
|-------------------------------------|--|
| Course Code : | DE00210 |
| Course Title : | Seminar & Technical Presentation (Listening, Reading & Speaking) Skills |
| Pre-requisite Course Title : | |
| Credit : | 1 |
| Max. ESE Marks : 50 | Min. Marks : 20 |

Unit – 1

Need of Learning to learn skills (Listening, Reading and Speaking), Methods of good study habits, Practice Loud reading, Practice Active Listening, Practice Speaking in Class(Group Discussion, Extempore, Debate, Role Play etc.

Unit – 2

Characteristics of good oral Presentation Ways of oral presentation Gestures Mannerism during oral Presentation Preparing Successful Presentations Making Effective Use of Visual Aids.

Books :

1. English Grammar in Use, Murphy Raymond, Cambridge Publications, 4th Edition
2. Living English Structure, Allen, Cambridge Publications, Fifth edition (2009).
3. Effective English with CD, Kumar, E. Suresh; Sreehari P.; Savithri J., Pearson Education, Noida, New Delhi, 2009 ISBN: 978-81-317-3100-0.
4. English Grammar at Glance, Gnanamurali, M., S. Chand and Co. New Delhi, 2011, ISBN: 9788121929042.
5. Elementary English Grammar and Composition Agarwal N. K., Goyal Brothers Prakashan, Latest Edition.

Open source software and website address:

1. <https://www.englishgrammar.org/>
2. <http://www.englishgrammarsecrets.com/>



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3. <https://www.usingenglish.com/handouts/>
4. <http://learnenglish.britishcouncil.org/en/english-grammar>
5. <https://www.englishclub.com/grammar/>
6. <http://www.perfect-english-grammar.com/>
7. <http://www.englishteacheramelanie.com/category/grammar/>
8. <https://www.grammarly.com/blog/category/handbook>
9. <https://www.britishcouncil.in/english/learn-online>
10. <http://learnenglish.britishcouncil.org/en/content>
11. <http://www.talkenglish.com/>
12. [language-labs.com](http://www.language-labs.com)
13. www.wordsworthelt.com



BHARTI VISHWAVIDYALAYA, DURG

Scheme of Teaching and Examination Diploma in Mechanical Engineering

Semester-III

| S. No. | Course Code | Course Titles | Scheme of Studies (Hours/Week) | | | |
|--------|-------------|---|-----------------------------------|----|----|-------------------------|
| | | | L | P | T | Credit (C) L+T+(P)/2 |
| 1 | DE02301 | Basic Electrical and Electronics Engineering | 2 | - | 1 | 3 |
| 2 | DE02302 | Strength of Materials | 2 | - | 1 | 3 |
| 3 | DE02303 | Thermal Engineering | 2 | - | 1 | 3 |
| 4 | DE02304 | Machine Drawing and Computer Aided Drafting | 2 | - | 1 | 3 |
| 5 | DE02305 | Material Technology | 2 | - | 1 | 3 |
| 6 | DE02306 | Basic Electrical and Electronics(Lab) | - | 2 | - | 1 |
| 7 | DE02307 | Strength of Material (Lab) | - | 2 | - | 1 |
| 8 | DE02308 | Thermal Engineering (Lab) | - | 2 | - | 1 |
| 9 | DE02309 | Machine Drawing and Computer Aided Drafting (Lab) | - | 4 | - | 2 |
| 10 | DE02310 | Material Technology (Lab) | - | 2 | - | 1 |
| 11 | | Health, Hygiene and Yoga (Non-Credit Subject) | - | 2 | - | - |
| Total | | | 10 | 14 | 05 | 21 |

L - Lecture

P – Practical

T - Tutorial



BHARTI VISHWAVIDYALAYA, DURG

Scheme of Teaching and Examination Diploma in Mechanical Engineering

Semester-III

| S. No. | Course Code | Course Titles | Scheme of Examination | | | | | |
|--------------|-------------|---|-----------------------|-----------|------------|------------|-----------|-------------|
| | | | Theory | | | Practical | | Total Marks |
| | | | ESE | CT | TA | ESE | TA | |
| 1 | DE02301 | Basic Electrical and Electronics Engineering | 70 | 10 | 20 | - | - | 100 |
| 2 | DE02302 | Strength of Materials | 70 | 10 | 20 | - | - | 100 |
| 3 | DE02303 | Thermal Engineering | 70 | 10 | 20 | - | - | 100 |
| 4 | DE02304 | Machine Drawing and Computer Aided Drafting | 70 | 10 | 20 | - | - | 100 |
| 5 | DE02305 | Material Technology | 70 | 10 | 20 | - | - | 100 |
| 6 | DE02306 | Basic Electrical and Electronics(Lab) | - | - | - | 35 | 15 | 50 |
| 7 | DE02307 | Strength of Material (Lab) | - | - | - | 35 | 15 | 50 |
| 8 | DE02308 | Thermal Engineering (Lab) | - | - | - | 35 | 15 | 50 |
| 9 | DE02309 | Machine Drawing and Computer Aided Drafting (Lab) | - | - | - | 35 | 15 | 50 |
| 10 | DE02310 | Material Technology (Lab) | - | - | - | 35 | 15 | 50 |
| 11 | | Health, Hygiene and Yoga (Non-Credit Subject) | - | - | - | - | - | - |
| Total | | | 350 | 50 | 100 | 175 | 75 | 750 |

ESE: End of Semester Exam, CT: Class Test, TA: Teachers Assessment



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| | |
|---|---|
| Course Code: | DE02301 |
| Course Title : | Basic Electrical and Electronics Engineering |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 3 |
| Maximum Marks :- 70 | Minimum Marks :- 28 |

Unit – 1

DC & AC Circuits

DC Circuits *Concept of Ohm's law*, potential difference and current, Kirchhoff's Current and Voltage Law (KCL & KVL), Series and Parallel circuits. AC Fundamentals Phase Difference, Power Factor RMS Value, Average Value and Form Factor. AC Circuits RLC Circuits, Impedance, admittance, Power and Phase or Representation. Poly phase circuits Basic Concepts of Three Phase Generation, phase sequence Line, Phase values of voltages and currents and their Relationship in three phase AC circuits. Star and Delta configuration (Balanced load only)

Unit – 2

Transformer & electrical Machines

Transformer – Construction, working principle, Transformation ratio, EMF equation. DC Machines – Construction Types, Working principle. Types of Transformer shell and core. EMF Equation, Back emf, Torque. Three Phase and single phase Induction Motor Construction, working principle. Slip, Torque- Speed characteristics. working principle of Synchronous generator and motor and applications.

Unit – 3

Diode and its Applications

Semiconductor materials, Introduction of PN junction diode, equivalent circuits of PN junction diode. V-I characteristics of diode, Need of rectification, Types of rectifiers (half wave and full wave) Zener Diode, equivalent circuits of Zener diode, Zener diode as a voltage regulator. *Zener diode characteristics*.



Unit – 4

BJT, FET and MOSFET

Introduction of BJT, types of BJT, construction and operation of NPN and PNP transistor, Need of transistor biasing Input and output characteristics of all configurations (CE, CB and CC) of transistor, Transistor's Applications:- Transistor as an amplifier, transistor as a switch. Introduction of FET, classification of FET types of JFET, construction and operation of N-channel and P-channel JFET, MOSFET, Construction and operation of depletion type MOSFET, Construction and operation of enhancement type MOSFET.

Unit – 5

Test and Measuring Instruments

Multimeter (Analog and Digital multimeter), working of multimeter Function Generator (frequency generator), working. CRO: Block diagram of CRO, constructional features of CRT, principle of operation, working of various blocks of CRO, Features of dual trace oscilloscopes Block schematic description of digital storage oscilloscope Fundamentals of LED and LCD display techniques *.megger & its application, continuity test.*

Books :-

1. A Textbook of Electrical Technology, Theraja B.L. & Theraja A.K, Volume I & II , A.K., Chand and Co. New Delhi
2. Basic Electrical Engineering, Mittle V.N., Tata McGraw-Hill, New Delhi
3. Principles of Electrical Engineering and Electronics, V.K.Mehta and Rohit Mehta, S. Chand & Co. Ltd.
4. Principles of Electrical engineering, Del Toro, Vincent, Prentice Hall of India, New Delhi
5. Electrical Machines, Bhattacharya, S.K., Tata McGraw-Hill, New Delhi
6. Principles of Electronics, Mehta ,V.K., S. Chand & Co. Ltd.
7. Electronic Devices and Circuits, Godse, A.P., Technical publications



BHARTI VISHWAVIDYALAYA, DURG

| | |
|---|------------------------------|
| Course Code: | DE02302 |
| Course Title : | Strength of Materials |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 3 |
| Maximum Marks :- 70 | Minimum Marks :- 28 |

Unit – 1

Direct Stresses and Strains in components

Basic of Stress & Strain, elastic constants, stress – strain diagram, Hooke’s law, Poisson’s ratio, shear stresses, stresses in the components subjected to multi-axial forces, thermal stresses, statically indeterminate systems.

Unit – 2

Shear Force and Bending Moments in Beamtype components

Statically Determinate Beams like Cantilever, Simply Supported and Over Hang Beam. Relation between Shear Force and Bending Moment. Sagging and Hogging Bending Moment and its importance. Point of Contra flexure and its importance. S.F and B.M Diagram for Cantilever, Simply Supported and Over Hang Beam.

Unit – 3

Bending stresses and shear stresses in beam type components

Bending Theory Equation Bending stress, Sectional Modulus Neutral Axis, application of Bending theory to statically determinate beams elements like shaft, axle, spindle, pulley arm having rectangular or circular section to find out stresses. Structural components subjected to Axial Eccentric Loads. Shear stress-Average and Maximum shear stress for rectangular, circular section.

Deflection of beam type components

Slope and Deflection. Deflection Formulae for Cantilever Beam subjected to Point Load at free end and with full UDL. Formulae for Simply supported Beam subjected to Point Load at Mid Span and with full UDL.



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Unit – 4

Springs

Definition, types and use of springs. Spring classification based on size, shape and load- leaf spring, helical and spiral spring. Stiffness, deflection and maximum stress in helical open and closed coil springs and leaf springs.

Torsion of Shaft

Torsion, Angle of Twist, Polar Moment of Inertia, Torsional Rigidity. Formula of Torsional Stress. Formula for Power Transmitted /Consumed for shaft, spindle and axle of solid and hollow sections subjected to Torsion.

Unit – 5

Principal Stresses and Strains

Multi load situations and need of estimating principal stresses. Definition of principal plane and principal stresses. Expression for normal and tangential stress, maximum shear stress. Stresses on inclined planes .Position of principal planes and planes of maximum shear. Graphical solution using Mohr's circle of Stresses.

Buckling stresses in Columns and Struts type components

Column and Strut Short and Long Column. End Condition of Column Effective Length of Column. and Modes of Failure in column. Radius of Gyration, Slenderness Ratio. Euler's Crippling Load and its application. Rankin's load / Buckling Load and its application in screw of screw jack.

Books :-

1. Strength of Material and Mechanics of Structures, Dr. B C Punamia , Laxmi Publications (p) Ltd. New Delhi, 10/e, 2015, ISBN-13: 978-8131809259
2. Strength of Material, S Ramamurtham, Dhanpat Rai Publishing Company Private Limited-New Delhi; Eighth edition, 2014, ISBN-13: 978- 9384378264
3. Strength of Material, Timoshenko and Gere , CBS, 2 edition, 2006, ISBN-13: 978-8123908946



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4. Theory of Structures, R S Khurmi, S. Chand Publishing, New Delhi, 2006 , ISBN-13: 978-8121928229
5. Strength of Materials, R.K. Rajput , S. Chand Publishing (6th Edition) (2015) ISBN-13: 978-9385401367
6. Strength of Materials, Rattan S.S, McGraw Hill Education; Third edition, 2016, ISBN-13: 978- 9385965517



BHARTI VISHWAVIDYALAYA, DURG

| | |
|---|----------------------------|
| Course Code: | DE02303 |
| Course Title : | Thermal Engineering |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 3 |
| Maximum Marks :- 70 | Minimum Marks :- 28 |

Unit – 1

Dimension and Concepts of Thermodynamics

Definition and importance of Thermodynamics, *Thermodynamic Systems - open close and isolated system* Thermodynamic properties, Work, heat and energy, Quasi-static process, work done during Quasi-static process, Zeroth law of Thermodynamics. *Thermal, mechanical, chemical and Thermodynamic Equilibrium,*

Unit- 2

First Law of Thermodynamics

Concept of heat reservoir , Heat source and heat sink First law of thermodynamics -First law of thermodynamics and its applications, Steady flow energy equation and its applications to boiler, engine, turbine, compressor and nozzle Thermodynamic processes and representation on P-V and T-S diagram, *Ideal gas processes-isochbaric, isochoric, isothermal, adiabatic ,polytropic, and throttling process. Computation of net heat transfer and work done and enthalpy.* Simple Numerical problem on first law of thermodynamics.

Unit – 3

Second Law of Thermodynamics

Limitations of First law of thermodynamics, Second law of thermodynamics: Kelvin Planck's and Clausius statements, Heat reservoir, Heat source and Heat sink, Concept of heat engine, heat pump and refrigerator, Carnot cycle Thermal Efficiency, Coefficient of performance, Parameters affecting thermal efficiency, Means of increasing efficiency, Thermodynamically reversible and irreversible processes. Factors that makes a process irreversible.

Entropy- Clausius inequality, concept of Entropy, Principle of increase of entropy, T-S and H-S diagrams computation of change in entropy



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Unit – 4

Steam Generators Definition ,and classification of steam generator , working of babcock and Wilcox boiler and Lancashire boiler . Mounting and accessories.

Steam Turbine Classification , working principle. Difference between impulse and reaction turbine. Compounding of steam turbine, velocity diagram and its use. Governing of steam turbine.

Unit- 5

Heat Transfer

Modes of heat transfer Conduction, convection and radiation. Terms related to heat transfer - thermal conductivity, Heat transfer coefficient , thermal diffusivity , heat flux, thermal resistance. Conduction-Fourier's law of heat conduction, temperature gradient.

Determination of heat transfer across a flat plate through conduction, engineering applications/examples. Convection- Newton's law of cooling, natural and forced convection, engineering applications/examples. Radiation- Stefan- Boltzmann law of thermal radiation, absorptivity, reflectivity, transmissivity, emissivity, Black body, Grey body, Emissive power, shape factor, engineering applications/examples.

