



YBN UNIVERSITY, RANCHI

School Of Engineering and Technology

B.Tech. Semester-I

Common to all Branches

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Credits Allotted Subject wise			Total Credits	Remark
			Theory Slot			Practical Slot			L	T	P		
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work						
							Lab work & sessional	Assignment / quiz					
1	YBE101	Engineering Chemistry	70	20	10	30	10	10	3	1	2	06	: One credit refers to one hour teaching in theory, Tutorial and in practical. :32 hour workload per week corresponding to LTP
2	YBE102	Engineering Mathematics -I	70	20	10				3	1		04	
3	YBE 103	Communication Skills	70	20	10	30	10	10	3	1	2	06	
4	YBE 104	Basic Electricals & Electronics Engg.	70	20	10	30	10	10	3	1	2	06	
5	YBE 105	Engineering Graphics	70	20	10	30	10	10	3	1	2	06	
6	YBE 106	Work Shop Practice	-	-	-	30	10	10	-	-	2	02	
		Total	350	100	50	150	50	50	15	05	10	30	750

MST: Mid Semester Tests Taken at Least twice Per Semester

L:Lecture-

T:Tutorial -

P: Practical





YBN UNIVERSITY, RANCHI

School Of Engineering and Technology

B.Tech. Semester-II

Common to all Branches

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Credits Allotted Subject wise			Total Credits	Remark
			Theory Slot			Practical Slot			L	T	P		
			End Sem.	Mid Sem. MST	Quiz, Assignment	End Sem.	Term work						
							Lab work sessional	Assignment / quiz					
1	YBE201	Engineering Physics	70	20	10	30	10	10	3	1	2	06	: One credit refers to one hour teaching in theory, Tutorial and in practical. :32 hour workload per week corresponding to LTP
2	YBE202	Energy, Environment, Ecology & Society	70	20	10				3	1		04	
3	YBE203	Basic Mechanical Engg.	70	20	10	30	10	10	3	1	2	06	
4	YBE204	Basic Civil Engg. & Engg. Mechanics	70	20	10	30	10	10	3	1	2	06	
5	YBE205	Basic Computer Engg.	70	20	10	30	10	10	3	1	2	06	
6	YBE206	Language Lab. & Seminars	-	-	-	30	10	10	-	-	2	02	
		Total	350	100	50	150	50	50	15	05	10	30	750



Course Content & Grade

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
B.Tech. Common	Engineering Chemistry	YBE 101	Min. "D"	Min. "D"	5.0

Unit I

WATER AND ITS INDUSTRIAL APPLICATIONS :

Sources, Impurities, Hardness & its units, Industrial water characteristics, softening of water by various methods (External & Internal treatment), Boiler trouble causes, effect & remedies, Characteristics of municipal water & its treatment, Numerical problems based on softening methods.

Unit II

FUELS & COMBUSTION:

Fossil fuels & classification, Calorific value, Determination of calorific value by Bomb calorimeter Proximate and Ultimate analysis of coal and their significance, calorific value Computation based on ultimate analysis data, Carbonization, Manufacturing of coke & recovery of by products. Knocking, relationship between' knocking & structure of hydrocarbon, improvement of anti knocking characteristics of IC engine fuels, Diesel engine fuels, Cetane number, combustion and it related numerical problems.

Unit III

A. LUBRICANTS:

Introduction, Mechanism of lubrication, Classification of lubricants, Properties and Testing of lubricating oils, Numerical problems based on testing methods.

B. CEMENT & REFRACTORIES:

Manufacture , IS-code, Setting and hardening of cement, Refractory : Introduction, classification and properties of refractories .

Unit IV

HIGH-POLYMER :

Introduction, types and classification of polymerization, Reaction. Mechanism, Natural & Synthetic Rubber; Vulcanization of Rubber, Preparation, Properties & uses of the following- Polythene, PVC, PMMA, Teflon, Poly acrylonitrile, PVA, Nylon 6, Nylon 6:6, Terylene, Phenol formaldehyde, Urea - Formaldehyde Resin, Glyptal, Silicone Resin, Polyurethanes; Butyl Rubber, Neoprene, Buna N, Buna S.

Unit V

A. INSTRUMENTAL TECHNIQUES IN CHEMICAL ANALYSIS:

Introduction, Principle, Instrumentation and applications of IR, NMR, UV, Visible, Gas Chromatography, Lambert's and Beer's Law

B. WATER ANALYSIS TECHNIQUES:

Alkalinity, hardness (Complexo-metric), Chloride, Free chlorine, DO, BOD and COD, Numerical problems based on above techniques.

Reference Books:

1. Chemistry for Environmental Engineering & Science- Sawyer, McCarty and Parkin – McGraw Hill, Education Pvt. Ltd., New Delhi
2. Engineering Chemistry - B.K. Sharma, Krishna Prakashan Media (P) Ltd., Meerut.
3. Basics of Engineering Chemistry - S. S. Dara & A.K. Singh, S. Chand & Company Ltd., Delhi
4. Applied Chemistry - Theory and Practice, O.P. Viramani, A.K. Narula, New Age International Pvt. Ltd. Publishers, New Delhi
5. Polymer Science – Ghosh, Tata McGraw Hill.
6. Engg. Chemistry – Shashi Chawla, Dhanpat Rai & company pvt. Ltd, Delhi.
7. Engg. Chemistry – Jain & Jain, Dhanpat Rai & company pvt. Ltd, New Delhi
8. A Text book of Engg. Chemistry- Agrawal, C.V, Murthy C.P, Naidu, A, BS Publication, Hyderabad.

Engineering Chemistry Practical

NOTE: At least 10 of the following core experiments must be performed during the session.

1. Water Testing

- (i) Determination of Total hardness by Complexometric titration method.
- (ii) Determination of mixed alkalinity
 - (a) OH^- & CO_3^{--}
 - (b) CO_3^{--} & HCO_3^-
- (iii) Chloride ion estimation by Argentometric method.

