SHRI JAGDISHPRASAD JHABARMAL TIBREWALA

UNIVERSITYCHUDELA JHUNJHUNU

RAJASTHAN

INSTITUTE OF ENGINEERING

TEACHING AND EXAMINATION SCHEME

AND DETAILED SYLLABUS FOR

B. TECH. (Ist Year Common For All Branches)

ACADEMIC SESSION 2021 – 2022

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: I**

BT -101   ENGLISH   **(L, T, P) = 4 (3+1+0)**

Unit	Contents of Course	Hrs.
I	Sentence Elements, Parts of speech Sentence and its Type: Reading comprehension, Précis writing, Meaning of Summary or Précis, Step for writing a précis Guidelines for Précis writing.	9
II	Modals, Preposition, Determiners and articles. The infinitives and ING forms, correct use of tenses and verbs. Gerund and Participle and their correct use in sentence.	8
III	Correspondence with Banks, Opening bank account, Request Credit Facility, Stopping payment of a Cheque, Request bank statement. Complaints and their replies, Causes of complaints, writing complaint letters, Replies to complains, Placing and supplying orders.	7
IV	Letters of Enquiry /Requests for Quotations and their replies, Letters of Enquiry, Offers and Quotations, Invitations to Tenders and Bids, Notices, Inviting tender and Bids, Communication with branch officers	8
V	Writing circulars, Word buildings, Prefixes, suffixes, Synonyms, antonyms, Abbreviations, , Punctuations & Capitalization, Common Errors. Self-development and its different dimensions, listening skills.	8
	Total	40

Reference Books:

1. English & Communication skills by Vibha bhoot (vardha pub.)
2. Word and language power" (apple books pub. Chennai)

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: I**

BT-102   **ENGINEERING MATHEMATICS-I**   **(L, T, P) = 7 (3+1+3)**

Unit	Contents of Course	Hrs.
I	**Differential Calculus** Asymptotes and Curvature (Cartesian Coordinates Only)Concavity, Convexity and Point of Inflexion (Cartesian Coordinates Only)Curve Tracing (Cartesian and Standard Polar Curves – Cardioids, Lemniscuses of Bernoulli, Limacon, Equiangular Spiral)	9
II	**Differential Calculus** Partial Differentiation, Euler's Theorem on Homogeneous Functions Approximate Calculations Maxima& Minima of Two and More Independent VariablesLagrange's Method of Multipliers	8
III	**Integral Calculus** Applications in Finding the Length of Simple CurvesSurface and Volumes of Solids of RevolutionDouble Integral, Areas & Volumes by Double IntegrationChange of Order of Integration Beta Function and Gamma Function (Simple Properties)	7
IV	**Differential Equations** Differential Equations of First Order and First Degree – Variable Separable Homogeneous Forms, Reducible to Homogeneous Form, Linear Form, Exact Form, Reducible to Exact Form Linear Differential Equations of Higher Order with Constant Coefficients Only	8
V	Second Order Ordinary Differential Equations with Variables Coefficients Homogeneous and Exact FormsChange of Dependent VariableChange of Independent Variable, Normal FormsMethod of Variation of Parameter	8
	Total	40

Reference Books:

1. A Text Book of Differential Equations, M.Ray and Chaturvedi, Students Friends & Co.

   Publisher, Agra.

2. Higher Engineering Mathematics, B.V.Ramana, Tata McGraw Hill.

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: I**

BT-103   ENGINEERING PHYSICS - I   **(L, T, P) = 7 (3+1+3)**

Unit	Contents of Course	Hrs.
I	**Interference of light** Michelson's Interferometer: Production of circular & straight line fringes, Determination of wavelength of light. Determination of wavelength separation of two nearby wavelengths. Newton's rings and measurement of wavelength of light. Interference of Optical technology: elementary idea of anti-reflection coating and interference filters.	9
II	**Polarization of light** Plane circular and elliptically polarized light on the basis of electric (light) vector, Malus Law. Double Refraction: Qualitative description of double refraction phase retardation plates, quarter and half wave plates, construction, working and use of these in production and Detection of circular and elliptically polarized light. Optical Activity: Optical activity and law of optical rotation, specific rotation and its Measurement using the half-shade and bi-quartz device.	8
III	**Diffraction of light** Single slit diffraction: Quantitative description of single slit, position of maxima / minima And width of central maximum, intensity variation. Diffraction Grating: Construction and theory. Formation of spectrum by plane transmission grating, Determination of wavelength of light using plane transmission grating. Resolving power: Geometrical & Spectral, Raleigh criterion, Resolving power of diffraction grating	7
IV	**Elements of Material Science** Bonding in Solids: Covalent bonding and Metallic bonding. Classification of Solids as Insulators, Semiconductors and Conductors. Semiconductors: Conductivity in Semiconductors, Determination of Energy gap of Semiconductor. X-Ray diffraction and Bragg's Law. Hall Effect: Theory, Hall Coefficient and applications.	8
V	**Special Theory of Relativity** Postulates of special theory of relativity, Lorentz transformations, relativity of length, mass and time. Relativistic velocity addition, mass-energy relation. Relativistic Energy and momentum.	8
		40

Reference Books:

1. Fundamental of Optics, Jenkins and White, Fourth Edition, McGraw Hill.
2. Optics, Ajoy Ghatak, Third Edition, Tata McGraw Hill.
3. Quantum Mechanics, Schiff, Third Edition, McGraw Hill.
4. Quantum Mechanics, Merzbacher, Third Edition, Wiley India.
5. Nuclear Physics: Principles and Applications, John Lilley, Wiley India.

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (I st Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: I**

BT-104   COMPUTER PROGRAMMING &IT   **(L, T, P) = 7 (3+1+3)**

Unit	Contents of Course	Hrs.
I	Stored Program Architecture of Computers, Storage Device- Primary Memory and Secondary Storage, Random, Direct, Sequential access methods. Concept of High-Level, Assembly and Low Level programming languages. Representing Algorithms through flow chart, pseudo code, step by step. Number System: Data Representation, Concept of radix and representation of numbers in radix r with special cases of r=2, 8, 10 and 16 with conversion from radix r1 to radix r2. r's and (r-1)'s complement, Representation of alphabets.	9
II	Programming in C: Structure of C Program, Concept of Preprocessor, Macro Substitution, Intermediate code, Object Code, Executable Code. Compilation Process, Basic Data types, Importance of braces ({ }) in C Program, enumerated data type, Identifiers, Scope of Variable, Storage Class, ConstantsOperators& Expressions in C, Type Casting, printf( ) and scanf ( ) with format specifires, reading single character.	8
III	Control Statements, Command Line Arguments, and Arrays in C, Pointers, and Using pointers to represent arrays, Pointer & address arithmetic. Structures, using typedef.	7
IV	Arrays of Structures & pointers, File Handling (fscanf, fprintf, feof, fopen, fclose, fread, fwrite only). Dynamic memory Allocation.	8
V	Functions in C, Passing Parameters (By value & Reference), using returned data, Passing arrays, structures, array of structures, pointer to structures etc., passing characters and strings, The voidpointer	8
		40

Reference Books:

1. Dey & Ghosh, Computer Fundamentals and programming in C, Oxford.
2. Kamthane, Programming in C, 2nd Ed., Pearson.
3. Balaguruswamy, Programming in ANSI C, 5th Ed., TMH.
4. V. Rajaraman, Fundamentals of Computers, 5th Ed. PHI, 2011.

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Iˢᵗ Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: I**

BT-105   ENGINEERING MECHANICS   **(L, T, P) = 7 (3+1+3)**

Unit	Contents of Course	Hrs.
I	System of forces, Fundamental laws of mechanics, Composition of forces•Free body diagram, Lami's theorem ,Moments and couple, Varignon's theorem, condition of equilibrium ,Types of support and loading, reaction, Analysis of simple trusses by methods of joints and method of sections	9
II	Laws of Coulomb friction, Ladder, Wedges Belt friction and rolling Principle of virtual work and its applications	8
III	Location of centroid and center of gravity, area moment of inertia, mass moment of inertia, Law of machines, Variation of mechanical advantages, efficiency, reversibility of machine, Pulleys, wheel and axle, wheel and differential axle , Transmission of power through belt and rope	7
IV	**Kinematics of Particle** Rectilinear motion, plane curvilinear motion Projectile motion Constrained motion of connected particles **Dynamics of Particle and Rigid Body** Newton's law of motion , D'Alembert's principle	8
V	**Work and Energy** Work, energy (Potential, Kinetic and Spring) Work – Energy relation Law of conservation of energy **Impulse and Momentum** Impulse, momentum , Impulse – Momentum relation, Impact **Vibration** Un-damped Free vibrations	8
		40

Reference Books:

1. Vector Mechanics for Engineers, Beer and Johnston, Tata McGraw-Hill.
2. Engineering Mechanics, Hibbeler, Pearson Education.
3. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.
4. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.
5. Engineering Mechanics, Shames, Pearson Education.
6. Engineering Mechanics, Boresi and Schmidt, CL-Engineering.
7. Engineering Mechanics, Andrew Pytel&Kiusalas, Cengage Learning.

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN
INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: I**

BT-106   ENGINEERING CHEMISTRY -I   **(L, T, P) = 6 (3+0+3)**

Unit	Contents of Course	Hrs.
I	**POLYMERS:** Introduction - Types of polymers – Classification - Methods of polymerization – Stereo specific polymers - Ziegler Natta catalysis - Properties of polymers –Conducting Polymers- Engineering applications – Biodegradable polymers - Individual polymers (Preparation, Properties, Uses of Poly Styrene, PVC, PTFE, Bakelite's, Cellulose derivatives, Poly Carbonates).	9
II	**PLASTICS:** Types –Compounding of plastics- Moulding (Four types)- Fiber reinforced , Glass fiber reinforced plastics –Bullet Proof Plastics– Properties of plastics – Engineering applications **RUBBERS & ELASTOMERS:** Introduction – Preparation – Vulcanization – Properties - Engineering applications. Buna-S, Buna-N, - Poly Urethane - Engineering applications of Elastomers.	8
III	**CORROSION:** Mechanism- Factors influence the rate of corrosion - Types of Corrosion - Protection methods (Anodic &Cathodic protection), - Metallic Coatings - Paints, Varnishes, Enamels, Special paints.	7
IV	**FUEL TECHNOLOGY:** Introduction & classification of fuels, advantages and disadvantages of fuels, calorific value, introduction to liquid fuels, classification of petroleum, refining of petroleum, cracking (thermal and catalytic) knocking, diesel index, gaseous fuels (natural gas, CNG, LPG, producer gas, water gas), polymerization, anti-knocking agents, octane &cetane number. **LUBRICANTS:** Introduction and classification of lubricants, functions of lubricants, mechanism of lubricants, properties of lubricants, viscosity, flash point and fire point, cloud and pour point, aniline point, saponification values	8
V	**BUILDING MATERIALS (CEMENT, REFRACTORIES, CRAMICS) CEMENT:** Introduction, Manufacturing of Portland Cement (Dry &Wet Process)-Chemistry of Setting and Hardening of Cement-Effect of Carbon dioxide, Sulphur Dioxide, Chloride on Cement concrete. **REFRACTORIES:** Introduction-Classification –Properties-Applications	8
	Total	36

Reference Books:

1. The Chemistry and Technology of Coal, by J G Speigh, CRC Press
2. The Chemistry and Technology of Petroleum, by J G Speigh, CRC Press
3. Polymer Chemistry: An Introduction, Malcolm P. Stevens, Oxford University Press
4. Solid State Chemistry and Its Applications, Anthony R West, John Wiley & Sons
5. Lubricants and Lubrications, Theo Mang, Wilfeied, Wiley-VCH
6. Hand Book of Conjugated Polymers, Tejre A Skotheim and J. R. Reynolds, CRC Press

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

**YEAR: I**   **SEMESTER: I**

BT-107   **PHYSICS LAB- I**   **(L, T, P) = 3(0+0+3)**

1. To convert a Galvanometer in to an ammeter of range 1.5 amp and calibrate it.
2. To convert a Galvanometer in to a Volt of range 1.5 volt and calibrate it.
3. To study the variation of semiconductor resistance with temperature and hencedetermine the Band Gap of semiconductor in the form of reverse biased P-N junction diode.
4. To determine the wave length of sodium light by Newton's Ring.
5. To determine the specific rotation of Glucose (Sugar) solution using a Polarimeter.
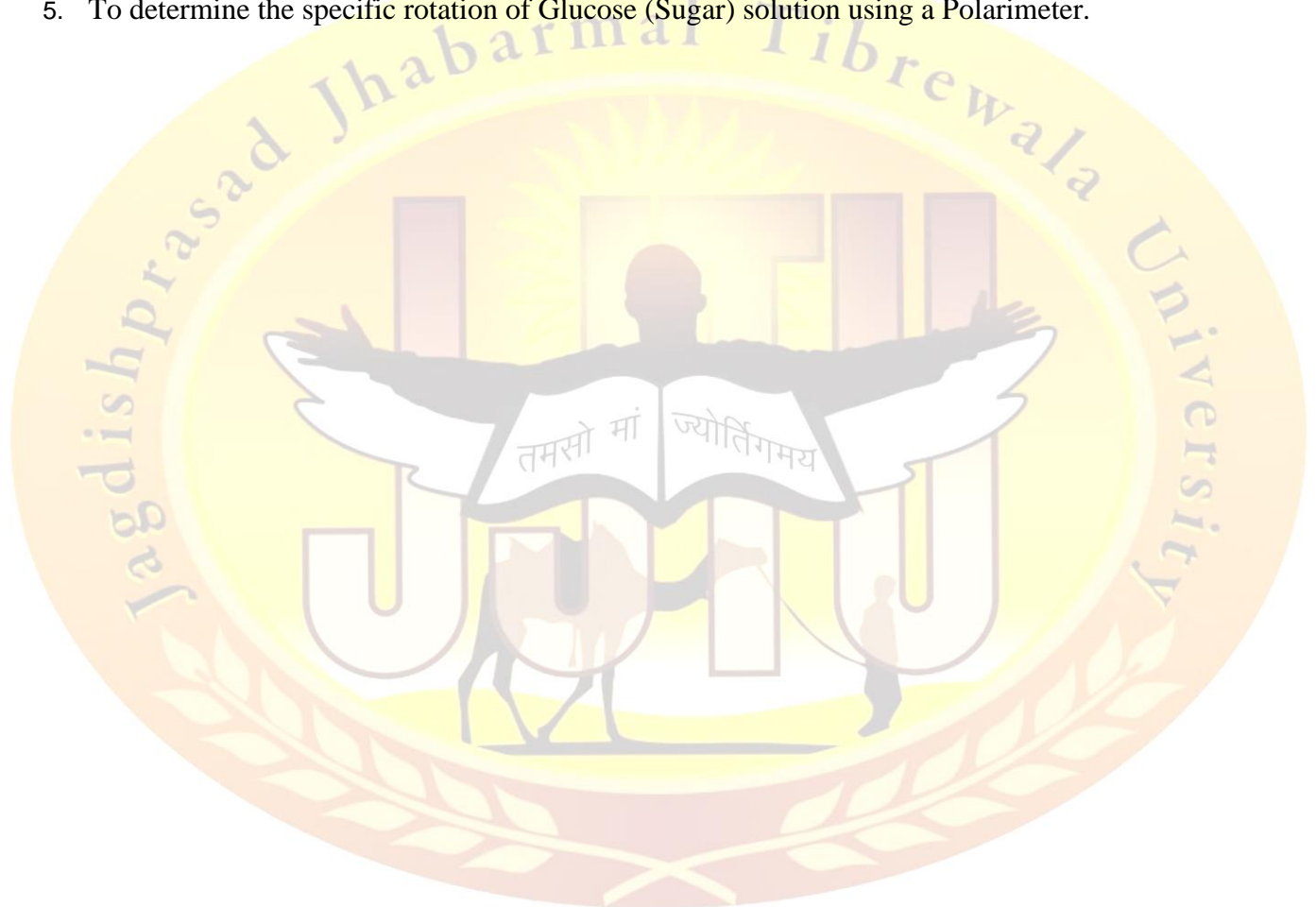
SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: I**