Books:-

1. A text book of Thermal Engineering, R.S.Khurmi, S.Chand,
2. A Course in Thermal Engineering, R.K. Rajput, Laxmi Publication, Dariya ganj, New Delhi, ISBN ,13: 9788131808047
3. Engineering Thermodynamics, P.K. Nag, Tata McGraw Hill, ISBN: 9781259062568
4. Fundamentals Engineering Thermodynamics, E Radhakrishnan, PHI, ISBN: 9788120327900
5. Thermodynamics, Prasanna Kumar, Pearson, ISBN: 9789332514133
6. Thermal Engineering (Tapiya Abhiyantriki), S.S.L. Patel, ISBN- 9788180141669
7. Introduction to Thermodynamics, Y. V. C. Rao, Universities Press, ISBN: 9788173714610



BHARTI VISHWAVIDYALAYA, DURG

| | |
|---|--|
| Course Code: | DE02304 |
| Course Title : | Machine Drawing and computer Aided Drafting |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 3 |
| Maximum Marks :- 70 | Minimum Marks :- 28 |

Unit – 1

Intersection of Solids

Curves of intersection of surfaces of the regular solids in the following cases:

Prism with prism (Tri- angular and square), Cylinder with cylinder, Square Prism with Cylinder when

- the axes are at 90° and intersecting
- The axes are at 90° and Offset

Cylinder with Cone: when axis of cylinder is parallel to both the reference planes and cone resting on base on HP with axis intersecting and offset from axis of cylinder.

Unit – 2

A .Development of surfaces

Development of Lateral surfaces of objects (cylinder, cone & pyramids) and their applications such as funnel, Chimney, pipe bend.

B. Isometric and Orthographic Sectional views

Recall Isometric and orthographic projections. Conversion of pictorial view into Orthographic views and Conversion of orthographic views into isometric View / projection.

Need for sectional views, Cutting plane and line, Sectioning conventions and section lines. Types of sections: Full, Half, Broken, Removed, Revolved and Offset Recall

Unit – 3

Conventional Representations

Standard convention as per BIS [SP – 46 (1988)], Materials- C.I., M.S, Brass, Bronze, Aluminum, wood, Glass, Concrete and Rubber, Long and short break in pipe, rod and shaft.



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Ball and Roller Bearings, Pipe joints, cocks, valves, Internal / external threads, Knurling, Serrated shafts, splined shafts, and keys and key ways, Springs with square and flat ends, Gears, sprocket wheel, chain wheels Countersunk & counter bored holes Tapers

Unit – 4

Limits-fits-tolerance, surface finish and welding symbols in Production drawing

Limits, fits and tolerances, hole & shaft base systems, tolerance diagram, Selection of fit. Geometric representation-tolerance frame, datum feature, magnitude of tolerance and symbol, interpretation of a given symbol on drawing. Welding symbols symbolic representation in Engineering practices

Characteristics of surface roughness Indication of machining symbol showing direction of lay, roughness grades, machining allowances, manufacturing methods, using ISO code. Relation of surface roughness values with manufacturing processes.

Unit – 5

Assembly to Detail drawing

Introduction, types of assembly drawing, accepted norms to be observed for assembly drawings, sequence for preparing assembly drawing. Bill of Material. Exploded view of :

Flange coupling Bushed Bearing Plummer Block Lathe Square Tool Post Knuckle Joint

Cast Iron Pulley Any other assembly consisting of 6 -10 parts, *Bill of material, Riveted Joint Type of riveted joints, single riveted lap joint, double riveted (chain) lap joint, double riveted (zigzag) lap joint, single riveted (single strap) butt joint, single riveted (double straps) butt joint*

Books :-

1. Machine Drawing, R. K. Dhawan, S. Chand, New Delhi, ISBN:81-219-1431-0
2. Fundamentals of Machine Drawing, Sadhu Singh, P. L. Sah, PHI
3. Machine Drawing including Auto Cad, Ajeet Singh, TMH
4. Machine Drawing, Bhatt N.D., Panchal V.M., Charotar Publishing house Pvt. Ltd., Anand, Gujarat, 2013, ISBN 9789380358635



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5. Engineering Drawing practice for schools and colleges IS : SP- 46 , Bureau of Indian standard, BIS Delhi , Third reprint, October 1998 ISBN8170610912
6. Production Drawing, Narayanan L.K., Kannaich P., Venkat Reddy K. , New Age International Publication, New Delhi, 2009, ISBN: 9788122435016
7. Engineering Drawing, Bhatt N.D., Charotar Publishinghouse Pvt. Ltd. Anand, Gujarat, ISBN: 9789380358178
8. A text book of Machine Drawing, Gill P.S., S.K.Kataria and Sons, New Delhi, 2007, ISBN: 9789350144169
9. Machine Drawing, N. Sidheswar, P. Kannaiah, V. V. S. Sastry, McGraw Hill, New Delhi, 2009, ISBN: 9780074603376



BHARTI VISHWAVIDYALAYA, DURG

| | |
|---|----------------------------|
| Course Code: | DE02305 |
| Course Title : | Material Technology |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 3 |
| Maximum Marks :- 70 | Minimum Marks :- 28 |

Unit – 1

Properties and Structure of Engineering Materials

Classification of engineering materials – Metals and Non-metals , Properties of engineering materials Physical, Thermal, Electrical, Magnetic and Mechanical properties,

Crystallization , crystal and amorphous, crystallography stability and metal stability of metal.

Crystal Structure – space lattice, unit cell, BCC, FCC, HCP lattice Structural imperfections: impurity atoms, point imperfection, line imperfection, dislocations, surface imperfection, volume defects, Metallurgical microscope, its use and care,

Unit – 2

Plastic deformation

Elastic and Plastic deformation, Mechanisms of deformation in crystalline materials – Slip and Twinning, Stress – Strain curves for polycrystalline materials, Yield point phenomena Strain hardening, Recovery, recrystallisation and grain growth

Unit -3

Metallic and Non-metallic Materials

Micro- Structure, Properties and application, designation and coding methods of:

Cast Iron: Gray, White, Malleable, Nodular Cast iron. Steels: Low, medium and high carbon steels, Stainless steel, High speed steel, Tool steel, Alloy steels , Copper, Aluminum, Zinc and their alloys, Bearing materials, Alloying elements *Polymers: Types, properties and industrial applications.*

Ceramic and refractory: Types, properties and applications. Composites: types, properties and applications. Nano and Smart materials: Definition, types - piezoelectric,



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thermoreponsive, shape memory alloys, polychromic, chromogenic or halochromic materials, Applications.

Unit – 4

Heat treatment of Steels

Introduction, purpose and advantage of heat treatment

TTT Curve: Significance and construction of TTT curve for eutectoid steel, Introduction to Pearlitic, Bainitic and Martensitic Transformation

Heat treatment processes: Annealing, Normalizing, Hardening, Tempering, Surface and Case hardening, Heat treatment furnaces: Muffle furnace, Box type furnace

Unit -5

Testing of Materials

Destructive and non-destructive testing Destructive testing, Hardness test (Brinell, Rockwell and Vickers), Non-destructive testing – Magnetic particle crack detection test, Dye penetration test, Ultrasonic test, Radiography test, Eddycurrent testing

Books:-

1. Materials Science and Metallurgy, R. K. Rajput , S. K. Kataria & Sons , ISBN: 9789350144183
2. Materials Science & Engineering, V. Raghvan , PHI, ISBN: 8120324552
3. Materials Science, R. S. Khurmi, S Chand, ISBN: 9788121901468
4. Materials Science and Metallurgy , R. K. Rajput , S. K. Kataria & Sons , ISBN: 9789350144183
5. Materials Science , G. K. Narula, K. S. Narula, V. K. Gupta , TMH, ISBN: 0074517961
6. Material Science & Metallurgy, U. C. Jindal, Pearson, ISBN: 9788131759110



BHARTI VISHWAVIDYALAYA, DURG

| | |
|---|--|
| Course Code: | DE02306 |
| Course Title : | Basic Electrical and Electronics(Lab) |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 2 |
| Maximum Marks :- 35 | Minimum Marks :- 14 |

List of Practical :-

1. Measure Voltages, current, power and power factor in a RLC series circuit.
2. Measure three phase power using two and three wattmeter methods.
3. Measure voltage transformation ratio of a single phase transformer.
4. Identify the different parts of a DC machine using cut section model.
5. Measure and plot the terminal voltage with respect to field excitation for a DC generator.
6. Measure and plot speed of a DC motor with respect to Load Current.
7. Measure the slip of three phase squirrel cage induction motor under varying load.
8. Make connection of starting and running winding and run a single phase induction motor.
9. Test the performance of PN Junction diode and Zener diode.
10. Measure the output voltage of the given Shunt Regulator consist of Zener Diode.
11. Test the Performance of Half Wave & Full Wave Rectifier.
12. Test the Performance of Bridge Rectifier.
13. Obtain the input and output transistor characteristics for CB configuration.
14. Verify the operation of BJT and FET as a switch.
15. Use analog multimeter to measure voltage and current in the given circuit.



BHARTI VISHWAVIDYALAYA, DURG

| | |
|---|-----------------------------------|
| Course Code: | DE02307 |
| Course Title : | Strength of Material (Lab) |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 2 |
| Maximum Marks :- 35 | Minimum Marks :- 14 |

List of Practical :-

1. Perform Tension Test on mild steel/ Aluminum on Universal Testing machine.
2. Perform Compression test on cast iron on Universal Testing Machine.
3. Plot Stress-Strain Curve for ductile materials like Mild Steel, Aluminum under tensile Loading.
4. Perform direct Shear Test on mild steel using Universal Testing Machine.
5. Determine Young's Modulus of Elasticity of different materials' beam simply supported at ends.
6. Calculate Impact Value/toughness of Mild Steel using IZOD Impact Test Apparatus.
7. Determine energy absorption capacity of Ductile and Brittle materials such as MS, Al, Br and Cu, by conducting Charpy Impact test.
8. Estimate Maximum Bending moment and shear force for simply supported and cantilever beam under point load and UDL using Combined Shear Force and Bending Moment apparatus.
9. Measure flexural rigidity (EI) for a given beam using 'Slope and Deflection' apparatus and compare it with theoretical value.
10. Investigate the effect of beam length and width on deflection of beam and compare it with theoretical value using 'Slope and Deflection' apparatus.
11. Measure Stiffness and deflection of given Spring and Modulus of Rigidity of the Spring wire using 'Extension and compression of Spring' apparatus.
12. Measure the buckling load of three different slenderness ratio long columns of same lengths using 'Behaviour of column and struts' apparatus.
13. Perform the torsion test on MS wire/ Rod using 'Torsion of Bar' apparatus.
14. Determine modulus of rigidity by conducting Torsion Test on MS.



BHARTI VISHWAVIDYALAYA, DURG

| | |
|---|----------------------------------|
| Course Code: | DE02308 |
| Course Title : | Thermal Engineering (Lab) |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 2 |
| Maximum Marks :- 35 | Minimum Marks :- 14 |

List of Practical :-

1. Determine the rise in temperature of air due to external work.
2. Determine the coefficient of performance of heat pump.
3. Determine the BP of four strokes diesel engine using brake dynamometer.
4. Determine the BP of four strokes Petrol engines using brake dynamometer.
5. Perform load test on 2 stroke petrol engine.
6. Determine the dryness fraction of given sample of steam using separating calorimeter.
7. Plot the steam properties on h-s diagram (Mollier diagram) for a given sample of steam.
8. Determine the Characteristics Gas Constant of commonly used gases from given data.
9. Determine the performance parameters of a Reciprocating Compressor/Centrifugal compressor.
10. Determine the capacity of the given reciprocating air compressor.
11. Determine Thermal conductivity of a solid metallic rod/plate.
12. Determine thermal conductivity of a given insulating powder.
13. Determine the value of Stefan-Boltzmann constant for radiation.



BHARTI VISHWAVIDYALAYA, DURG

| | |
|---|--|
| Course Code: | DE02309 |
| Course Title : | Machine Drawing and Computer Aided Drafting |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 4 |
| Maximum Marks :- 35 | Minimum Marks :- 14 |

List of Practical :-

1. Draw curves of intersection in case of cylinder with cylinder and cylinder with cone of given dimensions.
2. Draw curves of intersection in case of cylinder with square Prism and Prism with Prism (Tri-angular and square) of given dimensions.
4. Draw development of surfaces of funnel, chimney and pipe bend.
5. Draw symbols for representing different machine elements and materials.
6. Draw limits-fits-tolerance, surface finish, and welding symbols in the given production drawing.
7. Prepare exploded views of following assemblies:
 - i Flange coupling
 - ii Bushed Bearing
 - iii Plummer Block
 - iv Lathe Square
 - v Tool Post
 - vi Knuckle Joint
 - vii Cast Iron PulleyAny other assembly consisting of 6 -10 parts.
8. Prepare assembly drawing from given exploded views.
9. Draw isometric and Orthographic sectional views of simple machine elements (any four) manually.
- 10 Draw isometric and Orthographic sectional views of simple machine elements (any four) using computer aided drafting software.



BHARTI VISHWAVIDYALAYA, DURG

| | |
|---|----------------------------------|
| Course Code: | DE02310 |
| Course Title : | Material Technology (Lab) |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 2 |
| Maximum Marks :- 35 | Minimum Marks :- 14 |

List of Practical :-

1. Operate metallurgical microscope to examine the given specimen.
2. Macroscopy examination of constitution of a metal or an alloy in relation to its physical and mechanical properties.
3. Microscopy examination of constitution of a metal or an alloy in relation to its physical and mechanical properties.
4. Measure particle size and size distribution of powder using metallographic technique .
5. Determine the tensile behavior of the given material.
6. Prepare micro-specimen of the given material.
7. Use Metallurgical Microscope to identify different phases of the given material.
8. Determine the lead-tin (Pb-Sn) equilibrium phase diagram to demonstrate phase equilibrium in a binary system.
9. Polish and etch low-carbon steel samples to reveal the equilibrium phase distribution.
10. Identify the effect of non-equilibrium cooling rates on microstructure.
11. Measure cooling curve of a Pb-Sn eutectic alloy using thermocouple.
12. Use Metallurgical Microscope to determine the Micro structure of given alloy.
13. Use Metallurgical Microscope to determine Micro structure of given steel.
14. Use Metallurgical Microscope to identify different phases of the given material.
15. Use burning test to identify the different types of plastics.
16. Characterize the mechanical behavior of Teflon, a polymer, and identify its special characteristics as compared with metals.
17. Operate heat treatment furnace.
18. Use Brinell, hardness tester to determine the hardness of a given material.
19. Use Rockwell hardness tester to determine the hardness of a given material.
20. Use Vickers hardness tester to determine the hardness of a given material.
21. Use Magnetic particle crack detector to detect internal crack in a given part/material.