2. Fuels & lubricant testing:

- (i) Flash & fire points determination by
 - a) Pensky Martin Apparatus,
 - b) Abel's Apparatus,
 - c) Cleveland's open cup Apparatus.
 - d) Calorific value by bomb calorimeter
- (ii) Viscosity and Viscosity index determination by
 - a) Redwood viscometer No.1
 - b) Redwood viscometer No.2
- (iii) Proximate analysis of coal
 - a) Moisture content
 - b) Ash content
 - c) Volatile matter content
 - c) Carbon residue
- (iv) Steam emulsification No & Aniline point determination
- (v) Cloud and Pour point determination of lubricating oil

3. Alloy Analysis

- (i) Determination of percentage of Fe in an iron alloy by redox titration using N-Phenyl anthranilic acid as internal indicator.
- (ii) Determination of Cu and or Cr in alloys by Iodometric Titration.
- (iii) Determination of % purity of Ferrous Ammonium Sulphate & Copper Sulphate.

Course Content & Grade

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
B.Tech. Common	Engineering Mathematics - I	YBE102	Min.“D”	-	5.0

Unit I

DIFFERENTIAL CALCULUS :

Expansion of functions by Maclaurin's and Taylor's theorem. Partial differentiation, Euler's theorem and its application in approximation and errors, Maxima and Minima of function of two variables, Curvature : Radius of curvature, centre of curvature.

Unit II

INTEGRAL CALCULUS :

Definite Integrals : Definite Integrals as a limit of a sum , its application in Summation of series, Beta and Gamma Functions , Double and Triple Integrals, Change of Order of Integration, Area, Volume and Surfaces using double and triple Integral.

Unit III

DIFFERENTIAL EQUATIONS :

Solution of Ordinary Differential Equation of first order and first degree for Exact differential Equations, Solution of Ordinary Differential Equation of first order and higher degree (solvable for p, x and y, Clairauts Equation), Linear Differential Equations with Constant Coefficients, Cauchy's Homogeneous differential Equation, Simultaneous differential Equations, Method of Variation of Parameters

Unit IV

MATRICES :

Rank, Solution of Simultaneous equation by elementary transformation, Consistency of System of Simultaneous Linear Equation, Eigen Values and Eigen Vectors, Cayley-Hamilton Theorem and its Application to find the inverse

Unit V

Algebra of Logic, Boolean Algebra, Principle of Duality, Basic Theorems, Boolean Expressions and Functions. Elementary Concept of Fuzzy Logic
Graph Theory : Graphs, Subgraphs, Degree and Distance, Tree, cycles and Network,

References:

- (i) Advance Engg. Mathematics. By Ramana, Tata McGraw hill.
- (ii) Higher Engineering Mathematics by BS Grewal, Khanna Publication
- (iii) Advance Engineering Mathematics by D.G. Guffy
- (iv) Engineering Mathematics by S Sastri.P.H.I.



Course Content & Grade

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
B.Tech. Common	Communication Skills	YBE103	Theory	Practical	5.0
			Min.“D”	Min.“D”	

Unit I - Languages and skills of communication

Linguistic techniques, Modern usages, Reading comprehension, English phonetic symbols/sings, Oral presentation, Audition Communication, Processes of Communication, Verbal and Non Verbal Communication, Barriers to Communication.

Unit II - Application of linguistic ability

Writing of definitions of Engineering terms, Objects, Processes and Principles (Listening) Topics of General Interest, Reproduction from business, daily life, travel, health, buying and selling, company structure, systems etc.

Unit III - Letter Writing:

Applications, Enquiry, Calling quotations, Tenders, Order and Complaint.

Unit IV

Precise Writing, Noting and drafting, Technical Description of simple engineering objects and processes (writing), Report writing, precise writing, Note writing, Slogan writing comment, Speech advertising.

Unit V

Writing Technical reports of the type of observation report, Survey report, Report of trouble, Laboratory Report and Project Report on the subjects of engineering. (Speaking) Vocabulary, Presentations, Demonstrations, Conversation – Telephone media, socializing, cultural events, debates, speech.

Communicative Language Lab.

Course objective: The language lab focuses on the production and practice of sounds of English through audio – visual aids and Computer software. It intends to enable the students to speak English correctly with confidence and intends to help them to overcome their inhibitions and self – consciousness while speaking in English.



Topics to be covered in the Language laboratory sessions :

1. Basic Grammar & Vocabulary (Synonyms /Antonyms, Analogies, sentence completion, correctly spelt words, idioms, proverbs, common errors).
 2. phonetic symbols and pronunciation.
 3. Listening skills (Including Listening Comprehension)
 4. Reading Skills (Including Reading Comprehension)
 5. Writing Skills (Including structuring resume and cover letter)
 6. Speaking Skills
 7. Body Language
 8. Oral Presentation : Preparation and delivery using audio – visual aids with stress n body language and voice modulation (Topic to be selected by the teacher.)
- Final Assessment Should be based on Assignment, presentation and interview.

Reference Books :-

1. Business Correspondence and Report Writing - By Sharma; TMH.
2. Living English Structure – By W.S. Allen; Longmans.
3. English Grammar – Ehrlich, Schaum Series; TMH.
4. Spoken Englishfor India – By R.K. Bansal and IB Harrison – Orient Longman.
5. New International Business English – by Joans and Alexander; OUP.
6. Effective Technical Communication – Rizvi; TMH.



Course Content & Grade

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
B.Tech. Common	Electrical & Electronics Engineering	YBE104	Theory	Practical	5.0
			Min. "D"	Min. "D"	

Unit I

Electrical circuit analysis- Voltage and current sources, dependent and independent sources, source conversion, DC circuits analysis using mesh & nodal method, Thevenin's & superposition theorem, star-delta transformation. 1-phase AC circuits under sinusoidal steady state, active, reactive and apparent power, physical meaning of reactive power, power factor, 3-phase balanced and unbalanced supply, star and delta connections.

Unit II

Transformers- Review of laws of electromagnetism, mmf, flux, and their relation, analysis of magnetic circuits. Single-phase transformer, basic concepts and construction features, voltage, current and impedance transformation, equivalent circuits, phasor diagram, voltage regulation, losses and efficiency, OC and SC test.

Unit III

Rotating Electric machines- Constructional details of DC machine, induction machine and synchronous machine, Working principle of 3-Phase induction motor, Em equation of 3-Phase induction motor, Concept of slip in 3-Phase induction motor, Explanation of Torque-slip characteristics of 3-Phase induction motor, Classification of self excited DC motor and generator.