BT-108   ENGINEERING CHEMISTRY - I   (L, T, P) = 3(0+0+3)

1. Introduction to Chemistry Lab (the teachers are expected to teach fundamentals like Primary, Secondary Standard Solutions , Normality, Molarity, Molality etc and laboratory ware used,error ,accuracy,precision, Theory of indicators, use of volumetric titrations

2. **Introduction to Volumetric Analysis:**
   The Teacher has to perform four types of volumetric titrations and will explain about the working of Indicators. (The Teacher has to call the students at random to perform the titrations)

3. **ANALYSIS OF WATER**
   Estimation of :
   a)   Calcium, Magnesium, Iron (111),Zinc (SEPERATELY)
   b)   TOTAL HARDNESS BY EDTA METHOD
   c)   TURBIDITY
   d)   CONDUCTIVITY
   e)   pH
   f)   TOTAL DISSOLVED SALTS
   g)   FLORIDES,CHLORIDES AND NITRATES (USING ION ANALYSER OR BY OLORIMETER)
   h)   DISSOLVED OXYGEN
   i)   BACTERIAL COUNT

   The student has to get his water sample and the teacher has to explain the analysis and the results are to be compared with the INDIAN STANDRDS.All the teachers are requested to give top priority to water analysis as it is very useful for the students and society. Complete water analysis may take couple of hours more but this has a unique influence on the system.

4. **CONSTRUCTION OF GALVANIC CELL**
   Based on the position of the metals in the electrochemical series a model Electrochemical Cell is constructed and the values are determined and effect of metal ion concentration, Temperature etc. on emf are calculated.

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: I**

BT-109   COMPUTER PROGRAMING LAB   **(L, T, P) = 3(0+0+3)**

1. Simple OS Commands, vi editor, compiling program, compiler   options, linking libraries.

2. Simple input output program, integer, real, character and string. (Formatted & Unformatted), using command line Arguments

3. Conditional statement (if, if-else-if, switch-case)

4. Looping & iterations (for, while, do-while, continue, break)

5. Using Arrays (one, two and three dimensional)

6. Using Structures and Union.

7. Program using Function (with and without recursion), passing parameters by value &reference.

8. Using pointers.

9. File handling

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (I st Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: I**

BT-110   PRACTICAL GEOMETRY   **(L, T, P) = 3(0+0+3)**

1. (a) Lines, Lettering & Dimension (Sketch Book)

   (b) Scale-representative Fraction, Plan scale, Diagonal Scale, Vernier scales (In sheet)comparative Scale, & scale of chords (Sketch Book)

2. (a) Conic Section:-Construction of Ellipse, Parabola & Hyperbola by different methods (In sheet)

   (b) Engineering curves:-Construction of cycloid, Epicycloids, Hypocycloid and Involutes (In sheet) Archimedean and Logarithmic spiral, (Sketch book)

3. (a) Type of Projection, Orthographic Projection: First Angle and third Angle Projection (Sketch Book)

   (b) Projection of Points (Sketch Book)

   (c) Projection of Straight lines, different position of Straight lines, methods for determining True length, true inclinations and Traces of straight lines (Four problems in sheet and three problems in (Sketch Book)

   (d)Projection of Planes: Different positions of Plane lamina like.:- Regular polygon, circle three of planes (Four problems in Drawing sheet and three problems in Sketch Book.)

4. (a)Projection of Solids:- Projection of right and regular Polyhedron, Prisms, Pyramids and cone (Four Problem in Drawing sheet and there in Sketch Book.)

   (b) Section of Solids:- Projection of Frustum of a cone and pyramid, Projection of Truncated Solids (like Prism, Pyramid, Cylinder and Cone) in different positions.

5. (a) Development of Surfaces:- Parallel line and Radial line method for right, regular solids

(b) Isometric Projections:- Isometric Scales, Isometric Axes, Isometric Projection of Solids

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: I**

BT-111   WORKSHOP PRACTICE   **(L, T, P) = 3(0+0+3)**

Carpentry Shop

1. T – Lap joint

Foundry Shop

1. Mould of any pattern

2. Casting of any simple pattern

Welding Shop

1. Gas welding practice by students on mild steel flat

2. Demonstration of brazing

Machine Shop Practice

1. Job on lathe with one step turning and chamfering operations

2. Job on shaper for finishing two sides of a job

3. Drilling two holes of size 5 and 12 mm diameter on job used / to be used for shaping

4. Grinding a corner of above job on bench grinder

Fitting and Smithy Shop

1. Finishing of two sides of a square piece by filing

2. Tin smithy for making mechanical joint and soldering of joint

3. To cut a square notch using hacksaw and to drill three holes on PCD and tapping

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Iˢᵗ Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: II**

BT -201   COMMUNICATION TECHNIQUES   **(L, T, P) = 4 (3+1+0)**

Unit	Contents of Course	Hrs.
I	Communication: Its meaning, Importance and process, Importance of effective communication in business, The process of communication, Need for Communication	9
II	Objectives of communication, Types of communication, Verbal Communication, Nonverbal communication, Downward Communication, Upward communication, The c's of Good communication, Barriers of communication	8
III	Groups: Their Importance and Characteristics, Importance, Characteristics of Group Personality Advantages and disadvantages of Groups, Techniques of Group Decision Making.	7
IV	Tips of clear writing, Intrapersonal communication, Interpersonal communication, Self-Development & Communication, Speech & presentation. Questions/question Tags, Conditionals.	8
V	Business Correspondence, Formal & Informal letters, Essential Features of business letter, Drafting Advertisements. ,different dimension of personality development	8
	Total	40

Reference Books:

1. A practical course for developing writing skill in English By J.K.Guasal (PHI p. ltd. New Delhi)
2. Essential Communication skill By Shalini aggarwal (Ane books pvt. ltd)

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: II**

BT -202   ENGINEERING MATHEMATICS-II   **(L, T, P) = 4 (3+1+0)**

Unit	Contents of Course	Hrs.
I	**Coordinate Geometry of Three Dimensions** • Equation of a sphere • Intersection of a sphere and a plane, tangent plane, normal lines • Right circular cone • Right circular cylinder	9
II	**Matrices** • Rank of a matrix, inverse of a matrix by elementary transformations • Solution of simultaneous linear equations • Eigen values and Eigen vectors, Cayley – Hamilton theorem (without proof) • Diagonalization of matrix	8
III	**Vector Calculus** Scalar and vector field, differentiation & integration of vector functions Gradient, Divergence, Curl and Differential Operator Line, Surface and volume Integrals Green's Theorem in a Plane, Gauss' and Stoke's Theorem (without proof) and their Applications	7
IV	**Dynamics** • Angular Motion, Radial and Transverse Velocities and Accelerations • Tangential and Normal Accelerations • Rectilinear Motion in Resisting Medium	8
V	**Differential Equations** Series Solutions of Second Order Linear Differential Equations with Variable Coefficients (Complementary Functions only) Partial Differential Equations of First Order Lagrange's Form, Standard Forms Charpit's Method	8
	Total	40

Reference Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 9th Edition.
2. Calculus and Analytical Geometry, Thomas and Finney, Narosa Publishing House N. Delhi.
3. A Text Book of Differential Equations, M.Ray and Chaturvedi, Students Friends & Co. Publisher, Agra.
4. Higher Engineering Mathematics, B.V.Ramana, Tata Mcgra Hill.
5. Mathematics for Engineers, Chandrika Prasad, Prasad Mudranalaya Allahabad.
6. Advanced Mathematics for Engineers, Chandrika Prasad, PrasadMudranalaya Allahabad.

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: II**

BT -203   ENGINEERING PHYSICS-II   **(L, T, P) = 4 (3+1+0)**

Unit	Contents of Course	Hrs.
I	**Applications of Schrödinger's Equation** Particle in three-dimensional boxes. Degeneracy, Barrier penetration and tunnel effect. Tunneling probability, Alpha **Decay.Summerfield's Free electron gas model** Postulates, Density of energy states, Fermi energy level.Band Theory of solids	9
II	**Lasers** Theory of laser action: Einstein's coefficients, Components of a laser,Threshold conditions for laser action. Theory, Design and applications of He-Ne and semiconductor lasers. Elementary ideas of Q-switching and mode locking. **Holography** Holography versus photography, Basic theory of holography, Basicrequirement of a holographic laboratory.Applications of holography in microscopy and interferometry	8
III	**Coherence** Spatial and temporal coherence, Coherence length, Coherence time and 'Q' Factor for light. Visibility as a measure of coherence. Spatial Coherence and size of the source.Temporal coherence and spectral purity. **Optical Fibers** Optical fiber as optical wave-guide.Numerical aperture and maximum angle of acceptance	7
IV	**Nuclear Radiation Detectors and Dielectrics** Characteristics of gas filled detectors: general considerations. Constructions, Working and properties of: Ionization chamber, proportionalCounter, G.M.Counter and Scintillation Counter.Dielectrics: Electric break down and measurement of dielectric constant	8
V	**Electro Dynamics** Scalar and Vector fields ,Definitions of gradient Divergence and curl , Maxwell's Equations ,Boundary Conditions , Wave equation and its solution for free space ,Nature of E.M. Waves, Poynting vector	8
	Total	40

Reference Books:

1. Fundamental of Optics, Jenkins and White, Fourth Edition, McGraw Hill.
2. Optics, AjoyGhatak, Third Edition, Tata McGraw Hill.
3. Quantum Mechanics, Schiff, Third Edition, McGraw Hill.
4. Quantum Mechanics, Merzbacher, Third Edition, Wiley India.
5. Nuclear Physics: Principles and Applications, John Lilley, Wiley India.

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: II**

BT -204ENVIRONMENTAL ENGINEERING & DISASTER MANAGEMENT (L, T, P) = 4 (3+1+0)

Unit	Contents of Course	Hrs.
I	Basics of Environment. Adverse effects of environmental pollution and control strategies. Environmental Acts and Regulations. Functional concepts of Ecology. Basics of species. Ecosystem. Hydrological and chemical cycles. Energy flow in ecosystems. Biodiversity, Population dynamics. Renewable sources of energy. Potential & present status of renewable Sources of energy in India.	9
II	Quality and quantity of potable water. Surface and ground water sources. Basics of water Supply schemes. Treatment of water. Wastewater management, Treatment & disposal of wastewater. Anaerobic digestion, Septic tanks. Reuse and saving in use of water. Onsite sanitation. Environmental Impact Assessment (EIA). Necessity and methodology of EIA.	8
III	Air Pollution. Harmful effects of Air Pollution. Control of Air Pollution. Noise Pollution. Adverse effects and control of noise pollution. Global warming, Acid rain, Ozone depletion. Solid Waste Management. Classification of solid waste. Collection, transportation, treatment, and disposal of solid waste. Energy recovery. Sanitary landfill.	7
IV	Type of Disasters: Natural and Manmade (Earthquake, Tsunami, Cyclone, Flood, Drought, Landslides, Nuclear, Chemical, Fire and Environmental Hazards). Disaster Management Cycleand its components. Vulnerability of Indian Continent to different types of Disasters. Do's andDon'ts for safety during these disasters.Introductory seismology, Occurrence of Earthquakes, Plate Tectonic Theory, types ofearthquake	8
V	Definitions; Earthquake Magnitude, Intensity and their scales, Focus, Focal Depth, Epicentre,Epicentral Distance, Earthquake Energy. Concept of Seismic Zoning. Basic Concepts ofEarthquake Resistant Houses & Construction Practices.	8
	Total	40

Reference Books:

1. Environmental issues in India (rangaraugain Mahesh Pearson education)
2. Global environmental governance (speth, James G Pearson pub.)

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN
INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

1.

YEAR: I   **SEMESTER: II**

BT -206   ENGINEERING CHEMISTRY - II   **(L, T, P) = 4 (3+1+0)**

Unit	Contents of Course	Hrs.

I	1. JOULE THOMSON EFFECT
	    Definitions of Enthalpy, Free Energy, Entropy, Principle and explanation of Joule Thomson Effect, application to Air Conditioning , Refrigeration (WORKING PRINCIPLE AND FLOW DAIGRAMS)
	2. OSMOSIS &REVERSE OSMOSIS
	    Principles of Osmosis& Reverse Osmosis, application to Desalination process-Types of Membranes used in desalination process-Limitations
	3. SOLUBILITY PRODUCT& COMMON ION EFFECT--
	Definition of Solubility & Ionic products, Industrial applications
		9

II	1.CATALYSIS
	    Explanation of Catalysis, Criteria of Catalysts, Few Industrial Catalysts
	2. COLLOIDS
	    Explanation of Colloids- Properties of Colloids, Industrial applications of Colloids
	4.VISCOSITY:
	    Definition of Viscosity -Factors influence the Viscosity- Kinematic Viscosity- Determination of Molecular Weight of any one compound-Application to fluids in motion –Type of flow
		8

III	1. SUPERCONDUCTIVTY – Definition-Preparation –Properties –Engineering Applications 2. SEMICONDUCTORS - Definition –Types of semiconductors (Stiochiometric,Non stichometric ,Organic, Controlled Valency Semiconductors, Doping)-applications 3. STORAGE DEVICES - Materials used and working of Floppy, CD, Pendrive etc. 4. LIQUID CRYSTALS - Definition –Types - applications in LCD and Engineering Applications	7
IV	THERMAL ENERGY- introduction to solid fuels – definition – calorific value (LCV, HCV) bomb calorimeter, pulverized coal – carbonization – analysis of coal (proximate and ultimate analysis) – working of thermal power station.	8
V	NUCLEAR ENERGY: Introduction to nuclear fuels – binding energy – nuclear fission and fusion reactions – nuclear reactions – disposal of nuclear wastes	8
	Total	40

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN
INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (I^st Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

Reference Books:

1. Engineering Chemistry , P.C. Jain Monica Jain (DhanpatRai& Co)
2. Chemistry in Engineering & Tech, Vol. I & II , Kuriacose (TMH)
3. Instrumental methods of Chemical analysis, MERITT & WILLARD (EAST – WEST press)
4. Physical Chemistry , P.W Atkin (ELBS, OXFORD Press)
5. Physical Chemistry W.J.Moore (Orient Longman)

YEAR: I   **SEMESTER: II**

BT-207   PHYSICS LAB-II   **(L, T, P) = 3(0+0+3)**

1. To determine the height of water tank with the help of a Sextant.
2. To determine the dispersive power of material of a Prism for Violet Red and yellow colours of Mercury light with the help of a spectrometer.
3. To measure the Numerical Aperture of an Optical Fibre.
4. To determine the ferromagnetic constants retentivity, permeability and susceptibility by tracing B-H curve using C.R.O.
5. To study the Charge & Discharge of a condenser and hence determine time constant (Both current and voltage graphs are to be plotted.
6. To determine the high resistance by method of leakage, using a Ballistic galvanometer.
7. To verify the expression for the resolving power of a Telescope.
8. To determine the specific resistance of the material of a wire by Carey Fosters bridge.
9. To determine the specific resistance of the material of a wire by Carey Fosters bridge.