BHARTI VISHWAVIDYALAYA, DURG

Course Code:

Course Title :

Health, Hygiene & Yoga

Pre-requisite Course Code and Title:

Unit -1

HEALTH & HYGIENE

Concept of health, Physical health and mental health and wellbeing and how to achieve these, longevity and how to achieve it, concept and common rules of hygiene, cleanliness and its relation with hygiene; Overeating and underrating, amount of food intake required, intermittent fasting; adequate physical labour, sleep; consumption of junk fast food vs nutritious food; fruits, vegetables cereals and qualities of each of these.

Unit -2

INTRODUCTORY KNOWLEDGE OF COMMON STREAMS OF MEDICINAL CURE

History, development, basic concepts, modes of operation of Alopthy, Ayurved, Homoeopathy, Biochemic, Unani, Siddha, Accurpressure, Accupunture, Naturopathy, Yogic and Herbal, system of medicines, Introduction of Anatomy and Physiology concerned.

Unit -3

YOGASANS

Meaning and concept of Yoga, Yogasans and its mode of operation, How to perform Yogasans, Common Yogasans with their benefits, such as, Padahastasan, Sarvangasan, Dhanurasan, Chakrasan, Bhujangasan, Paschimottasan, Gomukhasan, Mayurasan, Matsyasan, Matsyendrasan, Pawanmuktasan, Vajrasan, Shalabhasan, ,Sinhasan, Shashankasan, Surya Namaskar, Halasan, Janushirasan, Utshep Mudra.

Unit -4

YOGASANS FOR COMMON DISEASES:

From Yogic Materia Medica with symptoms, causes, asans and herbal treatment.



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- **Modern silent killers:** High blood pressure, diabetes and cancer, causes and cure; Common health problems due to stomach disorders, such as, indigestion, acidity, dysentery, piles and fissures, arthritis, its causes, prevention and cure.
- **Asans for relaxation:** Shavasan, Makarasan, Matsyakridasan, Shashankasan.
- Asans to **increase** memory **and** blood **supply** to brain : Shirsh padasan, Shashankasan.
- **Asans for eye sight:** Tratak, Neti Kriya .
- **Pranayam:** Definition and types: Nadi Shodhan, Bhastrik, Shitakari, Bhramari useful for students.

Unit -5

CONCENTRATION

Concentration Of Mind And How To Achieve It. Tratak , Concentration On Breath, Internal silence Visualization ,In Mental Sky, Concentration On Point Of Light, Concentration On Feeling , Concentration On Figure

Text Books:

Health, Hygiene & Yoga, Dr P B Deshmukh, Gyan Book Pvt Ltd. New Delhi.

Reference Books:

- (1) Yogic Materia Medica
- (2) Asan, Pranayam and Bandh



BHARTI VISHWAVIDYALAYA, DURG

Scheme of Teaching and Examination Diploma in Mechanical Engineering

Semester-IV

| S. No. | Course Code | Course Titles | Scheme of Studies (Hours/Week) | | | |
|--------|-------------|--|--------------------------------|----|----|---------------------|
| | | | L | P | T | Credit L+T+(P/2) |
| 1 | DE02401 | Theory of Machines | 2 | - | 1 | 3 |
| 2 | DE02402 | Manufacturing Process | 2 | - | 1 | 3 |
| 3 | DE02403 | Industrial Measurements | 2 | - | 1 | 3 |
| 4 | DE02404 | Fluid Mechanics and Hydraulic Machines | 2 | - | 1 | 3 |
| 5 | DE02405 | Engineering Metrology | 2 | - | 1 | 3 |
| 6 | DE02406 | Theory of Machines (Lab) | - | 2 | - | 1 |
| 7 | DE02407 | Manufacturing Process (Lab) | - | 2 | - | 1 |
| 8 | DE02408 | Industrial Measurement (Lab) | - | 2 | - | 1 |
| 9 | DE02409 | Fluid Mechanics and Hydraulic Machines (Lab) | - | 2 | - | 1 |
| 10 | DE02410 | Engineering Metrology (Lab) | - | 2 | - | 1 |
| 11 | - | Indian Constitution | 2 | | - | |
| 12 | - | Library | | 2 | | |
| 13 | Humanities | Physical and Mental Fitness | | 2 | | |
| Total | | | 12 | 14 | 05 | 20 |

L - Lecture

P – Practical

T - Tutorial



BHARTI VISHWAVIDYALAYA, DURG

Scheme of Teaching and Examination Diploma in Mechanical Engineering

Semester-IV

| S. No. | Course Code | Course Titles | Scheme of Examination | | | | | |
|--------------|-------------|--|-----------------------|-----------|------------|------------|-----------|-------------|
| | | | Theory | | | Practical | | Total Marks |
| | | | ESE | CT | TA | ESE | TA | |
| 1 | DE02401 | Theory of Machines | 70 | 10 | 20 | - | - | 100 |
| 2 | DE02402 | Manufacturing Process | 70 | 10 | 20 | - | - | 100 |
| 3 | DE02403 | Industrial Measurements | 70 | 10 | 20 | - | - | 100 |
| 4 | DE02404 | Fluid Mechanics and Hydraulic Machines | 70 | 10 | 20 | - | - | 100 |
| 5 | DE02405 | Engineering Metrology | 70 | 10 | 20 | - | - | 100 |
| 6 | DE02406 | Theory of Machines (Lab) | - | - | - | 35 | 15 | 50 |
| 7 | DE02407 | Manufacturing Process (Lab) | - | - | - | 35 | 15 | 50 |
| 8 | DE02408 | Industrial Measurement (Lab) | - | - | - | 35 | 15 | 50 |
| 9 | DE02409 | Fluid Mechanics and Hydraulic Machines (Lab) | - | - | - | 35 | 15 | 50 |
| 10 | DE02410 | Engineering Metrology (Lab) | - | - | - | 35 | 15 | 50 |
| Total | | | 350 | 50 | 100 | 175 | 75 | 750 |

ESE: End of Semester Exam, CT: Class Test, TA: Teachers Assessment



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|-----------------------------|
| Course Code | : DE2401 |
| Course Title | : Theory of Machines |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 3 |
| Maximum Marks:-70 | : Minimum Marks:-28 |

Unit – 1

Planar Mechanisms

Kinematics of Machines: Introduction to Statics, Kinematics, Kinetics, Dynamics. Mechanism and machine, rigid and resistant bodies, Kinematic links, joints, pairs, chain and its types, degree of freedom, Constrained motion and its types. Four link planar mechanisms and Inversions:

Four bar chain: Locomotive coupler, Beam engine and Pantograph.

Single slider Crank chain: Pendulum pump, Rotary I.C. engine mechanism, Oscillating cylinder engine, Whitworth quick return Mechanism, Quick return mechanism of shaper. *Slider, crank chain and its inversions.* Double Slider chain: Scotch Yoke mechanism Elliptical trammels, Oldham's Coupling.

Unit – 2

Velocity and Acceleration in Mechanisms

Concept of relative velocity and relative acceleration of a point on a link, angular acceleration, inter- relation between linear and angular velocity and acceleration. Analytical method and Velocity and acceleration diagrams for simple mechanisms. Determination of velocity and acceleration of point on link by relative velocity method (Excluding Coriolis component of acceleration) Mechanical advantage calculation. *Analytical method of calculative the velocity and acceleration of piston in reciprocating engine mechanism. (no derivation)*



Unit – 3

Application of Friction

Clutches: Classification, Functions and Applications, Construction and principle of working of; Single-plate clutch, Multi-plate clutch, Centrifugal Clutch, Diaphragm clutch.

Calculation of power loss assuming uniform pressure and uniform wear theory.

Brakes: Functions, Types, Applications, Construction and working principle of; Shoe brake Band brake, Internal expanding shoe brake, Disc Brake, Braking force, braking torque and power for shoe and band brakes. *Simple numerical calculation in above items.*

Dynamometer: Meaning need and type.

Bearings: Classification of bearings – rolling contact and sliding contact bearings, types of rolling contact bearings and types of sliding contact bearings, advantages and disadvantages of rolling and sliding contact bearing and their application, Designation of bearings.

Unit-4

Power Transmission

Belt Drives – Introduction to Flat belt, V-belt & its applications, materials used for flat and V-belts. Introduction of timing belt and pulley. Angle of lap, *length of belt calculation for open and cross belt drive*, Slip and creep. Determination of velocity ratio of tight side and slack side tension, centrifugal tension and initial tension, condition for maximum power transmission. Merits, demerits and selection of belts for given applications.

Chain Drives – Introduction to chain drives, Types of chains and sprockets, Methods of lubrication. Merits, demerits and selection of chains for given applications.

Gear Drives – Introduction to gear drives, Classification of gears, Law of gearing, gear terminology,

Gear trains- Types of gear, simple, compound, reverted and epicyclic gear train. Computation of velocity ratio in gear train.

Unit 5

Flywheel, Governors and Balancing

Dynamics of reciprocating engine mechanism, inertia force due to reciprocating mass.



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Piston effort, crank effort, turning moment of crank shaft.

Fluctuation of energy and speed, coefficient of fluctuation of energy and speed. (No derivation)

Principle and application of flywheel. Governor- Function of governor and its comparison with flywheel. Classification of governor, Watt, Porter, Proell, Hartnell governor their construction and working. Equation for lift of governors. (No derivation)

Terms related to governor like Sensitivity, stability, Isochronous, Governor effort and power. (No derivation) .

Balancing- Need and types of balancing, Effects of unbalanced masses.

Balancing of rotating masses in same plane-Graphical methods .and simple numerical problems.

Books:

1. Theory of Machines , Rattan S. S. Tata McGraw-Hill Education 1986, ISBN 9780070591202
2. Theory of Machines , Khurmi R. S., Gupta J. K. S. Chand Publications New Delhi 2015, ISBN 9788121925242
3. Theory of Machines , Bevan Thomas , Pearson Education India 1986, 3/e ISBN 9788131729656
4. Theory of Machines, and Mechanisms Ballaney P.L. Publisher Khanna 2003, 23/e, ISBN 9788174091222
5. A Text Book of Theory of Machines Bansal R.K., Brar J. S. Laxmi Publication New Delhi 2004, ISBN 9788170084181
6. Mechanism and Machine Theory , A G Ambekar PHI Learning , Revised 2nd Edition, ISBN 9788120331341



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| | |
|--|----------------------------------|
| Course Code | : DE2402 |
| Course Title | : Manufacturing Processes |
| Pre-requisite Course Code and Title | : |
| Credit (L + T + P/2) | : 3 |
| Maximum Marks:-70 | : Minimum Marks:-28 |

Unit – 1

Introduction to Manufacturing Processes

Classification of basic manufacturing process based on chip-less and chip- removal processes, Primary and Secondary manufacturing processes, Various generating & forming processes, Factors which influence selection of manufacturing process for a particular application. Recall mechanical. properties of metals.

Unit-2

Metal Casting

Definition and Need Pattern: types, materials, pattern allowances, color code, applications
Cores: Need, types, materials Moulds: Molding sand: Types, properties, binders, additives, mixing, Molding equipments & tools Type of moulds, mouldmaking, applications
Melting of metal: Pit furnace, Cupola, Induction furnace Metal pouring: Gates and Risers.
Casting Processes: Dry sand mould casting, Shell mould casting, Investment casting, Die casting, Centrifugal casting. Casting defects: Blow, scar, blister, gas holes, pin holes, porosity, drop, inclusion, dross, dirt, wash, buckle, scab, rat tail, penetration, swell, misrun, cold shut, hot tear, shrinkage cavity, mould shift, core shift.

Unit-3

Metal Forming and Press working

Cold and Hot working of metals, effect on metal properties, advantages & limitations.
Forming processes, types, working principle, tools and equipment, applications of: Rolling, Forging, Drawing, Deepdrawing, Extrusion. Safety precautions.
Press working: Emphasis that press working is not forming process, Punching, Blanking,



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Notching, Lancing, Slitting, Nibbling, Trimming.

Unit 4

Metal Joining

Classification, recall gas and arc welding processes.

Working principle, equipment, sketch, process parameters, applications of:

- (i) MIG, TIG, Flux coated arc and submerged arc
- (ii) Resistance welding – Butt, Seam, Spot, Projection and Percussion.
- (iii) Thermit welding.
- (iv) Forged welding

Welding processes such as atomic hydrogen , submerged arc , electro slag , friction welding , soldering and brazing.

Unit-5

Plastic Molding and Powder Metallurgy

Plastic Molding: Concept, working principle, equipment and applications of Compression molding, Blow molding, Injection molding and Extrusion Safety precautions

Powder Metallurgy: Introduction, advantages and disadvantages, Powder metallurgy processes:

Powder making, blending, compacting, sintering, infiltration and impregnation, Applications Safety Precautions.

Books :

1. Material Science and Metallurgy O. P. Khanna Dhanpat Rai Publishing Company Private Limited, New Delhi ISBN 13: 9789383182459
2. Manufacturing Science Amitabha Ghosh and Asok Kumar Malik Affiliated East West Press Pvt Ltd. ISBN 13: 9780745800592
3. Manufacturing Technology R. K. Rajput CBS, 2 edition, 2006 ISBN-10: 8123908946 ISBN-13: 978-8123908946
4. Manufacturing Process O. P. Khanna Dhanpat Rai Publishing Company Private Limited, New Delhi ISBN: 9788189928230, 8189928236
5. Introduction to Basic Manufacturing Processes and Workshop Technology , Rajender Singh New Age International ISBN (13) : 978-81-224-2316-7



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6. Production Technology , R. K. Jain Khanna Publishers ISBN 10: 8174090991 ISBN 13: 9788174090997
7. Production Technology P. C. Sharma S. Chand Publishing ISBN:9788121911146



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|----------------------------------|
| Course Code | : DE2403 |
| Course Title | : Industrial Measurements |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 3 |
| Maximum Marks:-70 | : Minimum Marks :- 28 |

Unit – 1

Application of Transducer

Function of each block of Instrumentation system .Transducer :Need classification –active and passive , analog and digital , primary and secondary , mechanical and electrical. Electrical transducer – resistivity transducer – linear and angular potential meter, strain gauge –types , gauge factor, capacitive transducer, inductive transducer-LVDT , RVDT , piezoelectric transducer , LDR , Photo voltaic cell.