Unit IV

Digital Electronics- Number systems used in digital electronics, decimal, binary, octal, hexadecimal, their complements, operation and conversion, floating point and signed numbers, Demorgan's theorem, AND, OR, NOT, NOR, NAND, EX-NOR, EX-OR gates and their representation, truth table, half and full adder circuits, R-S flip flop, J-K flipflop.

Unit V

ELECTRONIC COMPONENTS AND CIRCUITS- Introduction to Semiconductors, Diodes, V-I characteristics, Bipolar junction transistors (BJT) and their working, introduction to CC, CB & CE transistor configurations, different configurations and modes of operation of BJT, DC biasing of BJT.



References:

1. Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition
2. S. Ghosh, Fundamentals of Electrical and Electronics Engineering, PHI, II Edition.
3. Millman, Halkias & Parikh, Integrated Electronics, McGraw Hill, II Edition
4. Nagrath & Kothari, Basic Electrical Engineering, III Edition TMH.
5. J.S. Katre, Basic Electronics Engg, Max Pub. Pune.
6. Hughes, Electrical and Electronic Technology, Pearson Education IX Edition

List Of Experiments

1. Verification of Thevenin's Superposition theorem.
2. Study of Transformer, name plate rating, determination of ratio and polarity.
3. Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests and estimation of voltage regulation and efficiency at various loading conditions and verification by load test.
4. Separation of resistance and inductance of choke coil.
5. Measurement of various line & phase quantities for a 3-phase circuit.
6. Identification of different Electronics components.
7. Observing input and output waveforms of rectifiers.
8. Transistor application as amplifier and switch.
9. Verification of truth table for various gates.



Course Content & Grade

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
B.Tech. Common	Engineering Graphics	YBE105	Theory	Practical	
			Min.“D”	Min.“D”	5.0

Unit I

Scales: Representative factor, plain scales, diagonal scales, scale of chords.

Conic sections: Construction of ellipse, parabola, hyperbola by different methods; Normal and Tangent.

Special Curves: Cycloid, Epi-cycloid, Hypo-cycloid, Involute, Archimedean and logarithmic spirals.

Unit II

Projection: Types of projection, orthographic projection, first and third angle projection, **Projection of points and lines**, Line inclined to one plane, inclined with both the plane, True Length and True Inclination, Traces of straight lines.

Unit III

Projection of planes and solids: Projection of Planes like circle and polygons in different positions; Projection of polyhedrons like prisms, pyramids and solids of revolutions like cylinder, cones in different positions.

Unit IV

Section of Solids: Section of right solids by normal and inclined planes; Intersection of cylinders.

Development of Surfaces: Parallel line and radial - line method for right solids.

Unit V

Isometric Projections: Isometric scale, Isometric axes, Isometric Projection from orthographic drawing.

Computer Aided Drafting (CAD): Introduction, benefit, software's basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders; transformations and editing commands like move, rotate, mirror, array; solution of projection problems on CAD.

References

1. Visvesvaraya Tech. University; A Premier on Computer Aided Engg drawing; VTU Belgaum
2. Bhatt N.D.; Engineering Drawing, Charotar
3. VenugopalK.; Engineering Graphics; NewAge
4. John KC; Engg. Graphics for Degree; PHI.



5. Gill P.S.; Engineering Drawing;kataria
6. Jeyopooan T.; Engineering drawing & Graphics Using AutoCAD;Vikas
7. Agrawal and Agrawal; EngineeringDrawing;TMH
8. Shah MB and Rana BC; Engg.drawing; PearsonEducation
9. LuzadderWJand DuffJM;FundamentalofEnggDrawing;PHI
10. JolheDA; Engg. Drawing an Introduction;TMH
11. Narayana K.L.; Engineering Drawing; Scitech

List of Practical:

Sketching and drawing of geometries and projections based on above syllabus

Term work: A min. of 30 hand drawn sketches (on size A4 graphic sketch Book) plus 5 CAD-printouts on size A4 sheets plus 10 sheets of size A2 or 6 sheets of size A1, (50% marks to be allotted for this record + 25% marks for attendance +25%marks for Teachers Assesmen



Course Content & Grade

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
B.Tech. Common	Work Shop Practice	YBE 106	-	Min.“D”	5.0

Unit I

Introduction: Manufacturing Processes and its Classification, Casting, Machining, Plastic deformation and metal forming, Joining Processes, Heat treatment process, Assembly nprocess. Powder Metallurgy, introduction to computers in manufacturing. Black Smithy Shop

Use of various smithy tools. Forging operations:Upsetting, Drawing down, Fullering, Swaging, Cutting down, Forge welding, Punching and drafting. Suggested Jobs : Forging of chisel., forging of Screw Driver

Unit II

Carpentry Shop:

Timber : Type, Qualities of timber disease, Timber grains, Structure of timber, Timber, Timber seasoning, Timber preservation .Wood Working tools: Wood working machinery, joints & joinery. Various operations of planning using various carpentry planes sawing & marking of various carpentry joints.

Suggested Jobs :Name Plate ,Any of the Carpentry joint like mortise or tennon joint

Unit III

Fitting Shop:

Study and use of Measuring instruments, Engineer steel rule, Surface gauges caliper, Height gauges, feeler gauges, micro meter. Different types of files, File cuts, File grades, Use of surface plate, Surface gauges drilling tapping Fitting operations: Chipping filling, Drilling and tapping.Suggested Jobs :Preparation of job piece by making use of filling, sawing and chipping , drilling and tapping operations.

Unit IV

Foundry: Pattern Making: Study of Pattern materials, pattern allowances and types of patterns. Core box and core print, .Use and care of tools used for making wooden patterns. Moulding: Properties of good mould& Core sand, Composition of Green , Dry and Loam sand. Methods used to prepare simple green and bench and pit mould dry sand bench mould using single piece and split patterns.

Unit V

Welding: Study and use of tools used for Brazing, Soldering, Gas& Arc welding. Preparing Lap & Butt joints using gas and arc welding methods, Study of TIG & MIG welding processes .Safety precautions.

Reference Books:

1. Bawa HS; Workshop Practice,TMH
2. Rao PN; Manufacturing Technology- Vol.1& 2,TMH
3. John KC; Mechanical workshop practice;PHI
4. HazaraChoudhary; Workshop Practices -, Vol. I &II.