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: II**

BT-208   ENGINEERING CHEMISTRY LAB-II   **(L, T, P) = 3(0+0+3)**

1. **PRODUCTION OF BIODIESEL.**
    INTRODUCTION   TO BIO FUELS :-The teacher has to perform the transesterfication reaction of FATTY ACID and the   Biodiesel thus produced can be used for analysis.(Please give priority to production of   Biodiesel from waste cooking oil)

2. **Estimation of properties of oil:**
    a. Acid Number
    b. Viscosity
    c. Saponification value
    d. Aniline point
    e. Flash and Fire points
    f. Pour and Cloud point

3. PREPARATION OF PHENOL –FORMALDEHYDE RESIN

4. SOIL ANALYSIS:
    pH, Determination of Zinc, Iron, Copper.

5. FOOD ANALYSIS:
    Determination Saturated and Unsaturated Fatty Acids, pH,etc.

All the teachers are requested   to focus on bio fuels, soil analysis and food analysis as these are the need of 21 st century and these experiments are so designed to encourage students to carry out lab to land process.

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN
INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: II**

BT-209   ELECTRICAL &ELECTRONICS LAB   **(L, T, P) = 3(0+0+3)**

1. To study the connection of ceiling fan along with the regulator & vary the speed.
2. To study the connection of single phase induction motor through single phase auto-Transformer and vary the speed.
3. To study the connection of three phase squirrel cage induction motor through three Phase auto transformer and vary the speed.
4. To study & prove the thevenin's theorem.
5. To study and testing various components such as resistors, inductors, capacitors, PN-diode, Zener diode, LED, LCD,BJT,SCR,FET, UJT,SCR etc.
6. To study measure the frequency, voltage, current with the help of CRO.
7. To study the single phase half wave rectifier and effects of filters on waveform.
8. To study the single phase bridge rectifier and effects of filters on waveform.
9. To study and verify the truth table of AND, OR,NOT,NAND& NOR gate.
10. To study and testing various symbols such resistors, inductors, capacitors, PN-diode, Transistors etc.

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN

INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

YEAR: I   **SEMESTER: II**

BT-210   ENGINEERING DRAWING   (L, T, P) = 3(0+0+3)

Introduction to machine drawing

Dimensioning, locations and placing,

Orthographic projections: First & third angle methods

Sheet 1: Orthographic Projections (3 Problems)

Sheet 2: Sectional Views (3 Problems)

Sheet 3: Riveted joints, lap joints, butt joints, chain riveting, zig-zag riveting

Sheet 4: Screw fasteners, different threads, Nuts & bolts locking devices, set screws,

Foundation

Sheet 5: Bearing, Plumber block

Lectures on free hand sketches

List of free hand sketches

• Different type of lines

• Conventional representation of materials

• Screw fasteners

• Bearing: Ball, roller, needle, foot step bearing

SHRI JAGDISHPRASAD JHABARMAL TIBREWALA UNIVERSITY
CHUDELA (JHUNJHUNU), RAJASTHAN
INSTITUTE OF ENGINEERING
TEACHING AND EXAMINATION SCHEME AND DETAILED SYLLABUS FOR
B. TECH. (Ist Year Common For All Branches)
ACADEMIC SESSION 2021 – 2022

• Coupling: Protected type, flange, and pin type flexible coupling

• Welded joints

• Belts and pulleys

• Pipes and pipe joints

• Valves

YEAR: I   **SEMESTER: II**

BT-211   LANGUAGE LAB   **(L, T, P) = 3(0+0+3)**

1. Phonetic Symbols and Transcriptions

2. Word Formation

3. Affixes

4. Listening and speaking Skills.

5. Words often Mis-spelt and Mis- Pronounced

6. One Word for Many.

7. Synonyms and Antonyms.

8. Seminar Presentation.

9. Group Discussion.

10. Job Interview

DEPARTMENT OF MECHANICAL ENGINEERING

SYLLABUS

B.TECH.

IIIrd Semester

STRENGTH OF MATERIALS

Unit – 1

Stress & strain: Tension, compression, shearing stress & strain; Poisson's ratio: Stress-strain relationship, Hooke's law; equations of static = w for 2D & 3D cars Elastic constants and their relations for a isotropic hookean material, anisotropy &orthotropy, thermal stresses, composite bars; simple elastic, plastic &visco-elastic behavior of common materials in tension and compression test, stress-strain curves. Concept of factor of safety & permissible stress.Conditions for equilibrium.Concept of free body diagram; Introduction to mechanics of deformable bodies.

Unit – 2

Members subjected to flexural loads: Theory of simple bending, bending moment and shear force diagrams for different types of static loading and support conditions on beams. Bending stresses, Section modulus and transverse shear stress distribution in circular, hollow circular, I, Box, T, angle sections etc.

Unit – 3

Principal planes, stresses & strains: Members subjected to combined axial, bending & Torsional loads, maximum normal & shear stresses; Concept of equivalent bending & equivalent twisting moments: Mohr's circle of stress & strain.

Theories of Elastic Failures: The necessity for a theory, different theories, significance and comparison, applications.

Unit – 4

Torsion: Torsional shear stress in solid, hollow and stepped circular shafts, angular deflection and power transmission capacity.

Stability of equilibrium: Instability & elastic stability. Long & short columns, ideal strut, Euler's formula for crippling load for columns of different ends, concept of equivalent length, eccentric loading, Rankine formulae and other empirical relations.

Unit – 5

Transverse deflection of beams: Relation between deflection, bending moment, shear force and load, Transverse deflection of beams and shaft under static loading, area moment method, direct integration method: method of superposition and conjugate beam method. Variational approach to determine deflection and stresses in beam.

Elastic strain energy: Strain energy due to axial, bending and Torsional loads; stresses due to suddenly applied loads; use of energy theorems to determine deflections of beams and twist of shafts. Castigliano'stheorem.Maxwell's theorem of reciprocal deflections.

Text Books:

1. Strength of Materials: R.K. Rajput – S Chand, India

Reference Books :

1. Strength of Materials – Popov, PHI, New Delhi.
2. Strength of Materials A Rudimentary Apprach – M.A. Jayaram, Sapna Book House, Bangalore

ENGINEERING THERMODYNAMICS

UNIT 1

Basic Concepts of Thermodynamics :Thermodynamics system, control volume, Properties, state, processes and cycle, equality of temperature, Zeroth Law of thermodynamics, temperature scale, laws of perfect gas, Pure substances, vapour-Liquid –solid-phase equibrium in a pure substances, thermodynamic surfaces.

UNIT 2

Work and heat, Law of conservation of mass and energy, First law of thermodynamics, steady state Processes, Second law of thermodynamics, Heat engine, Carnot cycle, thermodynamic temperature scale, entropy, change of entropy for different processes, equivalence of Kelvin plank and clausius statements, clausius inequality.

UNIT 3

Available and unavailable energy, availability of a non flow and steady flow system, Helmbeltz and Gibb's functions, Thermodynamic Relations: Important mathematical relations, Maxwell relations, Tds Relations, Joule-Thomson coefficient, Clayperon relation.

UNIT 4

Air – standard power cycle, Brayton cycle, Otto cycle, diesel cycle, Dual cycle, Stirling cycle, Ericssion cycle and Atkinson cycle, Mean effective pressure and efficiencies, Four stroke petrol and diesel engine, Two stroke Petrol and diesel engine.

UNIT 5

Properties of steam, phase change process, use of steam table &molier char. Rankine cycle, Reheat cycle, Regenerative cycle, cogeneration vapour compression refrigeration cycle.

Text Books:

1. Engineering Thermodynamics – C P Arora, Tata McGraw Hill

2. Engineering Thermodynamics – P K Nag, Tata McGraw Hill

Reference Books:

1. Theory and Problems of Thermodynamics – Y. V.C. Rao, Wiley Eastern Ltd., New Delhi.

ENGINEERING MATHEMATICS-III

Unit- 1 Fourier Series and method of separation of variables (Boundary value problems)

Expansion of simple functions in Fourier series, half range series, change of interval, Harmonic analysis. Application to the solution of wave equation and diffusion equation in one dimension and Laplace's equation in two dimensions by method of separation of variable.

Unit-2 Laplace Transform

Laplace Transform with its simple properties . Inverse Laplace transform convolution Theorem (without proof) solution of ordinary differential equation with constant coefficient .

Unit-3 Special functions.

Bessel's function of first kind, simple recurrence relations, orthogonal property. Legendre's function of first kind simple recurrence relations, orthogonal property ,Rodrigue's formula.

Unit –4 Numerical Analysis

Finite differences , Difference operators , forward, Backward, central & average operators. Newton's forward and backward interpolation formula, Stirling's central difference formula Lagrange's interpolation formula for unequal interval. Solution of non linear equations in one variable by Newton Raphson's and Regulafalsi'smethod .

Unit-5 Numerical Analysis

Numerical solution of simultaneous algebric equation by Gauss elimination and Gauss seidel method. Numerical differentiation , Numerical integration trapezoidal rule , Simpson's one third and three eight rule. Numerical solution of ordinary differential equation of first order: Picards method, Euler's, and modified Euler's method, Milne's methods and RungaKutta fourth order method.

Text Books:

1. Higher Engg. Mathematics: B.S. Grewal.

Reference Books:

1. Advance Engg. Mathematics: R.K. Jain, S.R.K.Iyenger.

2. Advance Engg. Mathematics: H.K. Dass, S.Chand Publication.

PRODUCTION TECHNOLOGY-1

UNIT-1

CASTING: Steps involved in making a casting – Advantage of casting and its applications. – Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems

UNIT-II

Solidification of casting – Concept – Solidification of pure metal and alloys, short & long freezing range alloys. Risers – Types function and design, casting design considerations, special casting processes 1) Centrifugal 2) Die, 3) Investment. Methods of Melting: Crucible melting and cupola operation, steel making processes, special.

UNIT-III

Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth, Comparison of properties of Cold and Hot worked parts, rolling fundamentals – theory of rolling, types of Rolling mills and products. Forces in rolling and power requirements.

UNIT-IV

Stamping, forming and other cold working processes : Blanking and piercing – Bending and forming -Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning – Types of presses and press tools. Forces and power requirement in the above operations.

UNIT-V

EXTRUSION OF METALS: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion Hydrostatic extrusion. Forging processes: Principles of forging – Tools and dies – Types Forging – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects.

TEXT-BOOKS:

1. Manufacturing Technology / P.N. Rao/TMH

KINEMATICS OF MACHINES

UNIT -1

Kinematics: Elements, pairs , mechanisms, four bar chain and its inversions, velocity and acceleration, Klein's construction, coriolis component, instantaneous center method, synthesis of mechanisms, panto graph, scott-Russel, Tchbeicheff straight line, indicator diagram mechanisms.

UNIT -2

Automotive vehicle mechanisms: Overhead valve mechanism, Davis and Ackerman steering mechanism, Trifler suspension and Hookes joint. Power transmission: Belts and ropes, effect of centrifugal force, creep, chain drive.

UNIT -3

Friction: Laws of static, dynamic and rolling friction, dry and viscous friction, inclined plane and screw jack, pivots and friction axis, bearing, Clutches. Theory of film lubrication.

UNIT -4

Brakes and dynamometers: Band, block and band & block brakes, braking action, absorption and transmission type dynamometers, prony, rope and hydraulic dynamometers braking system of automobiles.

UNIT -5

Cams: Type of cams, displacement, velocity and acceleration curves for different cam followers, consideration of pressure angle and wear, analysis of motion of followers for cams with specified contours.

Text Books:

1. Theory of Mechanisms and Machines: Amitabha Ghosh and Ashok kumarMallik, Third Edition Affiliated East-West Press.
2. Theory of Machines and Mechanisms: Joseph Edward Shigley and John Joseph Uicker, Jr. Second Edition, MGH, New York.

Reference Books :

1. Mechanism and Machine Theory : J.S. Rao and R.V. Dukkipati Second Edition New age International.
2. Theory and Machines : S.S. Rattan, Tata McGraw Hill.

OBJECT ORIENTED PROGRAMMING IN C++

UNIT 1

Introduction to Object Oriented Programming: Basic concepts: Class, Object, Method, Message passing, Inheritance, Encapsulation, Abstraction, Polymorphism.

UNIT 2

Basics of C++ Environment: Variables; Operators; Functions; user defined, passing by reference, passing an array to the function, inline function, scope, overloading; Pointers: objects and lvalue, arrays and pointers, the new and delete operators, dynamic arrays, arrays of pointers and pointers to arrays, pointers to pointers and functions; Strings: String I/O, character functions in ctype.h, string functions in string.h.

UNIT3

Object oriented concepts using C++: Classes: Member functions, Friend functions, Constructors, Access functions, Private member functions, class destructor, static data and function members; Overloading: inline functions, this operator, overloading various types of operators, conversion operators; the String Class; Composition and Inheritance: Hierarchy and types of inheritance, protected class members, private versus protected access, virtual functions and polymorphism, virtual destructors, abstract base classes.

UNIT 4

Templates and Iterators: function and class templates, container classes, subclass templates, iterator classes; Libraries: standard C++ library, contents of a standard C headers, string streams, file processing: Files and streams classes, text files, binary files, classification of files, the standard template library.

UNIT 5

Data Structures Using C++: Linked lists – Singly linked list, Doubly linked lists, Circular lists, Stacks and Queues priority Queues, Stacks, Queues.