Unit- 2

Pressure Measurement

Pressure and its unit , types – absolute , gauge , atmospheric , vacuum. Classification of pressure measuring device. Introduction of Manometer and its classification. Elastic pressure transducer, electrical pressure transducer , specification of electrical pressure transducer, calibration of pressure gauge using dead weight tester.

Unit- 3

Flow Measurement

Flow and its units, types of flow, classification of flow measuring transducer , variable head flow meter- Venturimeter, orifice plate meter, flow nozzle , pitot tube, Variable flow meter, electrical flow meter, positive displacement meter, typical specification of various flow meter.

Unit -4

Level Measurement

Level and its unit , classification of level measurement method, Direct method – Hook type , sight glass , hydrostatic type (Air purge) , indirect measurement method- float type with linear and rotary potential meter, capacitive type , Ultrasonic type, nuclear radiation, radar type, typical specification



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of electrical level measurement methods , Calibration of air purge and capacitance type level system.

Unit-5 Temperature measurement

Temperature and its units, temperature scale and conversions , classification of temperature measuring transducer- field system thermometer- vapour pressure thermometer, expansion thermometer-by metallic thermometer, electrical method- Thermistors, RTD, Thermocouple, Pyrometer-optical method and radiation method. , typical specification of thermistor RTD and thermocouple, calibration of temperature measuring transducer.

Books:-

1. Mechanical measurements and instrumentation Rajput R.K. S.K.Kataria and Sons, New Delhi, ISBN:978-93-5014-285-1 Edition (2013), 2013
2. Mechanical Measurement and Control , Jalgaonkar R.V Everest Publishing House, New Delhi, ISBN-9788186314265 18th Edition, 2010
3. Mechanical and Industrial Measurements Jain R.K. Khanna Publications, New Delhi ISBN: 978-8174091912 2012



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|---|
| Course Code | : DE2404 |
| Course Title | : Fluid Mechanics and Hydraulic Machines |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 3 |
| Maximum Marks:-70 | : Minimum Marks:-28 |

Unit-1

Fundamental of Fluid Flow

Definition of fluid-ideal and practical Compressible and incompressible fluids,

Fluid properties-density, specific weight, specific gravity, dynamic and kinematics viscosity

Types of flow-laminar and turbulent, steady and unsteady, uniform and non-uniform. Continuity equation. Simple numerical problems on continuity equation.

Unit – 2

Pressure and its Measurement

Concept of pressure, intensity of pressure, pressure head, gauge pressure, vacuum pressure, absolute pressure. Manometers- Piezometer, U-tube manometer, inclined manometer, differential manometer, inverted U-tube manometer, differential manometer

Pressure gauges. Simple numerical problems on differential manometers. Bernoulli Theorem and its assumption and practical application. Simple numerical problems on Bernoulli equation.

Unit-3

Flow through pipes , Orifices and Mouth Pieces

Characteristics of Pipe Flow Law of liquid friction for laminar flow and turbulent flow

Expression for head loss in pipes due to friction Darcy's weish bach / equation. Major losses. Expressions for loss due to sudden enlargement, bends, minor losses Flow through long pipe. Definition and types of orifices

Vena contracta, coefficient of contraction, velocity, discharge and resistance. Torricell's theorem. Experimental determination of C_c , C_v , and C_d . Head loss due to sudden enlargement, contraction



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and obstruction in pipe, Mouth piecestypes and their uses.

Unit-4

Impact of Jets and Water Turbines

Impact of jet on flat and curved plates- stationary and moving

Work done by pelton runner, velocity diagrams Simple numerical problems on axial, radial flow.

Meaning, classification-Impulse and reaction turbine. Comparison, description and working of pelton, Francis and Kaplan turbines. Selection of turbines, operating & characteristics.

Unit 5.0

Pumps

Centrifugal pumps: - Construction, working and installation.

Classification of centrifugal pumps, types & impellers, casings, stages, coupling, mounting in parallel arrangements, priming, cavitations, operating characteristics of pumps.

Selection of pump.

Submersible pumps : - Construction, working & installation. Classification & pumps: Types of impellers, casings, stages and couplings, mounting, Priming, Cavitations, operating characteristics of pumps. Selection of pump.

Reciprocating Pump:- Construction, working, installation, Classification of pump, single acting, double acting, slip, negative slip, max speed of reciprocating pump. Use of air vessels, cavitations and indicator diagrams, operating characteristics of pumps. Selection of pump.

Books

1. Fluid mechanics and hydraulic machines , Bansal R.K. Laxami Publication, New Delhi
ISBN-10: 8131808157 ISBN-13: 978-8131808153 Tenth or latest edition, 2018

2 .Fluid mechanics and hydraulic machines Rajput R.K. S. Chand and Co. Ltd., New Delhi ISBN-10: 8121916666 ISBN-13: 978-8121916660 3rd or latest Rev. Edition, 2006

3. Textbook of Fluid Mechanics and Hydraulic Machines Pati Sukumar McGraw Hill Education New Delhi ISBN-10: 1259006239 ISBN-13: 978-1259006234 Latest edition, 2017

4. Introduction to Fluid Mechanics and Fluid Machines S K Som & G Biswas Mc Graw Hill Publication ISBN-13:978-0-07-066762-4 ISBN-10:0-07-066762-4 Revised Second Edition



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|--------------------------------|
| Course Code | : DE2405 |
| Course Title | : Engineering Metrology |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 3 |
| Maximum Marks:-70 | : Minimum Marks:-28 |

Unit-1

BASIC CONCEPTS OF MEASUREMENTS

Need for measurement – Dimensional and Form tolerances – Precision and Accuracy – Errors in Measurements – Causes – Types – Handling of measuring instruments – Maintenance of Instruments – Standards and Practice – Metrology lab – Environment and conditions.

Unit-2

LINEAR AND ANGULAR MEASUREMENTS

Measurement of Engineering Components – Comparators, Slip gauges, Rollers, Limit gauges – Design and Applications – Angle dekkor – Alignment telescope – Sine bar – Bevel protractors – Types – Principle – Applications.

Unit- 3

FORM MEASUREMENTS

Measurement of Screw thread and gears – Radius measurement – Surface finish measurement – Auto collimator – Straightness, Flatness and roundness measurements – Principles – Application.

Unit-4

OPTICAL MEASUREMENTS

Optical microscope, interference microscope, Tool makers microscope, Vision systems, Precision instrument based on Laser – Use of Lasers – Principle – Laser Interferometer – Application in Linear and Angular measurements – Testing of machine tools using Laser Interferometer.



Unit- 5

ADVANCES IN METROLOGY

Co-ordinate measuring machine – Constructional features – Types – Applications of CMM – CNC CMM applications – Computer Aided Inspection – Machine Vision – Applications in Metrology. Nanometrology – Introduction – Principles – Nanometer metrology systems – Methods of measuring length and surfaces to nano scale result with interferometers and other devices

Books

1. Engineering Metrology R.K. Jain Khanna Publishers Latest edition 978-8174091536
2. Engineering Metrology I.C. Gupta Dhanpat Rai & Sons Latest edition 978-8189928452
3. A Text Book of Engineering Metrology Dhanpat Rai & Co. Latest edition 1234567143086
4. Engineering metrology & measurements N V Raghavendra and L Krishnamurthy Oxford Latest edition ISBN-9780198085492



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|-----------------------------------|
| Course Code | : DE2406 |
| Course Title | : Theory of Machines (Lab) |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 1 |
| Maximum Marks:-35 | : Minimum Marks:-14 |

EXPERIMENTS TO BE PERFORMED

1. Working models of all the inversions of Slider Crank Mechanism.
2. Working models of all the inversions of Double Slider Crank Mechanism available in the lab
3. Working models of all the inversions of Four bar Mechanism available in the lab.
4. Dismantle and assemble wiper mechanism of any four-wheeler.
5. Bicycle brake applying mechanism
6. Draw velocity diagram for a given mechanism using relative velocity method.
7. Draw acceleration diagram for the given mechanism
8. Measure important kinematic data related to following mechanisms and sketch them.
9. Determine friction in collar bearing
10. Dismantle and Assemble a single plate clutch.
11. Dismantle and Assemble a multi plate clutch.
12. Dismantle and Assemble a centrifugal clutch.
13. Demonstrate working of any one type of cam and followers.
14. Analysis and Working of gears in Lathe machine gear box.
15. Analysis and Working of gears in Gear box of two wheelers



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|--------------------------------------|
| Course Code | : DE2407 |
| Course Title | : Manufacturing Process (Lab) |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 1 |
| Maximum Marks:-35 | : Minimum Marks:-14 |

EXPERIMENTS TO BE PERFORMED

1. Prepare a pattern drawing, pattern and core for a given component or component drawing.
2. Prepare a sand mould using a given single piece pattern.
3. Prepare a sand mould using a given split piece pattern.
4. Prepare aluminum washer using flywheel press.
5. Prepare two jobs using hot forging.
6. Prepare a lap joint using spot welding equipment.
7. Use seam welding to join two sheets of metal.
8. Prepare a V – Butt joint using TIG welding.
9. Prepare a Balcony grill using welding of stainless Steel pipes.
10. Prepare a given job using blow molding process.
11. Prepare a job using injection molding process.



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|---------------------------------------|
| Course Code | : DE2408 |
| Course Title | : Industrial Measurement (Lab) |
| Pre-requisite Course Code and Title | : |
| Credit (L + T + P/2) | : 1 |
| Maximum Marks:-35 | : Minimum Marks:-14 |

EXPERIMENTS TO BE PERFORMED

1. Identify the contact and non-contact transducers from the given samples of transducers.
2. Measure the distance using ultrasonic transducers.
3. Measure the vibration parameters using Piezo- electric Transducer
4. Identify different elements of the given open loop and closed loop control systems
5. Control the temperature of an oven by using ON/OFF controller.
6. Measure the displacement of core using LVDT.
7. Measure the displacement using Capacitive Transducer.
8. Measure the speed of a motor shaft using Stroboscope.
9. Measure the speed of an electric motor with given type of tachometer.
10. Measure Pressure using diaphragms
11. Measure Pressure Using Bourdon Pressure Gauge.
12. Measurement of strain on a beam using strain gauge.



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|---|
| Course Code | : DE2409 |
| Course Title | : Fluid Mechanics and Hydraulic Machines Lab |
| Pre-requisite Course Code and Title | : |
| Credit (L + T + P/2) | : 1 |
| Maximum Marks:-35 | : Minimum Marks:-14 |

EXPERIMENTS TO BE PERFORMED

1. Use viscometer to determine the viscosity of a given liquid.
2. Measure the rise of liquid level using capillary action in capillary tube.
3. Determine the specific gravity of any given fluid.
4. Determine discharge through a given pipe using orifice meter, Pitot tube and Venturimeter
5. Determine C_c , C_d , C_v for different types of orifices.
6. Measure the flow characteristic of given flowing fluids.
7. Determine the different types of flow Patterns by Reynolds's experiment.
8. Determine the power required to drive the given reciprocating pump.
9. Determine the performance characteristics of: Centrifugal pump , Reciprocating Pump
10. Experimentally justify Bernoulli's theorem for a viscous and incompressible fluid.
11. Determine the meta-centric height of ship model.
12. Determine loss of head due to Sudden enlargement, Sudden contraction, Friction in pipes



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|--------------------------------------|
| Course Code | : DE2410 |
| Course Title | : Engineering Metrology (Lab) |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 1 |
| Maximum Marks:-35 | : Minimum Marks:-14 |

EXPERIMENTS TO BE PERFORMED

1. Given the industrial situations, suggest the type of inspection applicable to each situation.
2. Given the situations, state where accuracy is necessary and where precision is necessary.
3. Measure the height of a given object using vernier height gauge.
4. To measure the depth of a given object using Depth gauge.
5. Check the parallelism and perpendicularity of a machine tool using dial gauge.
6. Set a job on lathe using dial gauge.
7. Set the Sine bar to a given known angle.
8. Measure the angle of taper of a given component using Sine bar.
9. Measure the angle of a given component with Angle Dekkar.
10. Check the straightness of a given job using precision level.
11. Check the straightness of a given job using autocollimator.
12. Check the roundness of a given job using V block and dial indicator.



BHARTI VISHWAVIDYALAYA, DURG

Scheme of Teaching and Examination Diploma in Mechanical Engineering

Semester-V

| S. No. | Course Code | CourseTitles | Scheme of Studies (Hours/Week) | | | |
|--------|-------------|--|-----------------------------------|----|----|---------------------|
| | | | L | P | T | Credit L+T+(P/2) |
| 1 | DE02501 | Automobile Engineering | 2 | - | 1 | 3 |
| 2 | DE02502 | Machine Design, Estimation and Costing | 2 | - | 1 | 3 |
| 3 | DE02503 | Machine Tool Technology | 2 | - | 1 | 3 |
| 4 | DE02504 | Refrigeration & Air conditioning | 2 | - | 1 | 3 |
| 5 | DE02505 | Fluid Power Engineering | 2 | - | 1 | 3 |
| 6 | DE02506 | Automobile Engineering (Lab) | - | 2 | - | 1 |
| 7 | DE02507 | Machine Tool Technology (Lab) | - | 2 | - | 1 |
| 8 | DE02508 | Refrigeration & Air conditioning (Lab) | - | 2 | - | 1 |
| 9 | DE02509 | Fluid Power Engineering (Lab) | - | 2 | - | 1 |
| 10 | DE02510 | Industrial Training | - | 2 | - | 1 |
| 11 | | Major Project | | 2 | - | |
| 12 | Humanities | Library | | 2 | | |
| Total | | | 10 | 14 | 05 | 20 |

L - Lecture

P – Practical

T - Tutorial



BHARTI VISHWAVIDYALAYA, DURG

Scheme of Teaching and Examination

Diploma in Mechanical Engineering

Semester-V

| S. No. | Course Code | Course Titles | Scheme of Examination | | | | | |
|--------------|-------------|--|-----------------------|-----------|------------|------------|-----------|-------------|
| | | | Theory | | | Practical | | Total Marks |
| | | | ESE | CT | TA | ESE | TA | |
| 1 | DE02501 | Automobile Engineering | 70 | 10 | 20 | - | - | 100 |
| 2 | DE02502 | Machine Design, Estimation and Costing | 70 | 10 | 20 | - | - | 100 |
| 3 | DE02503 | Machine Tool Technology | 70 | 10 | 20 | - | - | 100 |
| 4 | DE02504 | Refrigeration & Air conditioning | 70 | 10 | 20 | - | - | 100 |
| 5 | DE02505 | Fluid Power Engineering | 70 | 10 | 20 | - | - | 100 |
| 6 | DE02506 | Automobile Engineering (Lab) | - | - | - | 35 | 15 | 50 |
| 7 | DE02507 | Machine Tool Technology (Lab) | - | - | - | 35 | 15 | 50 |
| 8 | DE02508 | Refrigeration & Air conditioning (Lab) | - | - | - | 35 | 15 | 50 |
| 9 | DE02509 | Fluid Power Engineering (Lab) | - | - | - | 35 | 15 | 50 |
| 10 | DE02510 | Industrial Training | - | - | - | 35 | 15 | 50 |
| Total | | | 350 | 50 | 100 | 175 | 75 | 750 |

ESE: End of Semester Exam, CT: Class Test, TA: Teachers Assessment



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|---------------------------------|
| Course Code | : DE2501 |
| Course Title | : Automobile Engineering |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 3 |
| Maximum Marks:-70 | : Minimum Marks:-28 |

Unit1.0 Essentials of Automobile

Introduction, classification of automobiles, Types of automobiles. Layout of automobile, importance of vehicle layout,. Layout of chassis, Frame and Body: Requirement of Chassis, classification of chassis. Function of Chassis

Frame and Body, Load acting on Frame, advantages, disadvantages and applications of different types of chassis, Basic Body Nomenclature.