Course Content & Grade

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
B.Tech. Common	Engineering Physics	YBE 201	Theory	Practical	
			Min. "D"	Min. "D"	5.0

Unit I

Quantum Physics

Group and particle velocities & their relationship. Uncertainty principle with elementary proof and applications (determination of position of a particle by a microscope, non existence of electron in nucleus, diffraction of an electron beam by a single slit). Compton scattering. Wave function and its properties, energy and momentum operators, time dependent and time independent Schrödinger wave equation. Application of time independent Schrödinger wave equation to particle trapped in a one dimensional square potential well (derivation of energy eigen values and wave function)

Unit II

Wave Optics

Interference: Fresnel's biprism, Interference in thin films (due to reflected and transmitted light), interference from a wedge shaped thin film, Newton's rings and Michelson's interferometer experiments and their applications. Diffraction at single slit, double slit and n-slits (diffraction grating). Resolving power of grating and prism. Concept of polarized light, Brewster's laws, Double refraction, Nicol prism, quarter & half wave plate.

Unit III

Nuclear Physics

Nuclear liquid drop model (semi empirical mass formula), nuclear shell model, Linear Particle accelerators: Cyclotron, general description of Synchrotron, Synchrocyclotron, and Betatron. Geiger- Muller Counter, Motion of charged particles in crossed electric and magnetic fields. Uses of Bainbridge and Aston mass Spectrographs.

Unit IV

Solid State Physics

Qualitative discussion of Kronig Penny model (no derivation), Effective mass, Fermi-Dirac statistical distribution function, Fermi level for Intrinsic and Extrinsic Semiconductors, Zener diode, tunnel diode, photodiode, solar-cells, Hall effect. Superconductivity: Meissner effect, Type I and Type II superconductors, Di-electric polarization, Complex permittivity, dielectric losses

UNIT V

Laser and Fiber Optics

Laser: Stimulated and spontaneous processes, Einstein's A & B Coefficients, transition probabilities, active medium, population inversion, pumping, Optical resonators, characteristics of laser beam. Coherence, directionality and divergence. Principles and working of Ruby, Nd:YAG, He-Ne & Carbon dioxide Lasers with energy level diagram. Fundamental idea about optical fiber, types of fibers, acceptance angle & cone, numerical aperture, V-number, propagation of light through step index fiber (Ray theory) pulse dispersion, attenuation, losses & various uses.



Reference Books: -

1. Optics By Ghatak, TMH
2. Engineering Physics- V. S. Yadava, TMH
3. Optics by Brijlaland Subhraminiyan.
4. Engineering physics by M.N. Avadhanuluand. S. Chand &Co.(2004)
5. Atomic and Nuclear physics by Brijlal andSubraminiyan.
6. Concepts of Modern Physics- Beiser, TMH
7. Solid State Physics by Kittel ,Wiley India
8. Fundamentals of Physics-Halliday, Wiley India

List of suggestive core experiments: -

1. Biprism, Newton's Rings, Michelsons Interferometer.
2. Resolving Powers –Telescope, Microscope, and Grating.
3. G.M. Counter
4. Spectrometers-R.I., Wavelength, using prism and grating
5. Optical polarization based experiments: Brewster's angle, polarimeteretc.
6. Measurements by LASER-Directionality, Numerical aperture, Distanceetc.
7. Uses of Potentiometers and Bridges (Electrical)..
8. Experiments connected with diodes and transistor.
9. Measurement of energy band gap of semiconductor.
10. To study Hall effect.
11. Solar cell.
- 12.To find the width of s single slit by f He-Ne Laser.
13. To determine the numeral aperture (NA) of a Optical Fibre.
14. To determine plank's constant.
15. Other conceptual experiments related to theory syllabus.

Course Content & Grade

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
B.Tech. Common	Energy , Environment , Ecology & Society	YBE 202	Theory	Practical	5.0
			Min.“D”	-	

Unit –I

Energy- Sources of Energy : Renewable & Non Renewable, Fossil fuel, Biomass Geothermal, Hydrogen, Solar, Wind, hydal, nuclear sources.

Unit –II

Ecosystem – Segments of Environment: Atmosphere, hydrosphere, Lithosphere, biosphere. Cycles in Ecosystem – Water, Carbon, Nitrogen. Biodiversity: Threats and conservation,

Unit–III

Air Pollution & Sound Pollution -

Air Pollution: Air pollutants, classification, (Primary & secondary Pollutants) Adverse effects of pollutants. Causes of Air pollution chemical, photochemical, Green house effect, ozone layer depletion, acid Rain. **Sound Pollution:** Causes, controlling measures, measurement of sound pollution (deciblage), Industrial and non – industrial.

Unit –IV

Water Pollution– Water Pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent.

Soil Pollution – Soil Profile, Pollutants in soil, their adverse effects, controlling measures.

Unit –V

Society, Ethics & Human values– Impact of waste on society. Solid waste management (Nuclear, Thermal, Plastic, medical, Agriculture, domestic and e-waste). Ethics and moral values, ethical situations, objectives of ethics and its study . Preliminary studies regarding Environmental Protection Acts , introduction to value education, self exploration, sanyam & swasthya.

References:

1. Harris, CE, Prichard MS, Rabin’s MJ, “Engineering Ethics”; Cengage Pub.
2. Rana SVS ; “Essentials of Ecology and Environment”; PHI Pub.
3. Raynold, GW “Ethics in information Technology”; Ceng age.
4. Svakumar; Energy Environment & Ethics in society; TMH
5. AK De “Environmental Chemistry”; New Age Int. Publ.
6. BK Sharma, “Environmental Chemistry”; Goel Publ. House.



7. Bala Krishna moorthy;“Environmental management”; PHI
8. Gerard Kiely, “Environmental Engineering” ; TMH
9. Miller GT JR; living in the Environment Thomson/cengage
10. CunninghamWP and MA; principles of Environment Sc;TMH



Course Content & Grade

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
B.Tech. Common	Basic Mechanical Engineering	YBE 203	Min. "D"	Min. "D"	5.0

UNIT- 1

Materials: Classification of engineering material, composition of cast iron and carbon steels on iron-carbon diagram and their mechanical properties; Alloy steel and their applications; stress-strain diagram, Hooks law and modulus of elasticity. Tensile, shear, hardness and fatigue testing of materials.