STRENGTH OF MATERIAL LAB
List of Experiments:

1. To study the Brinell hardness testing machine & perform the Brinell hardness test.
2. To study the Rockwell hardness testing machine & perform the Rockwell hardness test.
3. To study the Impact testing machine and perform the Impact tests (Izod&Charpy).
4. To study the Universal testing machine and perform the tensile test.
5. To perform compression & bending tests on UTM.
6. To perform the sheer test on UTM.
7. To study the torsion testing machine and perform the torsion test.

ENGINEERING THERMODYNAMICSLAB
List of Experiments:

1 .Comparative study of four stroke diesel and petrol engines.

2. Comparative study of two stroke petrol and diesel engines.

3. Study of fuelsupply systems of diesel and petrol engines.

4. Study of cooling, lubrication and ignition system in diesel and petrol engines.

5. To study various types of Boilers and to study Boiler mounting and accessories.

6. To study various types of Dynamometers.

7. To study Multi Stage Air Compressors.

8. To find the BHP, Thermal efficiency of four stroke diesel engine.

MACHINE DRAWING

List of Experiments:

Schematic product symbols for standard components in mechanical, electrical and electronic systems, welding symbols and pipe joints;

Orthographic views from isometric views of machine parts / components. Dimensioning, Sectioning. Exercises on Coupling, Crankshaft, Pulley, Piston and Connecting rod , Cotter and Knuckle joint. Riveted Joint and Welded Joint.

Isometric projection of components;

Assembly and detailed drawings of a mechanical assembly, such as a plummer block, tool head of a shaping machine, tailstock of a lathe, welded pipe joints indicating work parts before welding, etc.

(At least six sheets must be drawn)

OBJECT ORIENTED PROGRAMMING LAB
List of Experiments:
1. Program using basic I/O and control statements.
2. Program using class, objects, objects as function parameters.
3. Program using functions and passing reference to a function, inline functions. Program using Inheritance and virtual base class.
4. Program using pointers, arrays, dynamic arrays. Program using functions defined in ctype.h and string.h.
5. Program using constructors, destructors. Program using function and operator over loading

List of program in C++ implementing Data Structures
6. Creating and managing (add, delete, print, insert) nodes of a Linked list.
7. Creating and managing (create, pop, push etc.) stacks and queues.

IVth Semester

DYNAMICS OF MACHINES

UNIT l:-

Governors: Watt, Porter, Proell, Hartnell and spring controlled governors, governor effort, power, stability, inertia effects.

UNIT 2:-

Gyroscope: Principle of gyroscopic couple, effect of gyroscopic couple and centrifugal force on vehicle taking a turn, stabilization of sea vessels. Inertia force analysis: Velocity and acceleration of slider crank and four bar mechanism, inertia force, piston thrust and forces on connecting rod, turning moment diagram, flywheel.

UNIT 3:-

Gears: Law of gearing, terminology, tooth form, standard interchangeable tooth profile, minimum number of teeth on pinion in contact with gear or rack, interference and undercutting, bevel, helical and spiral gears.

UNIT 4:-

Gear trains: Simple, compound, reverted and epicyclic gear trains, analytical, tabular, graphical and vector methods for velocity ratio, gear boxes- sliding and constant mesh for automobiles.

UNIT 5:- Balancing: Balancing of rotating masses, balancing of reciprocating masses, locomotives, IC engines, balancing machines.

Text Books:

1. Theory of Mechanisms and Machines :AmitabhaGhosh and Ashok kumarMallik, Third Edition Affiliated East-West Press.

2. Theory of Machines and Mechanisms : Joseph Edward Shigley and John Joseph Uicker, Jr. Second Edition McGraw Hill, Inc

Reference Books:

1. Mechanism and Machine Theory : J.S. Rao and R.V. Dukkipati, New age International.

2. Theory and Machine (S I units) S.S. Rattan, Tata McGrawHill.

FLUID MECHANICS
UNIT-I
Introduction:

Introduction concepts: Fluids and solids, Liquid, gas and vapour, Fluid mechanics, Kinematics Dynamics, Fluid properties, Density, Specific volume, Specific gravity, Viscosity, Newton's law of Viscosity, Dynamic and Kinematics Viscosity: Compressibility, Surface tension-soap bubble, drop , Capillarity, Vapour pressure and its importance

UNIT-II
Fluid Pressure and its Measurement:

Definition and its units, Pascal's law: Intensity of pressure at a point in fluid at rest , Pressure head . Pressure: Atmospheric pressure, Gauge pressure, Vacuum pressure, Absolute pressure, Differentials pressure, Law of hydrostatic pressure, Brahma's press, Pressure measurement, Manometers Piezometer-its limitation: U-tube-simple, differential, inverted, Mechanical gauge, Bourdon gauge.

UNIT-III
Hydrostatics:

Total pressure, Centre of pressure, Total pressure and centre of pressure in following cases, Plane surface immersed horizontally, Plane surface immersed vertically, Plane surface immersed at an angle, Curved surface (no proof), Working of lock gates, sluice gate.

UNIT-IV
Hydro kinematics:

Description of fluid flow, Euler approach, Lagrangian approach, Definition of path line, streamline, Types of flow, Steady-Non-steady, Uniform-Non-uniform, Laminar–Turbulent, One, Two, Three dimensional flow, Continuity equation(no proof): Assumption, Rate of discharge for one dimensional flow.

UNIT-V
Hydrodynamics and Measurement of Flow:

Energy of fluid-pressure, kinetic and potential, Bernoulli's Theorem(no proof), Assumptions and its limitation, Conversion of pressure into pressure head, velocity into kinetic head, Applications of Bernoulli's theorem, Pitot-tube, Venturimeter, Orificemeter.

Text Books:

1. Fluid Mechanics – Streeter V L and Wylie E B, McGraw Hill

2. Mechanics of Fluids – I H Shames, McGraw Hill

References Books:

1. Introduction to Fluid Mechanics and Fluid Machines – S.K. Som and G. Biswas, TMH

2. Fluid Mechanics and Fluid Power Engineering – D.S. Kumar, S.K. Kataria and Sons

3. Fluid Mechanics and Machinery – S.K. Agarwal, TMH, New Delhi

MACHINING AND MACHINE TOOLS
UNIT 1

Classification of metal removal process and machines Mechanics of metal cutting: Geometry of
single point cutting tool and tool angles. Tool nomenclature in ASA, ORS, NRS and interrelationship.Mechanism of chip formation and types of chips, chip breakers. Orthogonal and oblique cutting, cutting forces and power required, theories of metal cutting. Thermal aspects of machining and measurement of chip tool interface temperature. Friction in metal cutting.

UNIT 2

Machinability: Concept and evaluation of machinability, tool life, mechanisms of tool failure, tool life and cutting parameters, machinability index, factors affecting machinability. Cutting fluids: Types, properties, selection and application methods General Purpose Machine Tools: Classification and constructional details of lathe, drilling, milling, shaping and planning machines. Tooling, attachments and operations performed, selection of cutting parameters, calculation of forces and time for machining. Broaching operation.

UNIT 3

Special Purpose Machine Tools: Automatic lathes, capstan and turret lathe machines. Swiss automatic, operational planning and turret tool layout, sequence of operations. Tracer attachment in Machine Tools: mechanical-copying machines; Hydraulic Tracing Devices; Electric Tracing systems; Automatic tracing.
Abrasive processes: Abrasives; natural and synthetic, manufacturing, nomenclature. Selection of grinding wheels, wheel mounting and dressing, characteristic terms used in grinding. Machines for surface and cylindrical grinding, their constructional details and processes. Surface finishing: Honing, lapping, superfinishing, polishing and buffing processes.

UNIT 4

Thread Manufacturing: casting; thread chasing; thread cutting on lathe; thread rolling, die threading and tapping; thread milling; thread grinding.
Gear Manufacturing Processes: hot rolling; stamping; powder metallurgy; extruding etc. Gear generating processes: gear hobbling, gear shaping. Gear finishing processes: shaving, grinding, lapping, shot blasting, phosphate coating, Gear testing.

UNIT 5

High Velocity Forming Methods: (High-energy rate forming processes) Definition; Hydraulic forming,
Explosive forming, Electro-hydraulic forming, Magnetic pulse forming. Industrial Safety: Human factor in machine equipment safety; reducing industrial noise; precautions to be taken by operators for safe working on different machine tools.

PRODUCTION TECHNOLOGY-II

UNIT 1: Jigs and Fixtures

Introduction to jigs and fixtures, tool design, elements of jigs and fixtures, general design principles, design steps, jig body, types of jigs & fixtures, clamping devices, locating devices, adaptors, drill-jig, template jigs, plate fixtures, angle-plate jigs & fixtures, channel jigs, drilling fixtures, universal jigs, plastic jigs, milling fixtures, turning fixtures.

UNIT 2: Manufacturing Methods

Characteristics of turret Lathes, turret-indexing mechanism, tooling equipment for turrets, tool Layout or turrets. Classification of gear production methods, gear generation, bevel gear generations, gear shaping, gear finishing methods; shaving, Gear testing.

UNIT 3: Unconventional Machining Processes

Need for unconventional processes, Ultrasonic machining, electrochemical machining, electrochemical grinding, Laser beam machining, and their process parameters, principle of metal removal, applications advantages and limitations.

UNIT 4: Press Working Tools & Thread cutting

Introduction, classifications of presses and dies, hear, action in die cutting operations, center of pressure, mathematical calculation of center of pressure, clearances, cutting forces, punch dimensioning.

Introduction of threads, thread standards, thread terms, methods of making threads, screw thread inspection.

UNIT 5: Industrial Hazards and Safety

Safety training, hazard check list, general safety rules, safety and health provisions of the factories act and rules, reducing industrial noise, fire prevention, accident prevention, guarding of machine, principles of safe machine design, precautions by operator for safety on powered machines, handling, storage of materials, handling of dangerous substances, safety instructions for different fields of industries, role of OSHA(Occupational Safety and Health Administration).

Text Books:

1. Manufacturing science: Ghosh and Malik, E.W. Press

2. Principles of metal cutting: Sen and Bhattacharya, New Central Book.

ADVANCED MECHANICS OF SOLIDS

UNIT 1:-

Analysis of stress in 3-Dimensions: Body force, surface force and stress vectors, state of stress at a point, normal shear stress components, stress component on arbitrary plane, principal stresses in 3-Dimentions, stress invariants, decomposition of stress matrix into hydrostatic and pure shear states, Lame's stress ellipsoid, differential equations of equilibrium.

UNIT 2:-

Analysis of strain in 3-Dimensions: introduction, deformation in neighborhood of a point, change of length of linear element, state of strain at a point, principal axes of strain and principal strains, compatibility conditions.

UNIT 3:-

Stress strain relations for linearity elastic bodies, generalized Hooke's law, stress-strain relations for anisotropic, orthotropic and isotropic materials.

UNIT 4:-

Bending of curved beams (Winkler-Bach formula); unsymmetrical bending of beams, shear centre.

UNIT 5:-

Stresses in thick cylinders, shrink fit stresses, stresses in rotating discs.

Text Books:

1. Strength of Materials – G.H.Ryder, Third Edition in SI Units 1969 Macmillan, India.
2. Mechanics of Materials – (Metric Edition) : Ferdinand P. Beer and E. Russel Johnston, Jr. Second Edition, McGraw Hill.

Reference Books :

1. Book of Solid Mechanics – Kazmi, Tata McGraw Hill
2. Strength of Materials – D.S. Bedi - S. Chand & Co. Ltd.
3. Advanced Mechanics of Solids and Structures – N. KrishanRaju and D.R.Gururaje- Narosa Publishing House.
4. Strength of Materials – Andrew Pytel and Fredinand L. Singer Fourth Edition, Int. Student Ed. Addison – Wesley Longman.

MATERIAL SCIENCE AND ENGINEERING

UNIT 1

Atomic structure of Metals: Crystal structure, crystal lattice of (i) Body centred cubic (ii) Face centred cubic (iii) Closed packed hexagonal, crystallographic Notation of atomic planes and Directions (Miller Indices), polymorphism and allotropy, Crystal imperfection.

UNIT 2

Theories of plastic deformation.Phenomenon of slip, twinning and dislocation.Identification of crystallographic possible slip planes and direction in FCC, BCC, HCP. Recovery and recrystallization, preferred orientation causes and effects on the property of metals.

UNIT3

Classification of engineering materials. Solidification of metals and of some typical alloys: Mechanism of crystallisation (I) nuclear formation (ii) crystal growth. General principles of phase transformation in alloys, phase rule and equilibrium diagrams, Equilibrium diagram of binary system having complete mutual solubility in liquid state and limited solubility in solid state, Binary isomorphous alloy system, Hume-Rothery rule, Binary system with limited solid solubility of terminal phase and in which solubility decreases with temperature and also alloy with a peritectic transformation. Equilibrium diagram of a system whose components are subject to allotropic change. Iron carbon Equilibrium diagram, phase transformation in the iron carbon diagram (I) Formation of Austenite (ii) Transformation of Austenite into pearlite (iii) Martensite transformation in steel, TTT curves.

UNIT 4

Engineering properties and their measurements.Principles and applications of annealing, normalising, hardening, tempering.Recovery and recrystallization. Hardenability -its measures, variables, effecting Hardenability, methods, for determination of Hardenability. Over-heated and Burnt steel, its causes and remedies. Temper brittleness -its causes and remedies. Basic principles involved in heat treatment of plain carbon steel, alloy steels, cast iron and Non-ferrous metals and their alloys. Chemical Heat treatment of steels: Physical principles involved in chemical heat treatment procedure for carburizing, Nitriding, Cyaniding, carbo-nitriding of steel.

UNIT 5

Effects produced by Alloying element on the structures and properties of steel Distribution of alloying elements (Si, Mn, Ni, Cr, Mo, Co, W, Ti, Al) in steel, structural classes of steel. Classification of steels, BIS Standards.Fibre reinforced plastic composites**:** Various fibres and matrix materials, basic composite manufacturing methods, applications of composite materials.

Text Books:

1.Elements of Material Science and Engineering: VanVlack, Wesley Pub. Comp.

2. Material Science - Narula, Narula and Gupta. New Age Publishers

Reference Books:

1. Material Science & Engineering –V. Raghvan, Prentice Hall of India Pvt. Ltd, New Delhi

2. A Text Book of Material Science & Metallurgy – O.P. Khanna, DhanpatRai& Sons

DYNAMICS OF MACHINES LAB
List of Experiments:
1. To determine experimentally, the moment of inertia of a flywheel and axle compare with theoretical values.
2. To find out critical speed experimentally and to compare the whirling speed of a shaft with theoretical values.
3. To find experimentally the Gyroscopic couple on motorized gyroscope and compare with applied couple.
4. To perform the experiment of balancing of rotating parts and finds the unbalanced couple and forces.
5. To determine experimentally the unbalance forces and couples of reciprocating parts.
6. To calculate the torque on a planet carrier and torque on internal gear using epicyclic gear train and holding torque apparatus.
7. To study the different types of centrifugal and inertia governors and demonstrate any one.
8. To study the automatic transmission unit.
9. To study the differential types of brakes.
10. To find out experimentally the corli and component of accelaration and compare with theoretical values.