Automotive engines

Types of Automobile Engines: Petrol Engine, Diesel Engine.

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 mufflers, Lubrication and cooling.

Unit-2.0 Fuel supply system and auto-electric and electronic

Introduction of fuel system for petrol engine. Gravity feed system, Fuel pump, Simple and Solex carburetor. Concept of Petrol Injection (Mechanical and Electronic injection systems) & MPFI Petrol injection systems. Concept of supercharging. Introduction of fuel system for diesel engine Concept of Fuel injection systems and Its Construction, Working of Fuel injection pump and their types, Fuel injector.

Electrical and Electronics system

Function of Starting and charging systems, construction and Working of Alternator. Ignition System, Function and Requirement of Ignition System, Distributor, Ignition Coil, Ignition Timing, Ignition Advance, coil System .Lighting system, Automobile Battery- Function of Battery, Types of Battery, Principle of Lead Acid Battery, Construction and Operation of Lead



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Acid Battery Low- maintenance and Maintenance-free Batteries., Significance of Battery Rating & Battery Capacity, Battery Open Volt and Specific Gravity Test. Types of Lights, Necessity and Importance of Cable Color Codes, Different types of Gauges, Windscreen wiper, Function & Location of Major Sensors and Actuators used in Automobile Electronics.

Unit-3.0 Brakes, Clutch and Suspension systems

(a) Brakes

Need & function of braking system, principle of braking system, Brake efficiency, stopping distance and basic terms related to braking. Foundation brakes - drum and disc brakes, Hydraulic and pneumatic brakes, Self energized brakes, Power brakes, Air brakes, Emergency & Parking Brakes Floating-caliper brakes, ceramic pads, twin brake disc systems, hybrid systems, coated discs, anti-squeal technology Electronic brakes - EPB (electric park brake), ESP (electronic stability control), braking assistance, predictive braking, brake-by-wire, slip control, regenerative braking, autonomous emergency braking Anti lock braking System: Layout of ABS, Pressure Modulation, and Types of ABS. Electric Driven Intelligent Brake-construction, working and its function Construction and Working of Master Cylinder, Wheel Cylinder, Tandem Master Cylinder ,

(b) Clutch system

Need and function of clutch system, construction and working of clutch system, classification of clutch Types of clutch systems Single plate and multi plate clutch , Centrifugal clutch, Semicentrifugal clutch AMTs (automate manual transmission), CVTs, DCTst,

(c) Suspension system

Need for good suspension system , stages in suspension system , element of suspension system , type of suspension system , inspection and service of suspension system (general), trouble shooting of suspension system , vibration dampers.

Unit-4.0 Automobile Transmission system

Need and functions of transmission system. Concept of various road resistances such as wind, Gradient, Resistance, Total resistance, Tractive- effort. Types of transmission systems.

Need of gear box, function and working of gear box, construction of gear box, types of gear boxes - sliding mesh. Constant mesh, synchromesh gear boxes, mathematical analysis of gear



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boxes, Gear shifting mechanisms, five speed gearbox. Function , construction and working of Torque converter, Overdrive automatic transmission, fluid flywheel and epicyclic gear trains. Functions of propeller shaft, types of propeller shaft, Universal joints & slip joints on propeller shaft. Function & need of differential Final drive and differential

Axles: function and need of axles, types of axles, Function and need of rear axle such as semi floating, fully floating, Three quarter floating. Rear axle drives such as Hotchkiss type, torque tubetype. Function and need of Front Axle, Types of (Front) Stub axle.

Unit-5. Automobile Emissions and its Control

Introduction, Complete and Incomplete Combustion. Constituents of Exhaust Gases, Pollutant Formation Effect of Air Fuel Ratio on Exhaust Emission, Effect of Driving Mode on Exhaust Emission, Sources of Pollutants in an Automobile Control Approaches for Automobile Emission Muffler, Alternative Fuels- Layout of Vehicle operated on Natural

Gas (LPG & CNG): Need, Fuel Characteristics, Construction & Working, Advantages, and Limitations. Layout of Electric Vehicles: Need, Working, Advantages, Limitations. Hydrogen as fuel. Motor Vehicle Act Salient Features of M. V. Act 1988 and Central Motor Vehicle Rules

1989. 6.1.2, Types and Significance of Traffic Signs, Important Transport Terms in M. V. Act (Motor Vehicle, Motor Cycle, HGV, MGV, LGV, Public Service Vehicle, Transport Vehicle, Driver, Passenger, Accident) Passenger Comfort and Safety, Function and requirements of Passenger Safety System. Features of Air Bags, Seat Belts, Collapsible Steering Column.

BOOKS:-

1. Automotive Engineering Vol I & II. Kirpal Singh Standard publishers and distributors, New Delhi 2012
2. Automotive Mechanics Crouse & Anglin McGraw Hill Education, New Delhi 10 2017
3. Automobile Engineering Jain K.K., Asthana R.B. McGraw Hill Education, New Delhi 1st 2017
4. Modern automotive technology James E. Duffy Goodheart-Willcox, New Delhi 8th 2013



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|---|
| Course Code | : DE2502 |
| Course Title | : Machine Design, Estimation and Costing |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 3 |
| Maximum Marks:-70 | : Minimum Marks:-28 |

Unit- 1

Introduction to machine design

Introduction to machine design, Basic design requirements for machine parts, Factor influencing design of machine elements-strength, stiffness Basic design procedure, Types of failures, types of forces, types of loading,

Design of Shaft and Axle:

Introduction of pure bending, member subjected to bending, Introduction to torsion equation, member subjected to torsion, Design of shaft and axle, Combined bending and twisting moment.

Unit-2

Design of Joints:

Function and application of Cotter Joints, Knuckle Joints, Members subjected to tensile, compressive and shear load, Design of Cotter Joint, Design of Knuckle Joint.

Unit-3

Riveted Joints:

Types of fasteners –temporary and permanent, Types of riveted joint-lap and butt joint, Definition of common terms like pitch, back pitch, diametral pitch, efficiency and margin, Types of failure in a riveted joints, Derivation of equation for checking the failure of a riveted joint, Design of a single and double row lap & butt joint for a given tensile load, Efficiency of riveted joint.



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Design of Welded & Threaded Joints:

Advantages of welding over rivetting, Types of welded joints,

Strength of the butt -weld, types of fillet joints and strength of fillet joint,

Types of threads and their proportions, Types of bolts,

Proportion of nut -bolt dimensions, Design of bolt, Designation of threads as per I.S. codes.

Unit – 4

Fundamentals of Estimating

Definition, importance and function of estimating

Estimating procedure Principle factors in estimating

Miscellaneous allowances

Unit – 5

Estimation of Material Cost

Estimation of volume and weight of material

Provision for scrap

Simple Problems

Books :

1. A Textbook of Machine Design P C Sharma and D K Aggarwal S. K. Kataria & Sons, New Delhi 13e, 2017 ISBN(13) 9789350142813
2. Machine Design U. C. Jindal Pearson Education, India, New Delhi 2010, ISBN13:9788131716595
3. Machine Design Data Book Kamal Kumar and S K Dhagat Khanna Publishers, New Delhi 5e, 2009, ISBN(10) 8174091505
4. Machine Design Data Book V B Bhandari McGraw Hill Education (India) Pvt. Ltd., New Delhi 2014, ISBN(13): 978-9351342847
5. Design of Machine Elements V B Bhandari McGraw Hill Education (India) Pvt. Ltd., New Delhi 4e, 2016, ISBN(13): 9789339221126



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|----------------------------------|
| Course Code | : DE2503 |
| Course Title | : Machine Tool Technology |
| Pre-requisite Course Code and Title | : |
| Credit (L + T + P/2) | : 3 |
| Maximum Marks:-70 | : Minimum Marks:-28 |

Unit-1

Metal cutting

Cutting Tools – classification of cutting tools-single point cutting tool , geometry cutting tool materials, tool wear , tool life , and cutting fluids- function and properties.

Geometry of Single Point Cutting Tool - Tool angle, Tool geometry and influence of tool angles, tool signature, Tool angle specification system, ASA,ORS and inter-relationship.

Mechanics of Metal Cutting - Theories of metal cutting, Chip formation, types of chips, BUE formation condition and its effect upon surface finish, chip breakers, Orthogonal and Oblique cutting, stress and strain in the chip, power and energy requirement in metal cutting.

Unit – 2

Mechanics of machining

Cutting forces and tool life - Forces acting on the cutting tool and their measurement, Merchant's circle diagram, dynamometer, force and velocity relationship, Tool wear, Factors causing wear, tool life , tool life equation, variables affecting tool life, Cutting parameters - speed, feed, depth of cut and machining time, economical cutting speed.

Machinability - Concept and evaluation of Machinability, Mechanism of Tool failure, Machinability index, factors affecting machinability.

Unit-3

Shaper, Planner and Drilling machine

Shaper: Principle of operation, classification, specification, Basic parts and their functions and Applications, safety precautions.

Planer: Principle of operation, Classification, Basic parts and their functions, Specifications and Applications, safety precautions.



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Drilling, Reaming & Boring: Drilling: Principle of operation, Classification, Basic parts and functions, drill nomenclature, other operations like counter boring, counter sinking, spot facing etc. **Reaming:** Principle of operation, description of reamers, and types of reaming operations, safety precautions, **Boring:** Principle of operation, Classification of boring machines, Basic parts and functions, boring operations, boring tools and applications, safety precautions.

Unit-4

Milling and Broaching operations

Milling: Principle of operation, Classification of milling machines, Basic parts and their functions, Specifications Milling cutters – Different types of cutters used in milling, face milling cutter, end milling cutter, Staggered tooth milling cutter, side and face milling cutter, form milling cutters, metal slitting saw Milling operations – Plain milling, face milling, side milling, end milling, straddle milling, gang milling, slotting, slitting, Up milling and down milling, safety precautions.

Dividing head – types, function of dividing head, method of indexing, index plates. Broaching: Principle of operation, types of broaches- horizontal, vertical, pull, surface-internal and external broaching machines, Basic parts and their function, nomenclature of broach.

Unit-5

Grinding and Finishing Processes

Grinder and types of grinding wheel, 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 Truing. Designation of grinding wheel Principles of working of grinding machines and functions of main parts, types of grinding processes, function of tool and work holding devices, Table drive in surface and cylindrical grinders, Types of lubricants and coolants used in Grinding, Grinding defects , their remedy and safety practices Finishing Processes Definition of micro finishing, honing, lapping, super finishing, polishing and buffing operations, equipment involved, materials used, Tolerances obtained and limitations and applications



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Book:

1. Machine tool engineering G.R. Nagpal Khanna Publishers ISBN 13: 8174090460
8174090460
2. Production Engineering P. C. Sharma S.chand, New Delhi ISBN 10: 8121901111
3. Manufacturing technology vol.II P.N. Rao Mcgraw hill Pub. ISBN-10: 1259029565
4. Manufacturing process O.P. Khanna Dhanpat Rai Publication ISBN: 9788189928
5. Production Technology R.K Jain Khanna Publishers ISBN-10: 9788185099



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|---|
| Course Code | : DE2504 |
| Course Title | : Refrigeration and Air Conditioning |
| Pre-requisite Course Code and Title | : 3 |
| Credit (L + T + P/2) | : |
| Maximum Marks:-70 | : Minimum Marks:-28 |

Unit-1

Refrigeration and Refrigeration Cycles

Introduction to Refrigeration, different terminology of RAC machineries.

Conventional Methods of Refrigeration-Ice refrigeration, Dry ice, Steam jet, Gas throttling, Liquid Gas, Air refrigeration, Vapour absorption, Vapour compression

Non conventional methods of refrigeration -Thermo electric, magnetic, Pulse tube, Vortex tube.

Concept of heat pump Refrigerating effect, Units of refrigeration,

COP, Reversed Carnot cycle and its representation on PV and TS diagram.

Air Refrigeration Cycles: Bell Coleman cycle - representation on PV and TS diagram, determination of COP, Application of the air refrigeration cycle such as Aircraft refrigeration.

Simple numerical

Vapour Compression Cycle: Schematic diagram, representation on PV, TS and PH diagrams and its working. Actual VCC, calculation of COP, Effect of Wet /Dry –compression, superheating and Sub cooling, (simple numerical) , Multistage vapour compression cycle- need and advantages, cascade refrigeration and its application.

Unit-2

Vapour compression and Vapour absorption refrigeration systems

Construction and working of various components- Open type, hermetically sealed, Centrifugal, Screw type compressors.