UNIT-2

Measurement: Temperature, pressure, velocity, flow, strain, force and torque measurement, concept of measurement error & uncertainly analysis, measurement by Vernier caliper, micrometer, dial gauges, slip gauges, sine-bar and combination set; introduction to lath, drilling, milling and shaping machines.

UNIT-3

Fluids: Fluid properties, pressure, density and viscosity; pressure variation with depth, static and kinetic energy; Bernauli's equation for incompressible fluids, viscous and turbulent flow, working principle of fluidcoupling, pumps, compressors, turbines, positive displacement machines and pneumatic machines. Hydraulic power & pumped storage plants for peak load management as compared to base load plants.

UNIT-4

Thermodynamics: First andsecond law of thermodynamics; steam properties, steam processes at constant pressure, volume, enthalpy & entropy, classification and working of boilers, efficiency & performance analysis, natural and induced draught, calculation of chimney height. Refrigeration, vapor absorption & compression cycles, coefficient of perform (COP), refrigerant properties &eco friendlyrefrigerants.

UNIT-5

Reciprocating Machines: Steam engines, hypothetical and actual indicator diagram; Carnot cycle and ideal efficiency; Otto and diesel cycles; working of two stroke & four stroke petrol & diesel IC engines



Reference Books:-

1. Narula; Material Science; TMH
2. Agrawal B &CM; Basic Mechanical Engg. WileyIndia
3. Nag PK, Tripathi et al; Basic Mechanical Engg; TMH
4. Rajput; Basic Mechanical Engg;
5. Sawhney GS; Fundamentals of Mechanical Engg; PHI
6. Nakra and Chaudhary; Instrumentation & measurement; TMH
7. Nag PK; Engineering Thermodynamics; TMH
8. Ganesan; Combustion Engines; TMH

List of Suggestive core Experiments(Please Expand it)

1. Tensile testing of standard mild steel specimen.
2. Experiments on Bernoulli's theorem.
3. Flow measurements by ventury and orificemeters.
4. Linear and angular measurement using, Vernier; micrometer, slip gauge, dial gauge and sine-bar.
5. Study of different types of boilers and mountings.
6. Experiment on mini-boiler (50Kg/Hour)
7. To find COP of a refrigeration unit.
8. Study of different IC engines & measurement of B.H.P. using rope/ belt dynamometer.
9. Analysis of exhaust gases on petrol, diesel & bio diesel engines.



Course Content & Grade

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
B.Tech. Common	Basic Civil Engineering & Engineering Mechanics	YBE 204	Theory	Practical	5.0
			Min.“D”	Min.“D”	

Unit I

Building Materials & Construction

Stones, bricks, cement, lime, timber-types, properties, test & uses, laboratory tests concrete and mortar Materials: Workability, Strength properties of Concrete, Nominal proportion of Concrete preparation of concrete, compaction, curing. Elements of Building Construction, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability

Unit – II Surveying & Positioning:

Introduction to surveying Instruments – levels, theodolites, plane tables and related devices. Electronic surveying instruments etc. Measurement of distances – conventional and EDM methods, measurement of directions by different methods, measurement of elevations by different methods. Reciprocal leveling.

Unit –III Mapping & Sensing:

Mapping details and contouring, Profile Cross sectioning and measurement of areas, volumes, application of measurements in quantity computations, Survey stations, Introduction of remote sensing and its applications.

Engineering Mechanics

Unit - IV

Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non-concurrent Co- planner forces, free Diagram, Force Diagram and Bow’s notations, Application of Equilibrium Concepts: Analysis of plane Trusses: Method of joints, Method of Sections. Frictional force in equilibrium problems

Unit – V

Centre of Gravity and moment of Inertia: Centroid and Centre of Gravity, Moment Inertia of Area and Mass, Radius of Gyration, Introduction to product of Inertia and Principle Axes.

Support Reactions, Shear force and bending moment Diagram for Cantilever & simply supported beam with concentrated, distributed load and Couple.



Reference Books:

1. S. Ramamrutam & R. Narayanan; Basic Civil Engineering, Dhanpat Rai Pub.
2. Prasad I.B., Applied Mechanics, Khanna Publication.
3. Punmia, B.C., Surveying, Standard book depot.
4. Shesha Prakash and Mogaveer; Elements of Civil Engg & Engg. Mechanics; PHI
5. S.P, Timoshenko, Mechanics of structure, East West press Pvt. Ltd.
6. Surveying by Duggal – Tata McGraw Hill New Delhi.
7. Building Construction by S.C. Rangwala- Charotar publications House, Anand.
8. Building Construction by Grucharan Singh- Standard Book House, New Delhi
9. Global Positioning System Principles and application- Gopi, TMH
10. R.C. Hibbler– Engineering Mechanics: Statics & Dynamics.
11. A. Boresi & Schmidt- Engineering Mechines- statics dynamics, Thomson’ Books
12. R.K. Rajput, Engineering Mechanics S. Chand & Co.

List of suggestive core Experiments:

Students are expected to perform minimum ten experiments from the list suggested below by preferably selecting experiments from each unit of syllabus.

S.No. Title

1. Topo form traverse surveying with prismatic compass, check for local attraction and determine corrected bearings and to balance the traverse by Bowditch’s rule.
2. To perform leveling exercise by height of instrument or Rise and fall method.
3. To measure horizontal and vertical angles in the field by using Theodolite.
4. To determine (a) normal consistency (b) Initial and Final Setting time of a cement Sample.
5. To determine the work ability of fresh concrete of given proportions by slump test or compaction factor test.
6. To determine the Compressive Strength of brick.
7. To determine particle size distribution and fineness modulus of coarse and fine Aggregate.
8. To verify the law of Triangle of forces and Lami’s theorem.
9. To verify the law of parallelogram of forces.
10. To verify law of polygon of forces
11. To find the support reactions of a given truss and verify analytically.
12. To determine support reaction and shear force at a given section of a simply Supported beam and verify in analytically using parallel beam apparatus.
13. To determine the moment of inertia of fly wheel by falling weight method.
14. To verify bending moment at a given section of a simply supported beam.