FLUID MECHANICS LAB

List of Experiments:

1. To determine the coefficient of impact for vanes.
2. To determine coefficient of discharge of an orificemeter.
3. To determine the coefficient of discharge of Notch (V and Rectangular types).
4. To determine the friction factor for the pipes.
5. To determine the coefficient of discharge of venturimeter.
6. To determine the coefficient of discharge, contraction & velocity of an orifice.
7. To verify the Bernoulli's Theorem.
8. To find critical Reynolds number for a pipe flow.
9. To determine the meta-centric height of a floating body.
10. To determine the minor losses due to sudden enlargement, sudden contraction and bends.
11. To show the velocity and pressure variation with radius in a forced vertex flow.

PRODUCTION ENGINEERING PRACTICE

List of Experiments:

1. Introduction to milling machines its types functions applications etc.
2. Practice of slab milling on milling machine.
3. Practice of slotting on milling machine.
4. To cut gear teeth on milling machine using dividing head.
5. Introduction to gear hobber, demonstration of gear hobbing and practice.
6. Introduction to various grinding wheels and demonstration on the surface grinder.
7. Introduction to tool and cutter grinder and dynamometer.
8. Study the constructional detail and working of CNC lathes Trainer.
9. To carry out welding using TIG/MIG welding set.
10. Introduction, demonstration & practice on profile projector & gauges.
11. To make a component on lathe machine using copy turning attachment.
12. To cut external threads on a lathe.
13. To cut multi slots on a shaper machine.
14. To perform drilling and boring operation on a Component.

MATERIAL SCIENCE & ENGINEERING LAB
List of Experiments:
1. To study crystal structures of a given specimen.
2. To study crystal imperfections in a given specimen.
3. To study microstructures of metals/ alloys.
4. To prepare solidification curve for a given specimen.
5. To study heat treatment processes (hardening and tempering) of steel specimen.
6. To study microstructure of heat-treated steel.
7. To study thermo-setting of plastics.
8. To study the creep behavior of a given specimen.
9. To study the creep behavior of a given specimen.
10. To study the properties of various types of plastics.
11. To study Bravais lattices with the help of models.
12. To study crystal structures and crystals imperfections using ball models.

VthSemester

HEAT & MASS TRANSFER

UNIT 1:-

Introduction to heat transfer processes, conduction and radiation. Fourier's law of heat conduction, thermal conductivity, thermal conductivity of solids, liquids and gases, effect of temperature on thermal conductivity. Newton's law of cooling, definition of overall heat transfer coefficient. General parameters influence the value of heat transfer coefficient.

Conduction:General 3-Dimensoinal conduction equation in Cartesian , cylindrical and spherical coordinates; different kinds of boundary conditions; nature of differential

equations; one dimensional heat conduction with and without heat generation; electrical analogy; heat conduction through composite walls; critical thickness of insulation.

UNIT 2:-

Heat transfer from finned surfaces; fin efficiency and effectiveness, two dimensional steady state heat conduction using analytical and numerical methods, periodic heat conduction.

Convection: review of Navier – Stokes and energy equation, hydrodynamic and thermal boundary layers; laminar boundary layer equations; forced convection appropriate non dimensional members; effect of Prandtl number; empirical relations for flow over a flat plate and flow through pipes.

UNIT 3:-

Natural convection: Dimensional analysis, Granhoff number, boundary layers in external flows (flow over a flat plate only), boundary layer equations and their solutions, heat transfer correlations.

Heat transfer with change of phase: nature of vaporization phenomena; different regimes of boiling heat transfer; correlations for saturated liquid vaporization; condensation on flat plates; correlation of experimental results, drop wise condensation.

UNIT4:-

Heat exchanger:Different types of heat exchangers, arithmetic and logarithmic mean temperature differences, heat transfer coefficient for parallel, counter and cross flow type heat exchanger; effectiveness of heat exchanger, N.T.U. method, fouling factor. Constructional and manufacturing aspects of Heat Exchangers.

UNIT 5:-

Thermal Radiation:Plank distribution law, Krichoff's law; radiation properties, diffuse radiations; Lambert's law. Radiation intensity, heat exchange between two black bodies heat exchanger between gray bodies. Shape factor; electrical analogy; reradiating surfaces heat transfer in presence of reradiating surfaces.

Text Books :

1. Heat Transfer – J.P. Holman, John Wiley & Sons, New York.

2. Fundamentals of Heat & Mass Transfer–Incropera, F.P. &Dewill, D.P **–John Willey New York.**

Reference Books :

1. Conduction of Heat in Solids – Carslow, H.S. and J.C. Jaeger – Oxford Univ. Press.

2. Conduction Heat Transfer – Arpasi, V.S. – Addison – Wesley.

3. Compact Heat Exchangers – W.M. Keys & A.L. Landon, Mc. Graw Hill**.**

4. Thermal Radiation Heat Transfer – Siegel, R. and J.R. Howell, Mc. Graw Hill.

5. Heat Transmission – W.M., Mc.Adams ,McGraw Hill.

INTERNAL COMBUSTION ENGINE & GAS TURBINE
UNIT-1
Heat engines; internal & external combustion engines; classification of i.c engines; cycle of operations in four stroke & two stroke I.C. engines; wankle engine. Assumptions made in air standard cycles; otto cycle; diesel cycle; dual combustion cycle comparision of otto, diesel & dual combustion cycles; sterling &ericsson cycle; air standard efficiency; specific weight; mean effective pressure.

UNIT-2
Mixture requirements for various operating conditions in S.I. engines; elementary carburetor Calculation of fuel air ratio; The complete carburetor; Requirements of a diesel injection system; type of injection system; petrol injection; MPFI; requirements of ignition system; spark plugs; stages of combustion in s.i engines; ignition lag; velocity of flame propagation; detonation; effect of engine variable on detonation; octane rating of fuel; pre-ignition; stages of combustion in c.i engine; delay period; knock in c.i engines; cetane rating

UNIT-3
Functions of a lubricating system; types of lubrication system; mist; wet sump & dry sump systems; properties of lubricating oil; SAE rating of lubricants; engine performance & lubrication; necessity of engine cooling; disadvantages of over cooling; cooling systems; air cooling, water cooling, radiators.

UNIT-4
Performance parameters; BHP, IHP, mechanical efficiency, brake mean effective pressure & indicative mean effective pressure, torque, volumetric efficiency; specific fuel consumption; thermal efficiency; heat balance; Pollutants from s.i&c.i engines; methods of emission control; alternative fuels for I.C engines

UNIT-5
Working of a single stage reciprocating air compressor; calculation of work input; volumetric efficiency; isothermal efficiency; advantages of multi-stage compression; two-stage compressor with inter-cooling; perfect inter-coolingrotary air compressor & their applications; componants of gas turbine plant; open & closed types of gas turbine plants; multi-stage compression with inter-cooling; multi-stage expension with re-heating between stages.

Text Books:

1. Internal Combustion Engines –V. Ganesan, Pub.-Tata McGraw-Hill.

2.Gas Turbines - V. Ganesan, Pub.- Tata McGraw Hill.

3. Engineering fundamental of the I.C.Engine – Willard W. Pulkrabek Pub.-PHI,India

Reference Books:

1. Internal Combustion Engines & Air pollution- Obert E.F, Pub.-Hopper & Row Pub., New York

2. Internal Combustion Engines Fundamentals- John B. Heywood, Pub.-McGraw Hill, New York

HYDRAULICS & HYDRAULIC MACHINES

Unit 1 Review of fundamentals

Euler's turbine equation, principles of similarity applied to hydraulic machines, non-dimensional specific speed. Classification of turbines on the basis of non-dimensional specific speed.Unit and specific quantities.

Impact of Free Jets: Impulse momentum principle, force exerted by the jet on stationary flat and curved plate, hinged plate, moving plate and moving curve vanes.

Unit 2 Impulse Turbine

Classification of turbine, impulse turbines, Pelton wheel, Construction, working. Work done, head, efficiency and design aspects. Governing of impulse turbine.

Unit 3 Reaction Turbine

Radial flow reaction turbine, Francis turbine: construction and working. Work done, efficiency, design aspects.

Axial flow reaction turbine

Propeller and Kaplan turbine, bulb or tubular turbine- construction and working. Draft tube, governing of reaction turbine. Performance characteristics and comparison of all the turbines.Cavitation Phenomenon in hydraulic machines.

Unit 4 Reciprocating Pumps

Classification, component and working, single acting and double acting, discharge, work done and power required, coefficient of discharge, indicator diagram, slip, effect of friction and acceleration theory of air vessels.

Unit 5 Fluid system

Hydraulic accumulator, Hydraulic intensifier, Hydraulic Press, hydraulic crane, hydraulic lift, hydraulic Ram, hydraulic coupling, hydraulic torque converter, air lift pump, jet pump.

Text Books:

1. Hydraulics & Fluid Mechanics – Modi& Seth, Pub. - Standard Book House, N.Delhi
2. Hydraulic Machines – JagdishLal, Metropolitan

Reference Books:

1. Fluid Mechanics and Hydraulic Machines – S S Rattan, Khanna Publishers
2. Introduction to Fluid Mechanics and Fluid Machines – S K Som and G Biswas, Tata McGraw Hill
3. Fluid Mechanics and Fluid Power Engineering –
4. D S Kumar, S K Kataria and Sons

INDUSTRIAL ENGINEERING

UNIT- I

Introduction to work study; Method study; Basic procedure; Recording techniques (charts and diagrams); Elemental breakdown; Micro-motion studies; Therbligs; SIMO-chart; Principles of motion –economy. Introduction; Objectives; technique; (time) information recording; methods of timings; Time study allowances; Work sampling technique; Performance rating and its determination PMTS; M. T. M.; Work factor.

UNIT- II

Principles of organization, Importance and characteristics of organization, Organization theories; Classical Organization theory; Neo-Classical organization theory, Modern organization theory; Types of organization, Military or line organization, Functional organization, Line and staff organization, Committees.

Objectives of PPC; Functions of PPC; Preplanning and planning; Routing; Estimating; scheduling-master schedule; Daily schedule; Gantt chart; Dispatching –centralized vs. decentralized; Control; Follow up and progress reporting. Introduction; Product development; Product characteristics; Role of product development; 3Ss – Standardization; Simplification and Specialization.

UNIT- III

Introduction, Objectives and importance of sales forecasting, Types of forecasting, Methods of sales forecasting-Collective opinion method, Delphi technique, economic indicator method; Regression analysis, Moving average method, Time series analysis. Introduction, Functions of inventory; Types of inventory; Control importance and functions, Inventory costs, Factors affecting inventory control, Various inventory control models. A. B. C. analysis, Lead-time calculations.

UNIT- IV

Introduction; Objectives; Concept and life cycle of a product and V.E.; Steps in VE., Methodology and techniques, Fast diagram, Matrix method. Various concepts in industrial engineering

a) WAGES AND INCENTIVES; -Concept; Types; Plans; Desirable characteristics.

b) ERGONOMICS; - its importance; Man-machine work place system; Human factors considerations in system design.

c) SUPPLY CHAIN MANAGEMENT; - its definition, Concept, Objectives, Applications, benefits, Some successful cases in Indian Industries.

d) JIT; - Its definition, Concept, Importance, Misconception, Relevance, Applications, Elements of JIT (brief description).e) MRP;-Introduction, Objectives, factors, Guide lines, Techniques Elements of MRP

f) TIME MANAGEMENT;-Introduction, Steps of time management, Ways for saving time, Key for time saves.

Text Books:

1. Production & Operations Management - Chary, TMH, New Delhi.

2. Management Information Systems - Sadagopan, PHI New Delhi.

3. Modern Production Management – S.S. Buffa, Pub.- John Wiley.
Ref.Books:
1. Operations Management - Schroeder, McGraw Hill ISE.
2. Operation Management - Monks, McGraw Hill ISE.
3. Production & Operations Management - Martinich, John Wiely SE.

DESIGN OF MACHINE ELEMENTS - I
UNIT -1
Materials: Properties and IS coding of various materials, Selection of material from properties and economic aspects. Manufacturing aspects in Design : Selection of manufacturing processes on the basis of design and economy, Influence of rate of production, standard size, Influence of limits, fits tolerances and surface finish. Change in the shape of the designed element to facilitate its production, Design of castings, working drawing.

UNIT -2
Design for strength: Allowable stresses, detailed discussion on factor of safety (factor of ignorance): Stress concentration. Causes &mitigation.Introduction of various design considerations like strength, stiffness, weight, cost, space etc.Concept of fatigue failures. Design of machine elements subjected to direct stress, Pin, cotter and keyed joints, Design of screw fastening.

UNIT -3
Design of members in Bending: Beams, levers and laminated springs.

UNIT -4
Design of members in torsion: Shafts and shaft couplings.

UNIT -5
Design of shafts, brackets under combined stresses, Calculation of transverse & torsional deflections. Screw fasteners subjected to eccentric loading.

Text Books:

1. Mechanical Engg. Design - First Metric Editions: Joseph Edward Shigley-MGH, New York.

2. Design of Machine Elements – V.B. Bhandari – Tata McGraw Hill, New Delhi.

3. PSG Design Data Book

Reference Books:

1. Engineering design – George Dieter, MGH, and New York.

2. Product Design and Manufacturing,A.K.Chitale and R.C.Gupta, PHI.

3. Machine Design an Integrated Approach: Robert L.Norton, Addison Wesley.

4. Machine Design: S.G. Kulkarini - Tata MacGraw Hill.

5. Design of machine elements-C S Sharma, KamleshPurohit, PHI.

ROBOTICS ENGINEERING

Unit I Robotic Manipulation: Automation and Robots; Robot Classification – Drive Technologies, Work-Envelope Geometries, Motion Control Methods, Applications; Robot Specifications – No. of Axes, Capacity and Speed, Reach and Stroke, Tool Orientation, Repeatability, Precision, Accuracy, Operating Environment, An Example; Rhino X-3.

Unit II Direct Kinematics: The Arm Equation Homogenous Co-ordinates – Frames, Translations and Rotations, Composite Homogenous Transformations; Screw Transformations; Link Co-ordinates; The Arm Equation; A Five-Axis Articulated Robot; A Four-Axis Scara Robot; A Six-Axis Articulated Robot; Problems.

Unit III Inverse Kinematics: Solving the Arm Equation: The Inverse Kinematics Problem; General Properties of Solutions; Tool Configuration; Inverse Kinematics of a Five-Axis Articulated Robot, Four-Axis Scara Robot, Six-Axis Articulated Robot and Three-Axis Planer Articulated Robot; A Robotic Work Cell; Problems.