Evaporators- their functions and types such as extended surface, Plate coil type, Flooded, Dry

Direct and Indirect expansion types Capacity of evaporator. Frosting /defrosting of evaporators

Condensers – types of condensers such as Evaporative type, Air cooled [forced and natural convection) Water cooled Construction and working of various types of expansion devices such

as – capillary tube auto expansion and thermostatic expansion valves and Low side High side



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valves

Vapour Absorption System – Schematic diagram, principle, components and working of Ammonia vapour absorption system, Lithium Bromide absorption system, Electrolux Refrigerators, Comparison with vapor compression system

Unit-3

Refrigerants

Refrigerants, Description, Function, Composition and its application, Thermodynamic properties and characteristics of ideal refrigerants. Types of refrigerants as primary / secondary, Properties of the Commonly used refrigerants such as – CO₂, Ammonia, SO₂, Freon 11, Freon 12, Freon 22, Azeotropes, Azeotropic. Secondary Refrigerants, Properties of brines and glycols. Application of various brines, Inhibitor and other secondary refrigerants Environmental impact of different refrigerants. Nomenclature of refrigerant, Selection of refrigerants. Next generation refrigerant, Alternatives of cfcs. Types of cylinder, colorcoding,

Unit-4

Psychrometric

Difference between refrigeration and air- conditioning, Necessity of airconditioning, Properties of air - DBT, WBT, Dew Point Temperature, Relative humidity, Sensible heat, Latent heat, Air as mixture of different gases and water vapour, Daltons law of partial pressure, Concept of humidity of air, absolute humidity, relative Humidity, Psychrometers and their types, Enthalpy of air, Specific Volume of air, Dew Point Temperature of moist air. Psychrometric charts, psychrometric processes such as sensible heating and cooling, latent heating and cooling, heating and humidification, cooling and dehumidification, evaporative cooling, sensible heat factor, By-pass factor, apparatus dew point, simple numerical problems.

Unit-5

Air Conditioning and Cooling Load Calculation

Air conditioning systems: Classification – Industrial, Comfort air conditioning, Summer, winter and year round air conditioning, Construction and working of window type, package type and central plant systems.

Air Distribution systems: Element of air distribution system such as types of fans, ducts.



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Duct system: *graduated trunk , loop perimeter, extended platinum , over head trunk , over radial duct system.*

Cooling load calculations: Sources of heat gain – External and internal source, solar radiation through windows, heat addition by occupants and equipments, infiltration of air – ventilation, Sensible heat load, Latent heat load, Total cooling load.

Book:

1. Refrigeration and Air Conditioning S.K. Kataria, Delhi 2013
2. Refrigeration and air conditioning (Prashitan avam Vatanukulan) Patel S.S.L. Standard Publishes- Distributors-Delhi 1st edition 2010
3. Refrigeration and Air Conditioning Arora, McGraw Hill Education; 3 edition ,1 July 2017
4. Refrigeration and Air Conditioning Khurmi R.S, gupta J.K S. Chand 1 December 2006
5. Principles of Air Conditioning. Lang Paull .V CBS publishers 3 edition 1 December 2003



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| | |
|--|----------------------------------|
| Course Code | : DE2505 |
| Course Title | : Fluid Power Engineering |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 3 |
| Maximum Marks:-70 | : Minimum Marks:-28 |

Unit 1

Introduction to Fluid Power Systems

Power transmission modes and their comparison, Concept of Fluid Power, Transmission of forces in fluid – Pascal's law, multiplication of forces, Factors affecting the fluid flow – gravity, atmospheric pressure, applied forces, inertia & friction, Application and advantages of fluid power.

Basic components of a fluid power system – Reservoir or Receiver, Pump or compressor, Piping, tubing or hose, Directional control valve and Actuating device. ISO Symbols used in Hydraulic & Pneumatic system. Oil, Hydraulic & Pneumatic systems: General layout, symbols used, Applications, Merits, Limitations. Hydraulic Fluids-Functions and properties, Types, ISO and SAE grades of oils, Selection of hydraulic fluids.

Unit 2

Elements of Hydraulic Systems

Pumps: Classification of pumps, Comparison of positive (Hydrodynamic) & non-positive displacement (Hydrostatic) pumps, Construction and working of Gear, vane, Screw, piston pumps(axial and radial), Performance characteristics and Selection of pumps Actuators:

Classification of actuators, Construction and working of hydraulic actuators, Linear and rotary actuators (Motors) used for hydraulic applications. Control Valves for hydraulic system:

Classification- Direction control valves- Check valve, 2/2, 3/2, 4/2, 4/3, 5/2, 5/3,

D.C. Valves used in Hydraulics, Standard centre positions, Methods of actuation, Pressure control valves- relief, unloading, sequence, counterbalance, pressure reducing valves

Flow control valves- Non compensated, Pressure and temperature compensated

Seals, Filters, Pipes, Hoses, Reservoirs, Accumulators and Pressure intensifiers.



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Unit 3

Oil Hydraulic Circuits

Control of single and Double acting Hydraulic cylinders.

Speed control double acting cylinder - Meter-in, Meter-out, Bleed Off circuit.

Unloading circuits, Regenerative circuits, Counterbalance valve & circuit, speed control of bidirectional hydraulic motor, braking and replenishing of hydraulic motor, synchronizing circuits, Sequencing Circuits. Applications, ISO Symbols used in hydraulic circuits.

Hydraulic circuits for Milling machine and Shaper machine. Common troubles in hydraulic systems, their causes and remedies

Unit 4

Elements of Pneumatic Systems

Air Compressors – Recall Types, construction & working of Reciprocating & Rotary compressors, Selection of compressor. Air treatment-Air receiver, Moisture separator and Air dryer, FRL unit, Pressure regulator Pneumatic actuators: Pneumatic Cylinders - Single & double acting cylinders, Air Motors – Vane, Georotor, Turbine and Piston motor. Electrical actuators for pneumatic systems, comparison between Air, Hydraulic and Electric actuators.

Accessories: Pipes, hoses, fittings, Seals and gaskets, Accumulators, heat exchanger, muffler.

Unit 5

Pneumatic Circuits

Sequencing circuits. Time delay operation

Pneumatic sensors. Common troubles in pneumatic systems, their causes and remedies.

Books :

- 1.Introduction to Hydraulics and Pneumatics Ilango Sivaraman PHI ISBN-13: 978-8120344068
- 2.Hydraulics and Pneumatics T Jagdeesha I K Publishing Company ISBN 13 9789384588908
- 3.Hydraulics and Pneumatics S Sameer, K Ilyias R K Publications ISBN 13: 978-9352689057
- 4.Hydraulics and Pneumatics Andrew Parr Jaico Publishing House ISBN 13: 978-8172241896
- 5.Hydraulics and Pneumatic Controls Sundaram Shanmuga S Chand ISBN 13:978-9789384588908



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| | |
|--|-------------------------------------|
| Course Code | : DE2506 |
| Course Title | : Automobile Engineering Lab |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 1 |
| Maximum Marks:- 35 | : Minimum Marks:- 14 |

Short Laboratory Experiment Titles

1. Identify vehicle layout and its chassis.
2. Dismantle internal combustion engines of the given vehicle.
3. Assemble Internal combustion engines of the given vehicle
 - a. Dismantle the Carburetor of the given vehicle.
 - b. Assemble the Carburetor of the given vehicle.
4. Identify the location of engine in the given vehicle.
5. Identify different constructional features of given petrol engine.
6. Identify different constructional features of given diesel engine.
7. Dismantle & assemble the Carburetor.
8. Dismantle and assemble the given fuel supply system.
9. Identify the different parts of fuel injection system
10. Dismantle and assemble of the given brake assembly
11. Dismantle and assemble the given clutch assembly
12. Dismantle, inspect and reassemble the Differential Assembly
13. Dismantle and assemble the given suspension system



BHARTI VISHWAVIDYALAYA, DURG

| | |
|--|--------------------------------------|
| Course Code | : DE2507 |
| Course Title | : Machine Tool Technology Lab |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 1 |
| Maximum Marks:- 35 | : Minimum Marks:-14 |

Short Laboratory Experiment Titles

1. Select appropriate cutting tool for a given machining situation and fix it properly in the tool post accurately
2. Interpret the given tool signature and observe the change in angles values if the tool is not fitted accurately in the tool post
3. Perform plain turning operations on Steel, Brass and Aluminum workpieces and observe the formation of type of chip
4. Practice orthogonal and oblique cutting.
5. Machine a flat surface using Shaper.
6. Prepare a square and v – groove using shaper.
7. Prepare a dove-tail guideway using Shaper.
8. Perform slot cutting operation using slotter.
9. To perform boring operation on lathe machine.
10. Perform an external and internal grinding on a given job.



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| | |
|--|---|
| Course Code | : DE2508 |
| Course Title | : Refrigeration and Air Conditioning Lab |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 1 |
| Maximum Marks:-35 | : Minimum Marks:-14 |

Short Laboratory Experiment Titles

1. Determine performance parameters on vapour compression refrigeration cycle test rig.
2. Perform performance test on heat pump.
3. Determine performance parameters on vapour absorption test rig.
4. Determine the performance parameters using a domestic refrigerator test rig.
5. Determine the performance of various expansion devices on a refrigeration test rig.
6. Identify the components of given condenser and evaporator.
7. Use leak detection method to detect the refrigerant leakage in a given setup.
8. Identify refrigerant cylinders by color coding & standing pressure
9. Charge refrigerant in a given system.
10. Determine the COP and refrigeration capacity of refrigerator using Freon-12, Freon-22,



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| | |
|--|--------------------------------------|
| Course Code | : DE2509 |
| Course Title | : Fluid Power Engineering Lab |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 1 |
| Maximum Marks:- 35 | : Minimum Marks:-14 |

Short Laboratory Experiment Titles

1. Create hydraulic circuit to actuate single acting cylinder.
2. Draw the symbols used in hydraulic and pneumatic circuit.
3. Create hydraulic circuit to actuate double acting cylinder.
4. Create hydraulic circuit to control the speed of hydraulic motor
5. Create meter-in and meter-out circuits.
6. Create a sequential hydraulic circuit.
7. Trouble shoots of the given Hydraulic circuits
8. Create pneumatic circuit to actuate single acting cylinder.
9. Create pneumatic circuit to actuate double acting cylinder.
10. Create a sequential pneumatic circuit.
11. Create pneumatic circuit to control the speed of motor.



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| | |
|--|----------------------------------|
| Course Code | : DE2510 |
| Course Title | : Industrial Training Lab |
| Pre-requisite Course Code and Title : | |
| Credit (L + T + P/2) | : 1 |
| Maximum Marks:- 35 | : Minimum Marks:-14 |

Planning for Industrial Training:

Following points need to be planned and briefed by the teachers to the students before proceeding for industrial training. Student should take into consideration these points and carry the relevant format/data/log book with them.

- Objectives /Purposes of the industrial training
- Outcomes targeted before proceeding to industrial training.

Identification and planning for demonstration of any equipment or experiments, concepts, under the content beyond syllabus.

- Preparation of database of nearby relevant industries.
- Good rapport need to be developed and maintained with the industries by the teachers, so that the students are ultimately benefitted by the industrial training.
- Industrial policy of the state also need to be taken care of while planning of industrial training
- For assessing the students on various dimensions of industrial training, assessment rubric may be prepared by the implementing teachers in advance.

Following formats need to be developed by the teachers and briefed to the students before proceeding to industrial training

- Formats of observations on layout, ambience, and work culture to be developed, and briefed to the students.
- Formats of outcome attainment, related to observation on relevant technical area also need to be developed by the teachers and briefed to the students.
- Formats and contents of report writing and presentation.
- Formats and contents on assessment of industrial training



**Scheme of Teaching and Examination
Diploma in Mechanical Engineering**

Semester-VI

| S. No. | Course Code | Course Titles | Scheme of Studies (Hours/Week) | | | |
|-----------------------------|-------------|---|-----------------------------------|---|----|-------------------------|
| | | | L | P | T | Credit (C) L+T+(P)/2 |
| 1 | DE02601 | Power Plant Engineering | 2 | - | 1 | 3 |
| 2 | DE02602 | Computer Aided Modeling and Manufacturing | 1 | - | 1 | 2 |
| 3 | DE02603 | Entrepreneurship Development and Management | 2 | - | 1 | 3 |
| 4 | DE02604 | Industrial Maintenance and Safety | 2 | - | 1 | 3 |
| Elective (Any One) | | | | | | |
| 5 | DE02605(1) | Advance Manufacturing Processes | 2 | | 1 | 3 |
| | DE02606(2) | Wind and Solar Energy Appliances | | | | |
| 6 | DE02607 | Computer Aided Modeling and Manufacturing (Lab) | - | 4 | - | 2 |
| Elective (Any One) | | | | | | |
| 7 | DE02608 | Advance Manufacturing Processes (Lab) | - | 2 | - | 1 |
| | DE02609 | Wind and Solar Energy Appliances (Lab) | | | | |
| 8 | DE02610 | Major Project | - | 2 | - | - |
| Total | | | 09 | 8 | 05 | 17 |

L - Lecture

P – Practical

T - Tutorial



**Scheme of Teaching and Examination
Diploma in Mechanical Engineering**

Semester- VI

| S. No. | Course Code | Course Titles | Scheme of Examination | | | | | |
|-----------------------------|-------------|---|-----------------------|-----------|------------|------------|-----------|-------------|
| | | | Theory | | | Practical | | Total Marks |
| | | | ESE | CT | TA | ESE | TA | |
| 1 | DE02601 | Power Plant Engineering | 70 | 10 | 20 | - | - | 100 |
| 2 | DE02602 | Computer Aided Modeling and Manufacturing | 70 | 10 | 20 | - | - | 100 |
| 3 | DE02603 | Entrepreneurship Development and Management | 70 | 10 | 20 | - | - | 100 |
| 4 | DE02604 | Industrial Maintenance and Safety | 70 | 10 | 20 | - | - | 100 |
| Elective (Any One) | | | | | | | | |
| 5 | DE02605(1) | Advance Manufacturing Processes | 70 | 10 | 20 | - | - | 100 |
| | DE02606(2) | Wind and Solar Energy Appliances | | | | | | |
| 6 | DE02307 | Computer Aided Modeling and Manufacturing (Lab) | - | - | - | 35 | 15 | 50 |
| Elective (Any One) | | | | | | | | |
| 7 | DE02608 | Advance Manufacturing Processes (Lab) | - | - | - | 35 | 15 | 50 |
| | DE02609 | Wind and Solar Energy Appliances (Lab) | | | | | | |
| 8 | DE02610 | Major Project | | | | 70 | 30 | 100 |
| Total | | | 350 | 50 | 100 | 140 | 60 | 700 |

ESE: End of Semester Exam, CT: Class Test, TA: Teachers Assessment



| | |
|---|--------------------------------|
| Course Code: | DE02601 |
| Course Title : | Power Plant Engineering |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 3 |
| Maximum Marks :- 70 | Minimum Marks :- 28 |

Unit -1

Steam Power Plant

General layout of modern thermal power plant, Site selection, Presents status of power generation in India, Elements of power plant, function of each element, steam condition and dryness fraction.