Course Content & Grade

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
B.Tech. Common	Basic Computer Engineering	YBE 205	Min.“D”	Min.“D”	5.0

UNIT I

Computer: Definition, Classification, Organization i.e. CPU, register, Bus architecture, Instruction set, Memory & Storage Systems, I/O Devices, and System & Application Software. Computer Application in e-Business, Bio-Informatics, health Care, Remote Sensing & GIS, Meteorology and Climatology, Computer Gaming, Multimedia and Animation etc.

Operating System: Definition, Function, Types, Management of File, Process & Memory. Introduction to MS word, MS powerpoint, MS Excel

UNIT II

Introduction to Algorithms, Complexities and Flowchart, Introduction to Programming, Categories of Programming Languages, Program Design, Programming Paradigms, Characteristics or Concepts of OOP, Procedure Oriented Programming VS object oriented Programming.

Introduction to C++: Character Set, Tokens, Precedence and Associativity, Program Structure, Data Types, Variables, Operators, Expressions, Statements and control structures, I/O operations, Array, Functions,

UNIT III

Object & Classes, Scope Resolution Operator, Constructors & Destructors, Friend Functions, Inheritance, Polymorphism, Overloading Functions & Operators, Types of Inheritance, Virtual functions. Introduction to Data Structures.

UNIT IV

Computer Networking: Introduction, Goals, ISO-OSI Model, Functions of Different Layers. Internetworking Concepts, Devices, TCP/IP Model. Introduction to Internet, World Wide Web, E-commerce

Computer Security Basics: Introduction to viruses, worms, malware, Trojans, Spyware and Anti-Spyware Software, Different types of attacks like Money Laundering, Information Theft, Cyber Pornography, Email spoofing, Denial of Service (DoS), Cyber Stalking, Logic bombs, Hacking Spamming, Cyber Defamation, pharming Security measures Firewall, Computer Ethics & Good Practices, Introduction of Cyber Laws about Internet Fraud, Good Computer Security Habits,

UNIT V

Data base Management System: Introduction, File oriented approach and Database approach, Data Models, Architecture of Database System, Data independence, Data dictionary, DBA, Primary Key, Data definition language and Manipulation Languages.

Cloud computing: definition, cloud infrastructure, cloud segments or service delivery models (IaaS, PaaS and SaaS), cloud deployment models/ types of cloud (public, private, community and hybrid clouds), Pros and Cons of cloud computing

List of Experiment

01. Study and practice of Internal & External DOS commands.
02. Study and practice of Basic linux Commands – ls, cp, mv, rm, chmod, kill, ps etc.
03. Study and Practice of MS windows – Folder related operations, My-Computer, window explorer, Control Panel,
04. Creation and editing of Text files using MS-word.
05. Creation and operating of spreadsheet using MS-Excel.
06. Creation and editing power-point slides using MS- power point
07. Creation and manipulation of database table using SQL in MS-Access.
08. WAP to illustrate Arithmetic expressions
09. WAP to illustrate Arrays.
10. WAP to illustrate functions.
11. WAP to illustrate constructor & Destructor
12. WAP to illustrate Object and classes.
13. WAP to illustrate Operator over loading
14. WAP to illustrate Function over loading
15. WAP to illustrate Derived classes & Inheritance
16. WAP to insert and delete and element from the Stack
17. WAP to insert and delete and element from the Queue
18. WAP to insert and delete and element from the Linked List

Recommended Text Books:

1. Fundamentals of Computers : E Balagurusamy, TMH
2. Basic Computer Engineering: Silakari and Shukla, WileyIndia
3. Fundamentals of Computers : V Rajaraman, PHI
4. Information Technology Principles and Application: Ajoy Kumar Ray & Tinku Acharya PHI.

Recommended Reference Books:

1. Introduction of Computers : Peter Norton, TMH
2. Object Oriented Programming with C++ : E. Bala gurusamy, TMH
3. Object Oriented Programming in C++: Rajesh K. Shukla, Wiley India
4. Concepts in Computing: Kenneth Hoganson, Jones & Bartlett.
5. Operating Systems – Silbers chatz and Galvin – Wiley India
6. Computer Networks: Andrew Tanenbaum, PHI
7. Data Base Management Systems, Korth, TMH
8. Cloud Computing, Kumar, WileyIndia

Course Content & Grade

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			Theory	Practical	
B.Tech. Common	Communicative Language	YBE 206			
			-	Min.“D”	5.0

Course objective:

This course intends to impart practical training in the use of English Language for Communicative purposes and aims to develop students' personality through LanguageLab.

Topics to be covered in the Language laboratory sessions:

1. Introducing oneself, family, social roles, personal image design, building relationships, body language, concept of time and space.
2. Public Speaking and oral skills with emphasis on conversational practice, Role plays, extempore speech, JAM (Just a minute sessions), describing objects and situations, giving directions, debate, telephonic etiquette.
3. Reading Comprehension: Intensive reading skills, rapid reading, and reading aloud (Reading material to be selected by the teacher).
4. Translation from English to Hindi and vice versa.
5. Oral Presentation: preparation and delivery (Topic to be selected by the teacher.)

Assessment Criterion:

Oral Presentation	10
Assignment	20
Viva Voice	20



YBN UNIVERSITY, RANCHI

School Of Engineering and Technology

B.Tech. Semester-III

MECHANICAL ENGINEERING

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Crets Allotted Subject wise	Total Credits	Remark				
			Theory Slot			Practical Slot		Total Marks							
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work		Period per week						
							Lab work & sessional	Assignment/quiz	L	T		P			
1	YBE 301	Mathematics -II	70	20	10	-	-	-	100	3	1	-	04		
2	YBME-302	Production Process	70	20	10	-	-	-	100	3	1	-	04		
3	YBME -303	Strength & Mechanics of Materials	70	20	10	30	10	10	150	3	1	2	06		
4	YBME -304	Thermodynamics	70	20	10	30	10	10	150	3	1	2	06		
5	YBME -305	Machine drawing & design	70	20	10	30	10	10	150	3	1	2	06		
6	YBME -306	Computer Programming (Java)	-	-	-	30	10	10	50	0	0	2	02		
7	YBME -307	Self study (Internal Assesment)	-	-	-	-	-	50	50	0	0	2	02	Grand Total	
8.	YBME -308	Seminar / Group Discussion (Internal Assessment)	-	-	-	-	-	50	50	0	0	2	02		
		Total	350	100	50	120	40	140	800	15	5	12	32	800	

MST: Mid Semester Tests Taken at Least twice Per Semester

L:Lecture-

T:Tutorial-

P: Practical

YBE301 - ENGINEERING MATHEMATICS II

Unit-1

Fourier Series: Introduction of Fourier series , Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series Fourier Transform: Definition and properties of Fourier transform, Sine and Cosine transform.