Unit IV Work Space Analysis and Trajectory Planning : Work Space Analysis; Work Envelope of a Five-Axis Articulated Robot; Work Envelope of a Four Axis Scrara Robot; Work Space Fixtures; The Pick and Place Operation; Continuous Path Motion; Interpolated Motion; Straight Line Motion; Problems.

Unit V Robot Control : The Control Problems; State Equations; Constant Solutions; Linear Feedback Systems; Single-Axis PID Control; PD-Gravity Control; Computed –Torque Control; Variable-structure Control; Impedance Control; Problems.

Text Books:

1. Fundamental of Robotics (Analysis & Control) by Robert J.Schilling, Published by PHI, Pvt. Ltd., New Delhi.

2. Introduction to Robotics (Mechanics & Control) by John J. Craig, Published by Addition Wesley (Intl. Student Edition).

Reference Books:

1. Analysical Robotics & Mechatronics by Wolfram Stadler, Published by Mc-Graw Hill, Inc., New Delhi.

2. Industrial Robotics - Technology, Programming & Applications by Mikell P. Grover, Weiss, Nagel and Ordef , Published by Mc-Graw Hill International Edition.

3. A Robot Engg. Test Book - Mohsen Shahinpoor, Harper & Low, Publishing New York.

4. Robots and Control - R.K.Mittal and I.J.Nagrath - Tata McGraw Hill 2003.

HEAT & MASS TRANSFER LAB

List of Experiments:
1. Determination of thermal conductivity of a metal rod
2. Determination of thermal conductivity of an insulating powder
3. Determination of thermal conductivity of a liquid using Guard plate method
4. Determination of thermal resistance of a composite wall
5. Temperature distribution of a pin fin in free-convection
6. Temperature distribution of a pin fin in forced-convection
7. Forced convection heat transfer from a cylindrical surface
8. Determination of Electiveness of a Heat exchanger
9. Determination of Stefan-Boltzman constant
10. Performance of Solar still
11. Determination of critical heat flux
12. Performance of solar water heater
13. Measurement of solar radiation using solar integrator.

I.C. ENGINE &GAS TURBINE LAB

List of Experiments:

1. To study the constructional details & working principles of two-stroke/ four stroke petrol engine.

2. To study the constructional detail & working of two-stroke/ four stroke diesel engine.

3. Analysis of exhaust gases from single cylinder/multi cylinder diesel/petrol engine by Orsat Apparatus.

4. To prepare heat balance sheet on multi-cylinder diesel engine/petrol engine.

5. To find the indicated horse power (IHP) on multi-cylinder petrol engine/diesel engine by Morse Test.

6. To prepare variable speed performance test of a multi-cylinder/single cylinder petrol engine/diesel engine and prepare the curves (i) bhp, ihp,fhp, vs speed (ii) volumetric efficiency & indicated specific specific fuel consumption vs speed.

7. To find fhp of a multi-cylinder diesel engine/petrol engine by Willian's line method & by motoring method.

8. To perform constant speed performance test on a single cylinder/multi-cylinder diesel engine & draw curves of (i) bhpvs fuel rate, air rate and A/F and (ii) bhpvsmep, mech efficiency &sfc.

9. To measure CO & Hydrocarbons in the exhaust of 2- stroke / 4-stroke petrol engine.

10. To find intensity of smoke from a single cylinder / multi-cylinder diesel engine.

11. To draw the scavenging characteristic curves of single cylinder petrol engine.

12. To study the effects of secondary air flow on bhp, sfc, Mech. Efficiency & emission of a two-stroke petrol engine.

Hydraulic and Hydraulics Machine Lab

List of Experiments:

1. To study and perform lest on the Pelton wheel and to plot curves Q, P Vs N at full, three fourth gate opening.

2. To study and perform test in the Francis Turbine and to plot curves Q, P Vs N at full, three- fourth gate opening.

3. To study Kaplan Turbine.

4. To study and perform test on Centrifugal Pump and to plot curves h, Power Vs Q.

5. To study and perform test on a Hydraulic Ram and to find its Rankine, Aubussion

6. To study and perform test on a Reciprocating pump and to plot the P and hVs H.

7. To study and perform test on a Gear Pump and to plot the curves Q.P Vs Pressure rise.

VIth Semester

AUTOMOBILE ENGINEERING

UNIT -1
FRAME & BODY: Layout of chassis, types of chassis frames and bodies, their constructionalfeatures and materials.

TRANSMISSION SYSTEM**:** Clutch; single plate, multi-plate, cone clutch, semi centrifugal,electromagnetic, vacuum and hydraulic clutches. Fluid coupling.

UNIT -2
Gear boxes, Sliding mesh, constant mesh, synchromesh and epicyclic gear boxes, Automatictransmission sytem; Hydraulic torque converter; overdrive, propeller shaft, universal joints, front

wheel drive, differential; Rear axle drives. Hotchkiss and torque tube drives; rear axle types; Twowheel and four wheel drive.

UNIT -3
RUNNING GEAR: Types or wheels and tyres. Tyre construction; tyre inflation pressure, tyrewear and their causes; re-treading of the tyre, Steering system, steering gear boxes, Steeringlinkages, steering mechanism, under and over steering. Steering Geometry, effect of camber,caster, king pin inclination, toe in and toe out; power steering; integral and linkage typessuspension system; objects and requirements, suspension spring, front and rear suspensionsystems, Independent suspension system shock absorber.

BRAKES; Classification and function;Mechanical, hydraulic, vacuum air and self engineering brakes; Brake shoes and lining materials.

UNIT -4
AUTOMOTIVE ELECTRICAL SYSTEM: Battery construction, Charging and testing,batterytypes,Starting and Battery Charging System: Starter motor construction, types of drive, Alternatorconstruction, regulation and rectification.

Ignition System: magneto and coil ignition systems, System components and requirements,

Automotive lighting: Wiring systems Electrical instruments; head lamp, electric horn, fuellevelindicator.

UNIT -5
AUTOMOTIVE AIR CONDITIONING: Introduction, Loads, Air conditioning systemComponents, Refrigerants, Fault Diagnosis. AUTOMOTIVE SAFETY: Safety requirements,Safety Devices, Air bags, belts, radio ranging, NVS (Night Vision System) GPS (GlobalPositioning System) etc.

Text Books:
1. Automobile Engineering by Anil Chhikara, SatyaPrakashan, New Delhi.
2. Automobile Engineering by Dr. Kirpal Singh, standard Publishers Distributors.

Reference Books:
1. Automotive Mechanics – Crouse / Anglin, TMH.
2. Automotive Technology – H.M. Sethi, TMH, New Delhi.
3. Automotive Mechanics – S.Srinivasan, TMH, New Delhi.
4. Automotive Mechanics – Joseph Heitner, EWP.
5. Motor Automotive Technology by Anthony E. Schwaller – Delmer Publishers, Inc.
6. The Motor Vehicle – Newton steeds Garrett, Butter Worths.

MECHANICAL VIBRATION
Unit 1

Scope of vibration, important terminology and classification, Degrees of freedom, Harmonicmotion; vectorial representation, complex number representation, addition. Derivation ofequation of motion for one dimensional longitudinal, transverse and torsional vibrationswithout damping using Newton's second law, D' Alembert's principle and Principle ofconservation of energy.

Unit 2

Damped vibrationsof single degree of freedom systems.Viscous damping; underdamped, critically damped andoverdamped systems, Logarithmic decrement. Vibration characteristics of Coulomb dampedand Hysteretic damped systems.

Unit 3

Forced vibrations of single degree of freedom systems. Forced vibration with constant harmonic excitation. Steady state and transient parts. Frequency response curves and phase angle plot. Forced vibration due to excitation of support. Vibration Isolation and transmissibility; Force transmissibility, Motion transmissibility. Forced vibration with rotating and reciprocating unbalance. Materials used in vibration isolation.

Unit 4

System with two degrees of freedom; principle mode of vibration, Mode shapes.Un-dampedforced vibrations of two degrees of freedom system with harmonic excitation. VibrationAbsorber; Un-damped dynamic vibration absorber and centrifugal pendulum absorber. Manydegrees of freedom systems: exact analysis.

Unit 5

Many degrees of freedom systems: approximate methods; Rayleigh's, Dunkerley's, Stodola'sand Holzer's methods. Vibrations of continuous systems; Transverse vibration of a string,Longitudinal vibration of a bar, Torsional vibration of a shaft.

Text Books:

1. Theory of Vibrations with Applications W.T. Thomson, Prentice Hall of India.

2. Mechanical Vibration : G.K. Grover and S.P. Nigam, Nem Chand and Sons

Reference Books :

1. Theory and Practice of Mechanical Vibrations J.S. Rao and K. Gupta, Wiley Eastern Ltd.

2. Mechanical Vibrations S.S. Rao, Addison – Wesely Publishing Company

DESIGN OF MACHINE ELEMENTS- II
UNIT 1

Fatigue Considerations in Design: Variable load, loading pattern, Endurance stresses, influence of size, surface finish, notch sensitivity & stress concentration. Goodman line, Soderberg, Design of machine members subjected to combined, steady and alternating stresses. Design for finite life. Design of Shafts under Variable Stresses.

UNIT 2

Pre loading of bolts; effect of initial tension & applied loads, Bolts subjected to variable stresses.Design of members which are curved like crane hook, body of C-clamp, machine frame etc. Power screws like lead screw, screw jack.

UNIT 3

Design of helical compression, tension, torsional springs. Springs under variable stresses.Design of belt, rope and pulley drive system, selection of chain & sprocket drive systems.

UNIT 4

Design of gear teeth, Lewis and Buckingham equations; wear and dynamic load considerations, Design and force analysis of spur, helical, bevel and worm gears. Bearing reactions due to gear tooth forces.

UNIT 5

Design of sliding & journal bearing; method of lubrication, hydrodynamic, hydrostatic, boundary etc.Minimum film thickness and thermal equilibrium.Selection of anti-friction bearings for different loads and load cycles.Mounting of the bearings.Method of lubrication, selection of oil seals.

Text Books:
> 1. Mechanical Engg. Design- Joseph Edward Shigley-McGraw Hill Book Co.
> 2. Design of Machine Elements – V.B. Bhandari – Tata McGraw Hill, New Delhi.

Reference Books :
> 1. Engineering design – George Dieter, McGraw Hill, New York.
> 2. Product Design and Manufacturing –: A.K.Chitale and R.C.Gupta, PHI, New Delhi.
> 3. Machine Design An Integrated Approach: Robert L.Norton,Second Edition –Addison Wisley Longman
> 4. Machine Design : S.G. Kulkarni , TMH , New Delhi.

REFRIGERATION& AIR CONDITIONING ENGINEERING

UNIT-I

Fundamental of Refrigeration:

Introduction to refrigeration and air conditioning, units of refrigeration, methods of refrigeration, natural system and artificial system of refrigeration, refrigeration effect. Rating of refrigeration, co efficient of performance. Difference between COP and efficiency. Introduction to air refrigeration cycle. Carnot cycle, bell-Coleman cycle.

UNIT-II

Vapour Compression System:

Principle, function, parts and necessity of Vapour compression system. P – H charts. Dry, wet, and super heated compression. Effect of sub-cooling and super heating, effect of moisture in vapour compression system. Comparison between air refrigeration and vapour compression system.

UNIT-III

Vapour Absorption System:

Introduction, principle and working of electrolux refrigeration system, Solar power refrigeration system, advantages and disadvantages of solar power refrigeration system over vapour compression system.

UNIT-IV

Refrigeration Equipment:

Compressor – Function, various types of compressor. Condenser – Function, Various types of condenser. Evaporators – Function, Various types of evaporators. Expansion Devices – Function, Different types such as capillary tube, thermostatic expansion valve, automatic expansion valve, low side float valve and high side float valve.

UNIT-V

Psychrometry:

Definition of dry air, moisture, saturated air, unsaturated air, specific humidity, relative humidity, degree of saturation, DBT, WBT, DPT. Psychometric charts, heating with humidification, cooling with dehumidification, by pass factor. Air conditioning systems. Windows type air conditioner, split type air conditioner.

Text Books :
1. Refrigeration & Air conditioning –R.C. Jordan and G.B. Priester, Prentice Hall of India.
2. Refrigeration & Air conditioning –C.P. Arora, TMH, New Delhi.

Reference Books:
1. A course in Refrigeration & Air Conditioning – Arora&Domkundwar, DhanpatRai& Sons.
2. Refrigeration & Air conditioning –W.F. Stocker and J.W. Jones, TMH, New Delhi.
3. Refrigeration & Air conditioning- Manohar Prasad Wiley Estern limited, New Delhi.

STEAM GENERATION AND POWER
UNIT 1
Introduction; classification of boilers; comparison of fire tube and water tube boiler; their advantages; description of boiler; Lancashire; locomotive; babcock; Wilcox; boiler mountings; stop valve; blow off valve; feed check; water level indicator; fusible plug; pressure gauge; boiler accessories; feed pump; feed water heater; preheater; superheater; economizer; natural draught chimney design; artificial draught; stream jet draught; mechanical draught; calculation of boiler efficiency and equivalent evaporation (no numerical problem)

UNIT 2
Carnot cycle; single and modified rankine cycle; effect of operating parameters on rankine cycle performance; effect of superheating; effect of maximum pressure; effect of exhaust pressure; reheating and regenerative rankine cycle; types of feed water heater; reheat factor; binary vapour cycle. simple steam engine; compound engine; function of various components.

UNIT 3
Function of steam nozzle; shape of nozzle for subsonics and supersonics flow of stream; variation of velocity; area of specific volume; steady state energy equation; continuity equation; nozzle efficiency; critical pressure ratio for maximum discharge; physical explanation of critical pressure; super saturated flow of steam; design of steam nozzle.

UNIT 4
Advantages of steam condensation; component of steam condensing plant; types of condensers; air leakage in condensers; dalton's law of partial pressure; vacuum efficiency; calculation of cooling water requirement; air expansion pump.

UNIT 5
Introduction; classification of steam turbine; impulse turbine; working principal; compounding of impulse turbine; velocity diagram; calculation of power output and efficiency; maximum efficiency of a single stage impulse turbine; design of impulse turbine blade section; impulse reaction turbine; working principle; degree of reaction; parsons turbine; velocity diagram; calculation of power output; efficiency of blade height; condition of maximum efficiency; internal losses in steam turbine; governing of steam turbine.