Rankine cycle

Representation on PV,TS, HS plane, efficiency of Rankine cycle, Revision & improvement of thermal efficiency of Rankine cycle by lowering exhaust pressure, increasing boiler pressure and superheating of steam. Numerical problems.

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 planes, advantages of regenerative cycle.

Power station- Types of power station such as central power station, industrial power station, captive power station, advantages, and classification of power station on the basis of prime-movers.

Unit -2

Elements of power plant

Steam Generators: Classification according to working pressure. **(a)** Low pressure boilers- Cochran, Lancashire and locomotive boilers **(b)** High pressure boilers in modern steam power plants such as Velox, Benson, La-mont, Leoffler, supercritical boilers.

(a) Boiler mountings- Safety valves, water level indicator, pressure gauge, blow off cock



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(b) Accessories – super heater, economizer, pre heater and draft equipment. Superheat control methods, Pulverized fuel and necessity, storing systems etc.

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.

Condensing Unit - Functions of Steam condenser and its type's jet and surface, Limitations and advantages of steam condenser, Elements of condensing unit, cooling towers.

Unit – 3

Gas & Diesel Power Plants

Brayton cycle, classification of 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, Essential auxiliaries and controls of a gas turbine power plants, Fuels for gas turbines.

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, solid injection system – common rail system, individual pump system, distribution system, data recording.

Unit -4

Nuclear Power Station

Evolution of nuclear energy from atoms by fission and fusion. Chain reactions, fission materials, types of reactors, gas cooled, boiling water liquid, metal cooled and fast reactor, Arrangements of various elements in a nuclear power station, steam cycles and boilers coolant heat exchangers, Reactor control, Reactor shielding and



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safety methods. Setting of Nuclear plants: Site evaluation Stages, Site Rejection Criteria, Earthquake, Geological criteria, Meteorological considerations, Flooding, Tsunami, Shoreline erosion, chemical explosion, Radiological impact study, Radioactivity pathways to humans, environmental Impact study. Hazards in nuclear power station – units of radiations, safe and dangerous doses of radiations, safety precautions in nuclear power station, Nuclear power plants in India.

Unit -5

Hydro Electric Power Plants

Potential power with reference to rainfall and catchments area, Water storage, element of hydro electric power stations. Characteristics of hydraulic turbines, Comparison of the factors governing the cost of hydro, steam and diesel power stations. Selection of prime mover, speed and pressure regulation, methods of governing, starting and stopping of water turbines, operation of hydro turbines. Maintenance of hydropower plants.

Power plant economics-

Concept of occurrence of fluctuating loads, Load curve and its significance, Definition and terminology of connected load, maximum demand, demand factor, average load, load factor, diversity factor, plant capacity factor, plant use factor, effect of variable load and remedies.

Books :-

1. Power Plant Engineering, Nag P.K., Mcgraw hill, 1259082849, 9781259082849
2. A Textbook of Power Plant Engineering, Rajput R. K., Laxami publication, 9788131802557
3. Power Plant Engineering, Domkundwar, Arora, Dhanpat Rai & Co. , 670000000406
4. A Textbook of Power Plant Engineering, Sharma. P.C., Katson publ. , 978-93-5014-384-1



BHARTI VISHWAVIDYALAYA, DURG

| | |
|---|--|
| Course Code: | DE02602 |
| Course Title : | Computer Aided Modeling & Manufacturing |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 2 |
| Maximum Marks :- 70 | Minimum Marks :- 28 |

Unit -1

Introduction of CAD/CAM

CAD definition, concept and need. CAD process and Functional areas CAD. CAD Workstation- types, functions and configuration. *List of various CAD Software, Components of Auto CAD window such as Tool bar, standard toolbar, menu bar,*

Unit -2

Computer aided Solid Modeling and Assembly

Working in 3D environment - Creating 3D Solid Models of simple and complex machine parts using Extrude, Revolve, Sweep, variable section sweep, Draft, loft, Blend or similar 3D commands. Part Editing tool: Trim, Extend, Erase, Mirror, Chamfer, Round, Copy, Move, Draft, Boolean operations, patterns, etc. Parametric and non parametric modeling- concept, differences and illustration. Preparation of assemblies using assembly commands. Introduction to Top down and Bottom up approach of assembly Exploded view: Explode the assembly.

Unit -3

Computer aided Drafting and Plotting

Generate orthographic projections. All types of views – front view, top view, side view, sectional views, isometric views, auxiliary views. Dimensioning Commands – Apply dimensions, dimensional and geometrical tolerances. Preparation of Assembly drawing using assembly features. Exploded view – Explode the assembly. Working in Drafting Mode. Bill of material – Prepare part list table and name plate. Page set up, Plot command.



Unit – 4

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 -5

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. ,Adaptive control machining systems.

Books:-

1. CNC Machines, Pabla B.S., Adithan M., New Age International, New Delhi.
2. Computer Numerical Control-Turning and Machining centres, Quesada Robert, Prentice Hall India, New Delhi
3. CAD/CAM, Sareen Kuldeep , S. Chand, New Delhi
4. Introduction to NC/CNC Machines, Vishal S., S.K. Kataria and Sons, New Delhi
5. Computer Aided Manufacturing, Rao P N, Tiwari N K, Kundra T, Tata McGraw Hill, New Delhi.
6. CAD/CAM: computeraided design and manufacturing, Groover Mikell P, Zimmered W Emory, Prentice Hall, New Delhi
7. CNC Machine, Pabla B.S., Adithan M, New Age International, New Delhi



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|---|--|
| Course Code: | DE02603 |
| Course Title : | Entrepreneurship Development and Management |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 3 |
| Maximum Marks :- 70 | Minimum Marks :- 28 |

Unit – 1

Characteristics of Entrepreneurs

Concept of entrepreneur and intrapreneur Benefits of becoming an intrapreneur/entrepreneur. Scope of entrepreneurship in local and global market. Planning for establishment of an enterprise. Traits of successful intrapreneur/entrepreneur and passion, initiative, independent decision making, team work, assertiveness, persuasion, persistence, information seeking, commitment to work contract etc. SW analysis. Team work simulation. Trait of successful entrepreneur: calculated risk taking. Risk taking simulation exercise. Business opportunity Guidance.

Unit – 2

Motivation Management

Motives, motivation and motivational cycle. Concept of Need for Achievement. Need for Achievement assessment through various tools. Ring toss game, Boat making exercise, Building block exercise, TAT stories, Who am I? Interpretation and action plan for self- development.

Unit – 3

Management of Creativity.

Creativity: Divergent thinking, creativity techniques. Innovation, types and applications Product life cycle, New product development process. Product development and innovation through creativity and innovation.



Unit – 4

Critical Resources

Forms of business organization: Proprietorship, Partnership, Cooperative, Private, Public Ltd Company, Section 8 company, LLP Institutional Support for entrepreneurship:MSMESI, CED, DTIC, CITCON, CSIDC, LUN, NSIC,KVIC, NABARD, Banks, SIDBI Entrepreneurship promotion schemes of centre and state. Marketing Mix, Market survey for project identification Inventory control, vendor development, material movement, store management. Manpower plan, hiring process, compensation, performance appraisal.

Unit – 5

Sustainable businessplan

Format of business plan/techno-economic feasibility report. Demand and annual production target based on market survey. Outline production/service process. Land, building and machinery requirement. Power,utilities and raw material requirement. Fixed capital, Working capital, Subsidy and Cost of Project. Means of finance, calculation of interest. Profitability analysis, Break-even point.

Books–

- 1. Entrepreneurial Development Desai Vasant Himalaya PublishingHouse*
- 2.Entrepreneur Harper Stephen C. Mc Craw-Hill*
- 3.Entrepreneurship Development in India Gupta Dr.C.B. Shrinivasa NP SultanChand & Sons*
- 4.Entrepreneurship Development Khanka Dr.S.S. S.Chand New Delhi*
- 5.Entrepreneurship Development and small Business Enterprises Charantimath M.Pearson Edu.Soc.INDIA*
- 6.Entrepreneurship Development Sharma Sangita PHI, DELHI*



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|---|--|
| Course Code: | DE02604 |
| Course Title : | Industrial Maintenance and Safety |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 3 |
| Maximum Marks :- 70 | Minimum Marks :- 28 |

Unit – 1

Fundamentals of industrial maintenance

Definition and aim of maintenance engineering. Primary and secondary functions and responsibility of maintenance department. Types of maintenance – Preventive, Periodic, Predictive, Condition based monitoring Types and applications of tools and equipments used for maintenance. Maintenance cost & its relation with replacement economy. Service life of equipment.

Unit -2

Preventive and Periodic Maintenance

Periodic maintenance –concept and need. Degreasing, cleaning and repairing.

Preventive maintenance - concept, need, steps and advantages. Maintenance and replacement schedules, Standard data for maintenance and replacement of parts Steps/procedure for periodic and preventive maintenance of: i machine tools ii. Pumps. iii. Air compressors. iv. Diesel generating (DG) sets. Repair cycle-concept and importance.

Unit -3

Wear and Corrosion

Basic fundamentals of friction and Wear Wear Mechanism. Wear- types, causes and their effects. Wear reduction methods Function, types and applications of Lubricants General sketch, working and applications of Lubrication methods –

- Screw down grease cup.
- Pressure grease gun.
- Splash lubrication.
- Gravity lubrication.
- Wick feed lubrication.



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- Side feed lubrication.
- Ring lubrication

Definition, principle and factors affecting the corrosion. Types of corrosion. Corrosion prevention methods.

Unit -4

Fault tracing

Fault tracing-concept and importance. Decision tree-concept, need and applications. Sequence of fault finding activities, show as decision tree. Draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment like:

- Pump
- Air compressor. Internal Combustion engine.
- Boiler.
- Electrical motors.

Types of faults in machine tools and their general causes.

Unit – 5

Maintenance Cost & Maintainability

Definition, classification of maintenance cost, Procedures for obtaining cost data

Maintenance cost control, productivity index and factors affecting the maintenance productivity index, use of control indices. Definition, factors in maintainability, maintenance index.

Industrial Safety and Safety Acts

Need, Aim, Objective and Four E's of Industrial Safety. Mechanical and electrical hazards-types, causes and preventive steps /procedure Personal protective equipments, Survey the plant for locations and hazards Education and training in safety, Prevention causes and cost of accident, Industrial psychology in accident prevention and Safety trials Accident -causes, types, results and control, Accident reporting and Investigations. Features of Factory Act, Introduction of Explosive Act, Boiler Act and ESI Act, Workman's compensation Act Industrial hygiene and Occupational safety, Diseases prevention,



Books :-

1. Industrial Maintenance Management, Srivastava, S.K., S. Chand and Co. ISBN-10: 8121916631 ISBN-13: 978- 8121916639, Third edition 2002
2. Installation, Servicing and Maintenance, Bhattacharya, S.N., S. Chand and Co. ISBN-10: 8121908310 ISBN-13: 978- 8121908313 2013
3. Occupational Safety Management and Engineering Willie Hammer Prentice Hall ISBN-10: 0136293794 ISBN-13: 978-0136293798 4th Edition 1988
4. Maintenance Planning White, E.N. Ashgate Publishing Limited ISBN-10: 0566021447 ISBN-13: 978- 0566021442 Revised edition 1979
5. Industrial Maintenance Michael E. Brumbach, J Jeffrey A. Clade Cengage Learning ISBN- 10: 1133131190, ISBN-13: 978- 1133131199 2nd Edition 2013
6. Industrial Maintenance: Techniques, Stories, and Cases José Baptista CRC press ISBN-10: 0367341158 ISBN-13: 978- 0367341152 1st Edition September 2019
7. Maintenance Engineering Handbook Higgins, L.R. Springer ISBN-10: 1848824718, ISBN-13: 978-1848824713 August 2009
8. Machinery Condition Monitoring: Principles and Practices Amiya Ranjan , Mohanty CRC Press ISBN-10: 1466593040 ISBN-13: 978- 1466593046, 1st Edition December 2014
9. Industrial Safety and Health, Management Ray Asfahl, C., David W. Rieske Pearson ISBN-10: 0134630564 ISBN-13: 978- 0134630564 7th edition January 2018
10. A Textbook of Reliability and Maintenance Engineering Alakesh Manna Dreamtech Press ISBN- 10: 9389698707 ISBN-13: 978- 9389698701 February 2020
11. Maintenance Engineering Handbook Higgins & Morrow McGraw Hill ISBN-10: 0070287554 ISBN-13: 978- 0070287556 3rd Revised edition April 1977
12. Audels Pumps Hydraulics Air Compressors; A Practical Guide Audels. Theo Audel & Co ASIN: B0024CQIG January 1949 13, Foundation Engineering Handbook Winterkorn and Fang Galgotia Booksource (2010) ISBN-10: 8193296060 ISBN-13: 978- 8193296066 January 2010



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|---|---|
| Course Code: | DE02605(1) |
| Course Title : | Advanced Manufacturing Processes |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 3 |
| Maximum Marks :- 70 | Minimum Marks :- 28 |

Unit -1

Non-Conventional Machining Processes

Intoduction and Need of advance manufacturing, manufacturing trends and challenges, manufacturing aspects. Types of non conventional machining processes and energy source utilized.

Working principle, setup, Process parameter Advantages, limitation and application and safe practices of- Electrical discharge machining (EDM), Wire Electrical discharge machining (WEDM), Electrochemical Machining (ECM), Plasma arc machining (PAM), Abrasive jet machining (AJM), Ultrasonic Machining (USM), Electron Beam Machining (EBM), Laser beam machining(Cutting).

Unit -2

Advanced Casting Processes

Metal casting basics, Gating and riser design, Working principle, set up, process parameters, Advantages, limitations and applications of Evaporative pattern casing process (EPC), Centrifugal and pressure die casting, Slush casting, Hybrid EPC process, Vacuum EPC, Shell Molding Process.

Unit – 3

Advanced Welding and Forming Processes

Working principle, setup, Process parameter Advantages, limitation and application- Orbital TIG welding, Electron beam welding (EBW), Laser beam welding (LBW), ultrasonic welding. Industrial adhesive and Adhesive bonding Advanced Metal forming- High energy rate forming, Electro-magnetic forming, explosive forming, Electro- hydraulic forming, Stretch forming, Contour roll forming.