Unit II

Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations

Unit III

Second Order linear differential equation with variable coefficients : Methods one integral is known, removal of first derivative, changing of independent variable and variation of parameter, Solution by Series Method

Unit IV

Linear and Non Linear partial differential equation of first order: Formulation of partial differential equations, solution of equation by direct integration, Lagrange's Linear equation, charpit's method. Linear partial differential equation of second and higher order: Linear homogeneous and Non homogeneous partial diff. equation of nth order with constant coefficients. Separation of variable method for the solution of wave and heat equations

Unit V

Vector Calculus: Differentiation of vectors, scalar and vector point function, geometrical meaning of Gradient, unit normal vector and directional derivative, physical interpretation of divergence and Curl. Line integral, surface integral and volume integral, Green's, Stoke's and Gauss divergence theorem

References

- (i) Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
- (ii) Higher Engineering Mathematics by BS Grewal, Khanna Publication
- (iii) Advance Engineering Mathematics by D.G.Guffy
- (iv) Mathematics for Engineers by S.Arumungam, SCITECH Publuication
- (v) Engineering Mathematics by S S Sastri. P.H.I.

YBME302 Production Process

Unit I

Metrology: Standards of Measurements, Linear and angular instruments; slip gauges, comparators, sine bar, angle gauges, clinometers, tape gauge, screw thread measurements limit gauging, Gauge design; fits and tolerance. Rolling: General description of machines and process; Rolling of structural sections plates and sheets; construction of mills; hot and cold rolling techniques

Unit II

Metal cutting : Principles of metal cutting, tool geometry ,Tool life plots , Mach inability, Tool wear , Cutting force analysis ,Cutting tool materials & Cutting fluids ,Economics of metal machining .

Unit III

Pattern Making: Pattern and pattern making, pattern allowances; pattern design considerations, core, core boxes, types of patterns.

Foundry: molding and core sands and their properties molding machines, centrifugal casting, dye casting shell molding; cupola description and operation. Lost wax molding; continuous casting.

Unit IV

Forging: Theory and application of forging processes description; principle of toleration of drop and horizontal forging machines; General principle of designs.

Press working: Description and operation of processes, process of shearing, punching, piercing, blanking, trimming, perfecting, notching, lancing, embossing, coining, bending, forging and drawing press, tool dies, auxiliary equipment, safety devices, stock feeders, scrap cutters, forces, pressure and power requirements, requirements of stock material.

Unit V

Welding: Gas welding, Electric arc welding, A.C. and D.C. welding machines and their characteristics. Flux, Electrodes, Pressure welding, electric resistance welding spot, seam and built welding, submerged arc welding; thermit and TIG & MIG Welding, Brazing Gas cutting Spinning: Introduction of spinning.

References:

1. Anderson and Tetro; Shop Theory;TMH
2. Kaushik JP; Manufacturing Processes; PHI
3. Bawa; Manufacturing Processes; TMH
4. Rao PN; Manufacturing Tech- Foundry, forming welding; TMH
5. Rao PN; Manufacturing Tech- Metal cutting and machine tools; TMH
6. Chapman; Workshop Technology :
7. Begeman; Manufacturing Process : John Wiley
8. Raghu vanshi; Workshop Technology ;; Dhanpat Rai.
9. Ravi B; Metal Casting- CAD analysis; PHI.
10. Hajra Choudhary; Workshop Technology:, Vol I
11. Pandya & Singh; Production Engineering Science:.

YBME303 Strength & Mechanics of materials

UNIT I

Mechanical properties of materials: Ductility, malleability, hardness, toughness, fatigue, creep; behavior of materials under tension, compression, bending, shear; ductile and brittle materials, failure of MS and CI in tension and torsion. Stress and strain: stresses in members of a structure, axial loading, normal stress, shear stress, bearing stress, analysis of simple structures, stepped rods, members in series and parallel: stress strain diagram, Hooke's law, modulus of elasticity, elastic and plastic behavior of materials, deformation under axial loading, statically indeterminate problems, stress due to temperature, Poisson's ratio, Bulk modulus, shear strain, relation among elastic constants, residual stress, fiber reinforced composite materials, strain energy under axial loads and stresses due to impact of falling weights.

UNIT II

Transformation of stress and strain, principal stresses, normal and shear stress, Mohr's circle and its application to two and three dimensional analysis, ductile and brittle failures, transmission shaft under combined bending and torsion; stresses in thin walled pressure vessel

UNIT III

Bending: pure bending, symmetric member, deformation and stress, bending of composite sections, eccentric axial loading, shear force and BM diagram, relationship among load, shear and BM, shear stresses in beams, strain energy in bending, deflection of beams, equation of elastic curve, Macaulay's method and Area moment method for deflection of beams.

UNIT IV

Torsion in shafts: stresses in a shaft, deformation in circular shaft, angle of twist, stepped-hollow, thin walled-hollow transmission shafts Leaf springs; helical springs, open and closed coil, stress in spring wire, deflection of helical spring, springs in series and parallel.

UNIT V

Theories of failures: maximum normal stress & shear stress theory; maximum normal and shear strain energy theory; maximum distortion energy theory; application of theories to different materials and loading conditions Columns: stability of structures, Euler's formula for columns with different end conditions, Rankin's formula.

References:

1. Beer FP, Johnson ER, Dewolf JT : Mechanics of Materials; TMH
2. Rattan; Strength of materials; TMH
3. Nash William; Schaum's Outline Series; Strength of Materials; TMH.
4. Negi ; strength of materials; TMH
5. Singh Arbind K; Mechanics of Solids; PHI
6. Sadhu Singh; Strength of Materials; Khanna Pub.
7. Kamal K and Ghai RC; Advanced Mechanics of Materials; Khanna Pub.