Text Books :
1. Thermal Engineering – P L Ballaney, Khanna Publishers
2. Thermodynamics and Heat Engines vol II – R Yadav, Central Publishing House
3. Thermal Engineering ; P L Ballaney

Reference Books :
1. Applied Thermodynamics for Engineering Technologists – T D Eastop and A
McConkey, Pearson Education

COMPUTER AIDED DESIGN AND MANUFACTURING
UNIT 1

Introduction to CAD/CAM, Historical Development, Industrial look at CAD/CAM, Introduction to CIM Basic of Geometric & Solid modeling, Coordinate systems,

UNIT 2

Introduction, Transformation of points & line, 2-D rotation, Reflection, Scaling and combined transformation, Homogeneous coordinates, 3-D scaling, shearing, rotation, reflection and translation, combined transformations, Orthographic and perspective projections.

UNIT 3

Algebraic and geometric forms, tangent & twist vectors, normal blending function, reparametrization, Sixteen point form, four Curve form, Plane surface, ruled surface Surface of revolution, tabulated cylinder Bi-cubic surface, bezier surface, B-spline surface. Solid models and representation scheme B-rep & CSG, sweep representation, Cell decomposition, spatial occupancy enumeration

UNIT 4

Introduction, fixed programmable and flexible automation, Types of NC systems, MCU & other components, Co-ordinate system, NC manual part programming, G & M codes, part program for simple parts, Computer assisted part programming

UNIT 5

Introduction, FMS component, Types of FMS, FMS layout, Planning for FMS, dvantage and applications.Part families, Part classification and coding, product flow analysis.

Text Books:
1. CAD/ CAM by Groover and Zimmer, Prantice Hall.
2. CAD/ CAM Theory and Practice by Zeid, McGraw Hill
3. Numerical Control and Computer Aided Manufacturing by Kundra, Rao&Tiwari, TMH.
Reference Books:
   1. CAD/CAM (Principles, Practice & Manufacturing Management) by ChirsMc Mohan & Jimmie Browne, Published by Addison- Wesley.

AUTOMOBILEENGINEERING LAB

1. To study and prepare report on the constructional details, working principles and operation of the following Automotive Engine Systems & Sub Systems.

(a) Multi-cylinder: Diesel and Petrol Engines.

(b) Engine cooling & lubricating Systems.

(c) Engine starting Systems.

(d) Contact Point & Electronic Ignition Systems.

2. To study and prepare report on the constructional details, working principles and operation of the following Fuels supply systems:

(a) Carburetors

(b) Diesel Fuel Injection Systems

(c) Gasoline Fuel Injection Systems.

3. To study and prepare report on the constructional details, working principles and operation of the following Automotive Clutches.

(a) Coil-Spring Clutch

(b) Diaphragm – Spring Clutch.

(c) Double Disk Clutch.

4. To study and prepare report on the constructional details, working principles and operation of the following Automotive Transmission systems.

(a) Synchromesh – Four speed Range.

(b) Transaxle with Dual Speed Range.

(c) Four Wheel Drive and Transfer Case.

(d) Steering Column and Floor – Shift levers.

5. To study and prepare report on the constructional details, working principles and operation of the following Automotive Drive Lines & Differentials.

(a) Rear Wheel Drive Line.

(b) Front Wheel Drive Line.

(c) Differentials, Drive Axles and Four Wheel Drive Line.

6. To study and prepare report on the constructional details, working principles and operation of the following Automotive Suspension Systems.

(a) Front Suspension System.

(b) Rear Suspension System.

7. To study and prepare report on the constructional details, working principles and operation of the following Automotive Steering Systems.

(a) Manual Steering Systems, e.g. Pitman –arm steering, Rack & Pinion steering.

(b) Power steering Systems, e.g. Rack and Pinion Power Steering System.

(c) Steering Wheels and Columns e.g. Tilt & Telescopic steering Wheels, Collapsible Steering Columns.

8. To study and prepare report on the constructional details, working principles and operation of the following Automotive Tyres& wheels.

(a) Various Types of Bias & Radial Tyres.

(b) Various Types of wheels.

9. To study and prepare report on the constructional details, working principles and operation of the Automotive Brake systems.

(a) Hydraulic & Pneumatic Brake systems.

(b) Drum Brake System.

(c) Disk Brake System.

(d) Antilock Brake System.

(e) System Packing & Other Brakes.

10. To study and prepare report on the constructional details, working principles and operation of Automotive Emission / Pollution control systems.

11. Modeling of any two automotive systems on 3D CAD using educational softwares (eg. 3D modeling package/Pro Engineering/I-Deas/ Solid edge etc.)

12. Crash worthiness of the designed frame using Hypermesh and LS-Dyna solver or other software.

MACHANICAL VIBRATION LAB

1. To study un-damped free vibrations of equivalent spring mass system and determine the natural frequency of vibrations

2. To study the free vibration of system for different damper settings. Draw decay curve and determine the log decrement and damping factor. Find also the natural frequency

3. To study the torsional vibration of a single rotor shaft system and to determine the natural frequency.

4. To determine the radius of gyration of given bar using bifilar suspension.

5. To verify the dunker ley's rule

6. To study the forced vibration of system with damping. Load magnification factor vs. Frequency and phase angle vs frequency curves. Also determine the damping factor.

7. To study the pressure distribution of a journal bearing using a journal bearing apparatus.

8. To determine the rate of wear of a metallic pin from the plot of displacement Vs time curves by using friction and wear monitor apparatus.

9. To determine abrasion index of a material with the help of dry abrasion test rig.

10. To evaluate the load wear index and the weld point of a lubricant with the help of a four ball stream pressure tester.

11. To determine the two frequencies of torsional spring type double pendulum &compare them with theoretical values.

12. To determine the radius of gyration of a compound pendulum.

13. To determine the radius of gyration of disc using tri-filar suspension.

REFRIGERATION & AIR CONDITIONING LAB

1. To study the vapour compression Refrigeration System and determine its C.O.P. and draw P-H and T-S diagrams.

2. To determine the COP using Refrigeration Test Rig.

3. To conduct performance test on vapour absorption type refrigeration system.

4. To study the cut- sectional models of Reciprocating and Rotary Refrigerant compressor.

5. To study the various controls used in Refrigerating & Air Conditioning systems.

6. To study the Ice- plant, its working cycle.

7. The air-conditioning test rig enables:

i. To study a vapour compression refrigeration system and determine its co-efficient of

Performance.

ii. To study the concept of air conditioning.

iii. To understand humidification process and

iv. To understand dehumidification.

8. The aim of the Window Air-Conditioning test rig is :

i. To study a vapour compression refrigeration system and to determine its coefficient

of the performance.

ii. To understand the concept of air conditioning.

iii. To determine the air conditioning capacity.

9. To Determine the Efficiency Of forced Draft Type Cooling Tower

COMPUTER AIDED DESIGN & MANUFACTURING LAB

1. **Implement simple programmes for the graphics representation of**

(i) Transformation and projections.

(ii) Conic Sections, cubic splines, and B-splines.

(iii) Surfaces- Bilinear, Bicubic surface patch and Bezier surface.

2. **CAD Modelling Assignments.**

(i) Construction of simple machine parts and components.

(ii) Modelling of machine components.

• Surface of a Diffuser section, Propeller.

• Gear blank and other mechanical parts.

• Mechanical assembly of parts.

VIIth Semester

OPERATIONS RESEARCH

Unit 1

Linear Programming: Introduction & Scope, Problem formulation, Simplex methods, Primal and dual problem, dual Simplex, Sensitivity analysis.

Unit 2

Transportation, Transshipment and Assignment Problems.

Dynamic Programming: Multistage decision problems and solution, Principle of optimality.

Unit 3

Decision Theory: Decision under various conditions.

Game Theory: Minimum and maximum strategies, Application of linear programming.

Integer Programming: Cutting plane method and Branch and Bound Method.

Unit 4

Deterministic and Stochastic Inventory Models: Single and multi period models with continuous and discrete demands, service level and reorder policy.

Unit 5

Simulation: Simulation versus mathematical modeling, Monte Carlo Simulation, Simulation Language ARENA

Quening Models: Introduction Model Types, M/M/1 and M/M/S System, Cost consideration.

Text Books:
1. Operation Research – TAHA, PHI, New Delhi.
2. Principle of Operations Research – Ackoff, Churchaman, arnoff, Oxford IBH, Delhi.

Reference Books :
1. Operation Research- Gupta & Sharma, National Publishers, New Delhi.
2. Quantitative Techniques- Vohra, TMH, New Delhi
3. Principles of operation Research (with Applications to Managerial Decisions) by H.M.Wagher, Prentice Hall of India, New Delhi.
4. Operation Research – D.S Hira, Gupta, S.Chand, New Delhi.
5. Operation Research – Philips, Revindran, Solgeberg, Wiley ISE.

TRIBOLOGY

UNIT- I

INTRODUCTION :-Introduction to Tribology, general tribological considerations in design of gears, cams, reciprocating components, Engine tribology basics – importance , tribological aspects of engine components such as bearing, piston assembly, valve train, transmission drive line-transmission, traction drive, universal and constant velocity joints, wheel bearings, drive chains, lubrication regims in the engine.

UNIT -II

FRICTION AND WEAR:-Nature of metal surface, surface properties, surface parameters and measurements, types, sliding friction, rolling friction, theories of friction, modified adhesive theory, engine friction, losses and engine design parameters. Introduction to wear, types of wear, theories of wear, mechanism of wear, wear testing and methods of wear measurements, factors affecting wear.

UNIT-III

BEARINGS, LUBRICATION AND AUTOMOTIVE LUBRICANTS:- Theory of hydrodynamics, lubrication, generalizedReynold's equation & physical significance of terms, pressure distribution and load carrying capacity equations for hydrodynamic journal bearinginfinitely long and short bearing approximations, thrust bearings, Raleigh bearing sintered bearings. Automotive Lubricants- introduction, properties, standard test methods for automotive lubricants, testing, classification, engine oil performance designations, tests, transmission fluids, gear lubricants, axle lubricants, solid lubricants, automotive engine oils, EP lubricants, Lubricant monitoring, SOAP, ferrography and other rapid testing methods of lubricant contamination

HYDROSTATIC AND ELASTOHYDRODYNAMIC LUBRICATION:- Hydrostatic bearings, basic concepts, bearing characteristic number and performance coefficients, flat, conical & spherical pad thrust bearing, air & gas lubricated bearing, squeeze film lubrication Elastohydrodynamic Lubrication, introduction, rolling of two cylinders, lubrication of ball & roller bearings, cams and gears, selection and life estimation, fatigue and diagnosis. .

UNIT-IV

INTRODUCTION TO PREVENTIVE MAINTANENCE:-Definition of preventive maintenance, difference between regular maintenance and preventive maintenance, preventive maintenance schedule for passenger vehicles and commercial vehicles, Noise, wear and corrosive maintenance.

PERIODIC MAINTANENECE:-Maintenance of batteries, Lead acid battery, Factor affecting battery life, testing and battery troubles Maintenance of auxiliaries Lubrication system, greasing of vehicle, lubrication charts , Cooling system Maintenance, Maintenance of Electrical system, testing of starters ,alternators, ignition coils, wiring harness, horns, wipers, maintenance of drive line system

Text Books:
1. Tribology in Indertrion- By Sushil Kumar Srivastava
2. Introduction to Tribology of Bearings- By B.C. Majumdar ; A.H.Wheeler
3. Principles of Tribology – By J. Halling, Macmillan
4. Mechanics and Chemistry in Lubrication- By Dorinson and Ludema , Elsevier
5. Friction and wear of Materials- By E. Robinowicz, Johan Wiley
6. Principles of Lubrication-By A. Cameron, Longmans

PRODUCT DEVELOPMENT AND LAUNCHING

Unit 1: Importance of new product-Definition-importance-Development Process.

Importance of new product for growth of enterprise.Definition of product and new product.Responsibility for new product development.Demands on product development team.Classification of products from new product development. Point of view- Need based/Marketpull products, Tech. push, Platform based, Process based and customized products. Newproduct development process and organization.Generic product development process forMarket Pull Products.Modification of this process for other types of products.

Unit 2: Need analysis- Problem Formulation

Establishing economic existence of need, Need Identification and Analysis, EngineeringStatement of Problem, Establishing Target Specification.

Unit 3: Generation of Alternatives and Concept Selection

Concept generation- a creative process, Creativity, Road Elects to creative thinking-Fear ofcriticism and Psychological set.Tools of creativity like brain storming, Analogy, Inversionetc.,Creative thinking Process.Concept feasibility and Concept Selection, Establishing Engineering Specification ofProducts.

Unit 4: Preliminary & detailed design- Design Review

Preliminary design- Identification of subsystems, Subsystem specifications,Compatibility.Detailed design of subsystems, component design, Preparation ofassembly drawings. Review of product design from point of view of Manufacturing,Ergonomics and aesthetics.

Unit 5: Management of New Product – development and Launch.

New Product Management's Challenges – Maintaining focus, Promotion of Right Culture,Management of Creativity, Top Management attention.Design Team Staffing and Organization.Setting key mile stone, Identification of Risk Areas,Project Execution and Evaluation Product Launch Strategies.Project Planning – Project Task matrix, estimation of time & resources, project scheduling.

FLEXIBLE MANUFACTURING SYSTEMS

Unit I Automation: Types of automation, reasons for automating, automation strategies, Detroit-type automation: Automated flow lines, methods of work part transport, Transfer mechanisms, buffer storage, automation for machining operations.

Unit II Automated assembly systems: Design for automated assembly, types of automated assembly systems, part feeding devices, quantitative analysis of the delivery system operation, analysis of a single-station assembly machine, numericals.

Unit III Group Technology: Part families, parts classification and coding, types of classification and coding systems. Machine cell design: The composite part concept, types of cell designs, determining the best machine arrangement, benefits of group technology.

Unit IV Flexible Manufacturing Systems: Components of an FMS, types of systems, where to apply FMS technology, FMS work stations. Material handling and storage system: Functions of the handling system, FMS layout configurations. Material handling equipment. Computer control system: Computer function, FMS data file, system reports. Planning the FMS, analysis methods for FMS, applications and benefits.

Unit V Robot applications: Characteristics of robot applications, robot cell design, types of robot applications: Material handling, processing operations, assembly and inspection.

Text Books:

1. Automation, Production Systems and Computer Integrated Manufacturing.

Groover M.P, Prentice Hall of India.
2. CAD/CAM – Groover M.P, Zimmers E.W, Prentice Hall of India.

Reference Books:

1. Approach to Computer Integrated Design and Manufacturing
Nanua Singh, John Wiley and Sons, 1998.
2. Production Management Systems: A CIM Perspective

Browne J, Harhen J, Shivnan J, Addison Wesley, 2nd Ed. 1996.

ENVIRONMENT ENGINEERING

UNIT 1

Introduction: Environment & its segment, Biosphere, impact of humans upon environment, impact of humans upon environment, Biodiversity and sustainable development. Ecology: Meaning, scope and sub division of ecology ecosystems and itstypes, Energy flow (Radiation &Haet Budget) food chains, trophic level,ecological pyramid biogeochemical cycles- nitrogen, sulphur andphosphorous cycles. Ecological balance in nature, consortism and ranks ofconsortium, Sources and effects of radio actives fall-outs , disposal ofradioactive waste, chemical and biological agents and effects of chemicaland biological warfare, population Explosion - its affects & India's scenario.