Unit – 4

Gear Manufacturing

Types of gear and Gear manufacturing methods.

Gear Hobbing- Types and working principle of gear hobbing, Advantages, limitations and application. Gear Shaping-Gear Shaping by pinion cutter, Gear Shaping by rack cutter, Advantages, limitation and application of both the methods and comparison of gear hobbing and gear shaping. Gear Finishing methods- Need of gear finishing and different methods of gear finishing like:

- a) Gear shaving
- b) Gear grinding
- c) Gear burnishing
- d) Gear lapping
- e) Gear honing
- f) Gear tooth rounding

Unit -5

Recent trends in CAM

Additive manufacturing: 3D printing, Rapid prototyping. Construction and working of 3D printer. Type and properties of material for 3D printer and Rapid prototyping machine. File format: STL (Stereo Lithography). 3D printer software: part import, orientation, processing and printing. Computer Integrated Manufacturing (CIM): concept, definition, areas covered and benefits. Automation-Define, need of automation, high and low cost automation, examples of automations.

Types of Automation - Fixed (Hard) automation, programmable automations and Flexible automations (Soft). Group Technology- concept, basis for developing part families, part classification and coding with example, concept of cellular manufacturing. Advantages and limitations- Robot :-definition, terminology, classification and types Components of Robot: manipulator, end effectors, actuators, sensors, controller, processor, software and applications.



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Books:-

1. Manufacturing Technology, R. K. Rajput , CBS,2 edition, , 2006, ISBN-10: 8123908946 ISBN- 13: (2010), ISBN: 9788123908946
2. Manufacturing Process, O. P. Khanna , Dhanpat Rai Publishing Company Private Limited, New Delhi, (2013), ISBN:9383182040
3. Introduction to Basic Manufacturing Processes and Workshop Technology Rajender Singh New Age International (2006), ISBN: 9788122423167
4. Production Technology P. C. Sharma S. Chand Publishing (1999) ISBN: 9788121901116
5. Elements of Workshop Technology Vol. I, Hajra Choudhury, Media Promoters and Publishers Pvt Ltd. (2008) ISBN: 9788185099149
6. A Course In Workshop Technology (Manufacturing Processes Vol. 1), B. S. Raghuwanshi Dhanpat ai and Co.,New Delhi (2014) ISBN:
7. Manufacturing Technology Vol. I & II, P. N. Rao, McGraw Hill (2016) ISBN: 9781259062575
8. CAD/CAM: Computer- Aided Design and Manufacturing Groover Pearson Education India (2006) ISBN: 9788177584165



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|---|---|
| Course Code: | DE02606(2) |
| Course Title : | Wind and Solar Energy Appliances |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 3 |
| Maximum Marks :- 70 | Minimum Marks :- 28 |

Unit - 1

Wind Energy Systems

Basics of wind energy conversion, site selection, Types of wind energy systems – large and small, commercial & domestic, grid connected & stand-alone. Classification of wind turbines – horizontal axis & vertical axis, types of blades & vanes. Wind turbine performance analysis and curves. Generators used in wind energy systems- types, ratings, installation & maintenance procedure. Tower, rotor, gearbox, power regulation, safety mechanisms. Wind ventilators-types construction, installation & maintenance procedure. Grid connectivity – methods, agencies involved, schemes, commercial terms and conditions, documentation.

Unit – 2

Solar Thermal Systems

Alternative energy sources: primary, secondary and tertiary energy. Classification of solar thermal systems. Solar thermal systems used for low temperature applications – Flat plate collectors with various types of tubes. Domestic-Water heating systems. Commercial-Heating systems used for process heating. Installation- standard procedure, precautions, Plumbing – piping, Valves.

Maintenance - Routine maintenance, procedure for domestic and commercial water heater systems. Failure maintenance – Major causes, remedies. Solar thermal systems used for high temperature applications and for power generation. Concentrators used for steam generation. Power generation systems. Solar dryers – Classification, construction, working and applications commercial, agro-products, domestic. Choice of a system for a given Application- technical and financial criteria used for selection.



Unit – 3

Solar Photovoltaic Systems

Classification of Solar Photovoltaic systems – Grid connected, Off - grid, stand-alone systems. PV cells – types, merits and demerits Photovoltaic system for power generation, solar cell modules and arrays, solar cell types, material, applications, advantages and disadvantages.

Panels – types. Battery and other accessories – types, rating, methods of selection. Solar pumping, solar refrigeration and air conditioning, heliostat, solar furnace ,Recent trends and promotional schemes – Net metering. Installation, commissioning and maintenance of Solar Roof Top systems, Stand-alone Street light.

Unit - 4

Bio-Energy Systems

Classification of bio-fuels- biogas, biodiesel, Systems for production of bio-fuels – bio-gas plants, gasifiers, digestors, bio- diesel plants -Layout, construction and principle of working ,Applications of various bio- fuels- Domestic – heating, cooking, Commercial – process heating, power generation Systems used for utilization of bio-fuels – smokeless Chulhas, burners, heaters & engines. Installation -procedure, precautions operating procedures of a Bio gas plant.

Unit -5

Hybrid Systems and Feasibility Studies

Recent trends – hybrid systems. Types of hybrid system. Power output of hybrid system. Installation-procedure, precautions, operating procedures of Wind- Solar PV hybrid system. Choice of systems – technical and commercial feasibility assessment, costing of renewable energy systems.

Books:-

1. Solar Photovoltaic: A Lab Training Module Solanki, Singh Chetan, Arora, Brij M., VasiJuzer, Patil, Mahesh B, Cambridge University Press, New Delhi, (2009), ISBN: 9789382264590



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2. Solar Photovoltaic: Fundamentals Technologies and Application, Solanki, Singh
Chetan PHI Learning, New Delhi (2009), ISBN: 9788120351110
3. Solar Energy, Sukhatme S.P., Nayak J.K., Tata McGraw, New Delhi (2010), ISBN:
9781259081965
4. Solar Cells and Their Applications raas Lewis M., Partain Larry D. Wiley, UK
(2010), ISBN: 9780470446331
5. Wind Power in Power Systems, Ackermann Thomas, John Wiley & Sons, UK
(2012), ISBN: 9781119942085
6. Solar Energy: Principles of Thermal Collection and Storage, S. Sukhatme, J Nayak
McGraw Hill Education, New Delhi (2008), ISBN: 978- 0070260641
7. Introduction to Bioenergy Nelson Vaughn C., Kenneth L. Starcher CRC
press, UK, (2015) ISBN 9781498716987
8. Non-conventional Sources of Energy (Urja Ke Aparamparagat Sroat) ,S.S.L.
Patel Standard Publishers Distributors, Delhi. ISBN- 978-81-8014-199-7 Year-
2013



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| | |
|---|--|
| Course Code: | DE02607 |
| Course Title : | Computer Aided Modeling and Manufacturing (Lab) |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 2 |
| Maximum Marks :- 35 | Minimum Marks :-14 |

List of Practical:-

1. Launch and exit an CAD software
2. Start, stop and manipulate, CNC lathe and Milling machines
3. Develop solid models of individual components of Bench vice / Drill Jig / Screw Jack / Tool Post using any parametric CAD software.
4. Develop solid model of any complex industrial component using any parametric CAD software.
5. Develop anyone assembly using solid models from LE2.1 and any parametric CAD software.
6. Print orthographic views (regular and sectioned) of the solid models developed LE2.1
7. Print orthographic views (regular and sectioned) of the solid models developed LE2.2
8. Print orthographic views (regular and sectioned) of the assembly developed LE2.3
9. Print production drawing of the solid models developed LE2.1
10. Print production drawing of the assembly developed LE2.3 with Bill of Materials.
11. Operate CNC turning machine and try to change different parameters and controls to see their effect during machining.
12. Prepare CNC part programme using G and M codes with ISO format for Simple turning of part.
13. Prepare part on CNC turning machine using part program developed in LE4.2
14. Prepare CNC part programme using G and M codes with ISO format for turning of complex part.
15. Prepare complex part on CNC turning machine using part program developed in



LE4.4

16. Operate CNC milling machine and try to change different parameters and controls to see their effect during machining.
17. Prepare CNC part programme using G and M codes with ISO format for Simple contour milling of part.
18. Prepare part on CNC milling machine using part program developed in LE5.2
19. Prepare CNC part programme using G and M codes with ISO format for milling a complex part.
20. Prepare complex part on CNC milling machine using part program developed in LE5.4



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|---|--|
| Course Code: | DE02608 |
| Course Title : | Advance Manufacturing Processes (Lab) |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 2 |
| Maximum Marks :- 35 | Minimum Marks :-14 |

List of Practical:-

1. Prepare the machining job using electrical discharge
2. Prepare the job using electrochemical machining.
3. Prepare a job using abrasive jet machining.
4. Prepare a job using Electron beam machining.
5. Design a gating system for given application.
6. Prepare a casting product using shell molding process.
7. Prepare a casting product using high pressure die casting.
8. Prepare a job of a given design using electron beam welding
9. Prepare a job of a given design using laser beam welding.
10. Prepare a job of a given design using Ultrasonic welding.
11. Perform gear shaping operation using pinion cutter.
12. Perform gear shaping operation using Rack cutter.
13. Produce gear using hobbing process.
14. Print a simple and a complex component modeled in LE2.1 and 2.2 of Computer Aided Modeling & Manufacturing course using 3D printer
15. Prepare a simple program for manipulation of standard components using Robotic arm



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| Course Code: | DE02609 |
| Course Title : | Wind and Solar Energy Appliances (Lab) |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 2 |
| Maximum Marks :- 35 | Minimum Marks :-14 |

List of Practical:-

1. Use vane anemometer for measurement of different locations for site selection for wind mill.
2. Identify various components of wind turbines horizontal axis.
3. Identify various components of wind turbines vertical
4. Calculate wind turbine power using suitable software.
5. Measure the output power of the turbine, rotation speed of the turbine, wind speed, system voltage and system current.
6. Identify the components of Solar cooker.
7. Use of pyranometer for measurement of solar radiation flux density.
8. Assemble and dismantle solar drier.
9. Assemble and dismantle solar flat plate collector.
10. Assemble a solar PV cell, module, array system with and without battery connection
11. Measure heat output, Maximum power, power output efficiency of solar PV panel.
12. Identify various components in bio-energy systems such as bio-gas plants, gasifiers, digestors, bio- diesel plants.
13. Maintenance of various components of Bio-Gas system like smokeless chulhas, burners, heaters and engines.
14. Assemble a wind-solar PV hybrid system.
15. Measure heat output and power output of a wind-solar PV hybrid system.



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|---|---------------------------|
| Course Code: | DE02610 |
| Course Title : | Major Project |
| Pre-requisite Course Code and Title: | |
| Credit (L + T + P/2) | 2 |
| Maximum Marks :- 100 | Minimum Marks :-60 |

Identification of project and allocation methodology: Though the teachers and students, both are involved in identification of project titles, but the prime responsibility of identification of project titles goes to the teachers involved in implementing the course or programme. Teachers are fully aware of course/programme curriculum. They are also aware of related industrial problems. They try to explore the possibility of identification of project titles through these problems.

These small industrial problems in the form of project titles may be brought into the laboratories or workshop of institutions of a specific programme, which are equipped with all necessary facilities and resources to carry out the project work. These labs or workshop can function as miniature industry to solve the industrial problems in the form of simulated industrial projects. These projects may be integrated problem of courses or programme. The project identified may be application type, product type, Research type and review type.

Criteria for Identification and Implementation of Project Titles: Identification of project title is planned to be done based on many considerations like: Cost effectiveness, Safety considerations. Ethical issues, Environmental considerations, improvised process, Improvised equipment, simulated industry's problem, Application or utility in the world of work.

Implementation and Evaluation of Project Work: Once the identification of project titles and guide allocation process is over, quality of student's project, on different criteria including the report writing need to be continually monitored. Projects planning, design, execution and report writing is done by the students under the guidance and feedback by respective teachers for attainment of courses. Continual Monitoring, feedback and assessment mechanism on weekly progress/updates



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on action taken on different criteria and sub-criteria of the project work need to be planned for individual and team of students. Path breaking teachers who think out of the box are required to guide, monitor and evaluate the project work.

For objective, valid and reliable assessment, teachers should use different tools of assessment such as checklist, rating scale, assessment rubric, observation schedule, portfolio assessment, incidental records etc. Even the students may be encouraged to adopt self-assessment techniques using the assessment rubrics.

Criteria of Evaluation of Project: The different criteria of evaluation of project under different sub heads of project work completion are given below:

Project Planning: Project planning, its action plan, steps of realizing the projects, may be specifically planned in advance based on feasibility, resources available, time allocation, finance and manpower requirement for each and every step or activity of project work.

Under project planning, many points need to be considered like - Selection of relevant industry based projects as per the requirement of curriculum, Objectives Set, Literature survey, Literature survey on the project title need to be done through abstract, journals, websites, open sources and other relevant sources available

It need to be ensured that objectives are written properly with clear specific, measurable and attainable statements. The sample size has to be delimited and decided as per the time limit allotted, feasibility and many other considerations.

Objectives formulated will decide the further course of action, depth and breadth of the project and implementation plan.

Design, Development and Execution of Project: Following important characteristic features of project are **needed** to be given special emphasis during the implementation of the project work- Innovativeness, Creativity, Originality, Proactiveness, Initiativeness, Cost Effectiveness, Resourcefulness, Development of soft skills/generic skills. There may be deviation from planning, design and implementation of the project as per the requirement.



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Quality of Report Writing: Following points need to be taken care of for report writing-Report writing as per prescribed format, Clarity of Objectives, Presentation of Data, Data Analysis, Interpretation and Result, Quality of Product.

Presentation & Discussion: Quality of presentation of data need to be ensured using the following criteria - Clarity in Communication and Presentation, Voice Audibility, Use of Media and methods, Satisfying the queries of audience, Attainment of objectives set.

Project's Potential: Futuristic scope and recommendation for further studies related to project may be assessed from the following criteria - Papers published or award received, Exhibition or Display or showcase of project in competition or exhibition or Tech Fest, Evaluation of working of projects or prototype, Relevance and Applications in the world of work, Recognition in any form, Related areas/sub areas for further studies. The students need to be assessed, continuously based on the assessment rubric prepared by the implementing teachers on different stages of project work completion.