UNIT 2 Energy &Environment

Energy, uses of energy, historical background, economic of energy, conventional and non conventional sources of energy, renewable energysources (such as solar, wind, tidal, wave, geothermal, hydro and bio massenergy), and their environmental impacts with special references on Indianscenario.

UNIT 3Air pollution

Composition and structure of atmosphere, classification and sources of air pollutants, Meteorological parameters influencing air pollution, plume behavior, effects of air pollution on meteorological

Conditions like greenhouse effects ozone depletion, & acid reins, effects of air pollution on plants, animals and human health & economic effects of airpollution. EI-Nin and its affects. Automobile pollution – effects and control measures and techniques of air pollution control.Air pollution control devices like settling chamber, cyclones, ESP, Bag, filters, catalytic convertors etc.

UNIT 4Noise Pollution

General introduction to noise pollution, human acoustic.Unit of measurement, loudness, measurements of noise & weighting networks , sources and effects of noise pollution, noise abetment / control

and noise standards.

UNIT 5 Solid wastes

Definition, types and composition, sources of solid wastes, method of disposal, land filling, incineration, pulverization, Compositioning. Selection of method of disposal. Solid waste management and reuse of material.

Recommended Books:

1. Environmental Engineering by H.S.Peavy and D.R.Rowe , McGraw Hill
Book co. ltd.
2. Ecology By E.P.Odum Oxford & IBN publication. New Delhi.
3. Air Pollution By: M.N. Rao
4. Environmental Noise pollution by P.F. Cuniff, John Wiley & sons.

MEASURMENTS & CONTROL

UNIT -1

System configuration, basic characteristic, calibration, classification and performancecharacteristics of a instrumentation system, Specification and testing of dynamic response. Strain

Measurement : Electric Strain Gauges -Types ; Selection and Installation, Strain gauge circuits;temperature compensation and calibration; Use of Strain Gauges on Rotating Shafts, Load Cells,Mechanical and Optical Strain Gauges.

UNIT -2

Various Mechanical, Electro-Mechanical & Photoelectrical Sensors for sensing of Displacement,

Velocity, Acceleration, Torque, Force, Temperature from Low to High Range, flow, level offluid , pressure, angular speed, voltage, frequency and current.

UNIT -3

Introduction to Multi-Channel Data-Acquisition System, Measurement Pods, Interface Hardware,Data Analysis Software, Interfacing.Concepts and examples of automatic control systems, systems by differential equations, transferfunction, block diagram, open and feed back control systems, signal flow graphs &itsconstructions. Control System components, error sensing devices and servo motors.

UNIT -4

Control for mechanical systems &processes ; speed control system for steam/gas turbines. Aconstanttension ;reeling system, Electro-mechanical systems. Thermal systems, Pneumaticsystems; Mathematical Models of physical systems, Feedback characteristics of Control Systems.Time response analysis; transient response analysis, time response specifications, steadystate-error.

UNIT -5

Concepts of stability, Routh-Hurwiz stability criterion, relative stability. The root locus technique,use of construction rules without any derivation. Frequency response analysis, Polar plots;stability in frequency domain, Bode / Logrithmic plots. Nyquist stability criterion.

Reference and Text Books:

1. Mechanical measurements & control - By D.S. Kumar, Metropolitan book

2. Instrumentation and Mechanical measurements - By AX. Tayal, Galgotia Pub!.

3. Measurements systems application and design -By Ernest Doebelin, McGraw-Hili

MEASUREMENT & CONTROL LAB

1. Study of a strain gage based cantilever beam and measurement of strain on thebeam

2. Study of a LVDT and-measurement of linear displacement

3. Study of an inductive pick up and measurement of linear displacement

4. Study of a LDR and measurement of linear displacement

5. Study of capacitive pick up and measurement of angular displacement

6. Study of temperature transducers and measurement of temperature of fluid

7. Study of a LVDT (strain gage based) and measurement of linear displacement

8. Study of a torque pick up and measurement of torque

9. Study of a pressure pick up and measurement of pressure of fluid

10. Study of load cell and measurement of load with load cell

11. Study of non-contact type speed pick up and measurement of rotational speed

12. Comparison of sensitivity of thermocouple, thermister and RTD

VIIIthSemester

ENTREPRENEURSHIP

UNIT 1

Engineering Economics:Definition and concept, Importance of economics for engineers, present value and future value, Wealth, Goods, Wants, Value and price, capital, money, utility of consumer and producer goods.

Costing:Introduction, Elements of cost, Prime cost, Overhead, Factory cost, Total cost, Selling price, Nature of cost, Types of cost.

UNIT 2

Depreciation:Definition and concept, Causes of depreciation, Methods of calculating depreciation.

Economic analysis of investment and selection of alternatives:Introduction, Nature of selection problem, Nature of replacement problem,Replacement of items which deteriorate, Replacement of machines whose operatingcostincrease with time and the value of money also changes with time, methods usedin selection of investment and replacement alternatives.

UNIT 3

Entrepreneurship:Entrepreneurship, Role of entrepreneur in Indian economy, Characteristics of anentrepreneur, Types of entrepreneurs, some myths and. realities aboutentrepreneurship.

Small scale Industries:Introduction, Role and scope of small scale industries, concept of sma!1 scale andancillary industrial undertakings, How to start a small scale industry, Steps inlaunching own venture, procedure for registration of small scale industries, variousdevelopment.:tl agencies-their functions and role in industrial and entrepreneurshipdeveiopment, Infrastructure facil!ties available for entrepreneurship development inIndia.

UNIT 4

Product planning and Development:Introduction, Requirement of a good product design, product developmentapproaches, Product development process, Element of Concurrent engg., Qualityfunction development, rapid prototyping, various controlling agencies, involved -their role and formalities for getting clearance before starting individual venture

UNIT 5

Financial management:Financial concept for small-scale industries, financial requirements Financial supportprogrammer of banks, government financial agencies, Hire-purchase facilities alternatesources of finance.

Marketing: The modern concept of marketing, Definitions, functions and principle of marketing,Marketing research, Advertising, Market survey, Pre-feasibility and feasibility ofproject. Identification and evaluation of business opportunity, risk involved andpreparation of business plan.

Reference and Text Books:

The practice of Entrepreneurship - By G. G. Meredikh, R.E. Nelson and

P.A. Neck

Handbook of Entrepreneurship - By Rao and Pareek

POWER PLANT ENGINEERING

UNIT 1

Sources of Energy:Conventional and non-conventional sources of energy; Importance of electrical energy;Geothermal power plants; Tidal power plants; Windmills; Solar power plants; Directenergy conversion systems; Energy sources in India; Recent developments in powerplants.

UNIT 2

Hydro Power Plants: Hydrology: rainfall, runoff, hydrographs, flow duration curves; Site selection for hydropower plants; Classification of hydro power plants; Storage type hydro power plant and its operation; Estimation of power availability; Selection of water turbines; Combination of hydro power plants with steam plants; advantages and disadvantages of hydro power points.

Steam (Thermal) Power Plants: Analysis of steam power cycles for power plant application; High pressure boilers- La-Mont boiler, Benson boiler; Loeffler boiler; Velox boiler; Super pressure steam power plants; Economizers; Air-pre heaters; Super heaters and reheaters; Feed water heaters. General layout of thermal power plant; Site selection for thermal power plant; Coal as fuel, classification of coals, analysis of coal; Coal handling; Dead and live storage; Combustion of coal: coal burning methods, overfeed stokers, underfeed stokers, pulverized fuels and burners. Ash handling and disposal; Dust collectors. Heat balance sheet for thermal power plants.

UNIT3

Diesel Power Plants: Introduction; Field of use; Outline of diesel electric power plant; Different systems of diesel power plant; Supercharging of diesel engines; Performance of diesel power plant; Advantages and disadvantages of diesel plants over thermal power p:ants.

UNIT 4

Gas Turbine Plants: Elements of plant; Thermal refinements; Performance of plants; Gas turbine characteristics; Comparison with other plants; Combined steam and gas turbine powerplants.

Nuclear Power Plants: Basic theory and terminology; Nuclear fission and fusion processes; Fission chain reaction; Moderation; Fertile materials; Nuclear fuels; General components of nuclearreactor; Different types of reactors; Breeder reactors; Nuclear power plants in India; Disposal of nuclear waste.

UNIT 5

Fluctuating-Loads on Power Plants: Introduction; Load curves; Different terms. And definitions; Effects of variable loads on power plant design and operations.

Economic Analysis of Power plants and Tariffs: Cost of electrical energy; Selection of type of generation; selection of generating equipment; performance and operating characteristics of power plants; Load divisionamong generators; Tariffs methods tor electrical energy.

Reference and Text Books:

1. Power Plant Engineering - By Morse

FUNDAMENTAL MANAGEMENT

UNIT 1

Meaning of management: Definitions of Management, Characteristics of management,Management vs. Administration.Management-Art, Science and Profession.ImportanceofManagement.Development of Management thoughts.

UNIT 2

Principles of Management.The Management Functions, Inter-relationship of Managerialfunctions.

Nature and Significance of staffing, Personnel management, Functions of personnelmanagement, Manpower planning, Process of manpower planning, Recruitment,Selection; Promotion – Seniority Vs. Merit. Training – objectives and types of training.

UNIT 3

Production Management : Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control. Brief introduction to the concepts of material management, inventory control; its importance and various methods**.**

UNIT 4

Marketing Management – Definition of marketing, marketing concept, objectives & Functions of marketing.

Marketing Research – Meaning; Definition; objectives; Importance; Limitations; Process. Advertising – meaning of advertising, objectives, functions, criticism.

UNIT 5

Introduction of Financial Management, Objectives of Financial Management, Functions and Importance of Financial Management.Brief Introduction to the concept of capital structure and various sources of finance.

Text Books:

1. Principles and Practice of Management – R.S. Gupta, B.D.Sharma, N.S. Bhalla.

(Kalyani Publishers)

2. Organisation and Management – R.D. Aggarwal (Tata McGraw Hill)

Reference Books:

1. Principles & Practices of Management – L.M. Prasad (Sultan Chand & Sons)

2. Management – Harold, Koontz and CyriloDonell (Mc.Graw Hill).

3. Marketing Management – S.A. Sherlikar (Himalaya Publishing House, Bombay).

4. Financial Management – I.M. Pandey (Vikas Publishing House, New Delhi)

5. Management – James A.F. Stoner &R.Edward Freeman, PHI.

NON CONVENTIONAL MANUFACTURING

UNIT-1.

Unconventional machining processes, Rapid prototyping processes, their classification, considerations in process selection.

UNIT- 2.

Elements of process, design of cutting tool, metal removal mechanism, effect of parameters, economic considerations, limitations and applications, surface finish. Elements of process, process chemistry, metal removal mechanism, tool design, accuracy, surface finish and work material characteristics, economics advantages, limitations and applications, Electrochemical grinding, debarring and honing, Chemical machining.

UNIT-3.

Principle and mechanism of metal removal, generators, electrode feed control, electrode material, tool electrode design, EDM wire cutting, surface finish, accuracy and applications, Principal and metal removal mechanism of abrasive and water jet machining, process variables, design of nozzle, advantages, limitations and applications.

UNIT-4.

Plasma arc machining, Electron beam machining, laser beam machining, their principles and metal removal mechanism, process parameters, advantages and limitations, applications.

UNIT-5.

Fundamentals, process chain, physics of processes, principles and process mechanism of SLA, SGC, LOM, FDM and SLS processes, their advantages and limitations, applications of RP processes, RP data formats, STL file format, STL file problems, STL file repair, other translators and formats.

Reference and Text Books:

Modern machining processes -By P.C. Pandey and H.S. Shan, TMH

CNC MACHINES AND AUTOMATION

UNIT 1
<u>**Introduction:**</u> Basic concepts of NC, CNC & DNC, adoption controls. Advantages & Disadvantage of CNC machines.Application of CNC machines. Difference between conventional & CNC Machines. Profitable applications of CNC Machines. What is automation Need of automation. Different types of automation. Advantages/disadvantages of automation.

UNIT 2
<u>**Construction of CNC Machines:**</u> Machine control unit.NC control. PLC control, its advantages &disadvantages.Application aid limitations of PLC machines. Axis designate of CNC machines. Special constructional requirement of CNC machines. Slide ways, bolt screw & nut assembly. Lubrication & cooling of CNC machines. Spindle & spindle motors, axis drives motor. Swarf removal & safety provision of CNC machines.Feedback mechanism in CNC machines.Various cutting tools for CNC machines. Work holding devices. Automatic tool changer.

UNIT 3
<u>**Control System:**</u> Open & close loop control system Fundamental problem in control: Accuracy, resolution, repeatability, instability, response & damping, Type of position control: i) Point to point ii) Straight line iii) Continuous

UNIT 4
<u>**Part Programming:**</u> Part programming and basic concepts of part programming, NC words, part programming formats, simple programming for rational components, part programming using conned cycles, subroutines and do loops, tool off sets, cutter radius compensation and wear compensation

UNIT 5
<u>**Common Problems in CNC Machines:**</u> Common problems in mechanical, electrical, pneumatic, electronic and PC components of NC machines, diagnostic study of common problems and remedies, use of on-time fault finding diagnosis tools in CNC machines

Text Books:

1. Automation, Production Systems and Computer Integrated Manufacturing. Groover M.P, Prentice Hall of India.

2. CAD/CAM – Groover M.P, Zimmers E.W, Prentice Hall of India.

Reference Books:

1. Approach to Computer Integrated Design and Manufacturing Nanua Singh, John Wiley

AUTO CAD & SOFTWARE LAB

1. Setting up of drawing environment by setting drawing limits, drawing units, naming the drawing, naming layers, setting line types for different layers using various type of lines in engineering drawing, saving the file with .dwg extension.

2. To Draw Orthographic projection Drawings (Front, Top and side) of boiler safety valve giving name the various components of the valve.

3. Make an Isometric dimensioned drawing of a connecting Rod using isometric grid and snap.

4. Draw quarter sectional isometric view of a cotter joint.

5. Draw different types of bolts and nuts with internal and external threading in Acme and square threading standards. Save the bolts and nuts as blocks suitable for insertion.

6. Draw 3D models by extruding simple 2D objects, dimension and name the objects.

7. Draw a spiral by extruding a circle.

CNC MACHINE & AUTOMATION LAB

1. Study and operation of CNC lathe

2. Part programming and operation of CNC lathe for facing, turning and threading operations.

3. Study and operation of CNC Machining Center

4. Part programming and operation of CNC machining Center

5. Part programming for CNC Wire-cut machine.