List of experiments :

1. Standard tensile test on MS and CI test specimen
2. Direct/ cross Shear test on MS and CI specimen
3. Transverse bending test on wooden beams to obtain modulus of rupture
4. Fatigue test
5. Brinell Hardness tests
6. Vicker hardness test
7. Izod/ Charpy impact test



YBME304 Thermodynamics

Unit I

Basic concepts: Thermodynamics, Property, Equilibrium, State, Process, Cycle, Zeroth law of thermodynamics, statement and significance, concept of an Ideal gas, Gas laws, Avogadro's hypothesis, Heat and work transfer. First law of thermodynamics- Statement of first law of thermodynamics, first law applied to closed system, first law applied to a closed system undergoing a cycle, processes analysis of closed system, flow process, flow energy, steady flow process, Relations for flow processes, limitations of first law of thermodynamics.

Unit II

Second law of thermodynamics, heat engine, heat reservoir, Refrigerator, heat pump, COP, EPR, Available energy, Carnot's theorem, Carnot's cycle, efficiency of Carnot's cycle, statement of second law Reversible and irreversible processes, consequence of second law, Entropy, Entropy change for ideal gas, T-S diagrams, Availability and Irreversibility. Gibbs and Helmholtz functions

Unit III

Real gas, Deviation with ideal gas, Vander-wall's equation, evaluation of its constants, limitations of the equation. The law of corresponding states Compressibility factor, Generalized compressibility chart, P-V-T surface of a Real gas, Thermodynamics relations, Maxwell relations and there applications.

Unit IV

Pure Substance, Phase, Phase-transformations, formation of steam, properties of steam, PVT surface, HS,TS,PV,PH,TV diagram, processes of vapor measurement of dryness fraction, Use of steam table and Mollier chart.

Unit V

Air standard cycles, Carnot, Otto, Diesel, Dual cycles and there comparison, two stroke and four stroke engines, Brayton cycle, non reactive gas mixture, PVT relationship, mixture of ideal gases, properties of mixture of ideal gases, internal energy, Enthalpy and specific heat of gas mixtures, Enthalpy of gas- mixtures.

References:

1. P.K.Nag; Engineering Thermodynamics; TMH
2. Van GJ; Thermodynamics; John Wylen
3. Cengel Y; Thermodynamics; TMH
4. Arora CP; Thermodynamics; TMH
5. Thermal Engineering by R Yadav
6. Engineering Thermodynamics by Omkar Singh New Age International.
7. Engineering Thermodynamics by Ratha Krishanan PHI India Pvt. Ltd.
8. Engineering Thermodynamics by M. Achuthan, PHI India.

List of Experiments (Pl. expand it):

1. To find mechanical equivalent of heat using Joules apparatus
2. To study working of impulse and reaction steam turbine by models.\
3. To study working of Gas turbines by models and to identify various processes of Brayton Cycle.
4. To calculate COP of vapour compression refrigeration system and to plot on T-s, p-H diagrams.
5. To plot specific fuel consumption versus rpm diagrams for diesel and petrol engines

Theory classes must be supplemented with laboratory classes.



YBME305 Machine Drawing & design

UNIT I:

Drawing conventions; drawing and dimensioning IS codes, sectional views and sectioning, surface finish and tolerances, representation of machine parts such as external and internal threads, slotted heads, square ends, and flat radial ribs, slotted shaft, splined shafts, bearings, springs, gears. Rivet heads and Riveted joints, types of welded joints and representation.

UNIT II

Assembly Machine Drawing: Basic concept, plotting technique, assembly and blow up of parts, bill of materials, product data; Cotter and Knuckle joints, pedestal and footstep bearings, crosshead, stuffing box, IC engines parts - piston and connecting rods; lath machine parts.

UNIT III

Introduction to Compute Aided Drafting software for 2D and 3D Modeling, Basic design concepts, design process, stages/phases in design, flowchart, problem formulation, design considerations (strength, manufacturing, maintenance, environment, economics and safety); design for recycle and reuse, Design and safety factors for steady and variable loads, impact and fatigue considerations, reliability and optimization, standardization in design..

UNIT IV

Design of components subject to static loads: riveted joints, welded joints threaded joints, pin, key knuckle, and cotter joints

References:

1. Bhat, ND; Machine Drawing; Charotar
2. Singh A; Machine Drawing; TMH
3. Narayana and Reddy; Machine Drawing; New age, Delhi.
4. Agarwal and agrawal; Engineering Drawing; TMH
5. Shigley JE et al; Mechanical Engineering Design, TMH
6. John KC; Text Book Of Machine Drawing; PHI Learning
7. Kulkarni SG; Machine Design; TMH
8. Mubeen and Mubeen; Machine Design.
9. Bhandari VB; Design of Machine elements; TMH
10. Sharma PC, Agarwal DK; Machine Design; Katson
11. Luzzader WJ, Duff JM; Fundamental of Engg Drawing Interactive Graphics; PHI.
12. PSG Design data book
13. Mahadevan and Reddy's Mechanical design data book

List of Experiments (Pl. expand it):

1. Computer Aided Drafting of simple machine parts
- 2 3D modeling of simple solid shapes
- 3 Design and drawing of parts contained in the syllabus

YBME306 Computer Programming (Java)

UNIT-I

Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes

UNIT-II

Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees, Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector. Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

UNIT-III

Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

UNIT-IV

Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips

UNIT-V

Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

References:

1. Deitel & Deitel, "JAVA, How to Program"; PHI, Pearson.
2. E. Balaguruswamy, "Programming In Java"; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH
4. Peter Norton, "Peter Norton Guide To Java Programming", Techmedia.
5. Merlin Hughes, et al; [Java Network Programming](#) , Manning Publications/Prentice Hall

List of Program to be made (Expandable)

1. Installation of J2SDK
2. Write a program to show Concept of CLASS in JAVA
3. Write a program to show Type Casting in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write Programs to show Inheritance and Polimorphism.
6. Write a program to show Interfacing between two classes
7. Write a program to Add a Class to a Package
8. Write a program to demonstrate AWT.
9. Write a Program to show Data Base Connectivity Using JAVA
10. Write a Program to show “HELLO JAVA ” in Explorer using Applet
11. Write a Program to show Connectivity using JDBC
12. Write a program to demonstrate multithreading using Java.
13. Write a program to demonstrate applet life cycle.



YBME307 Self Study (Internal Assessment)

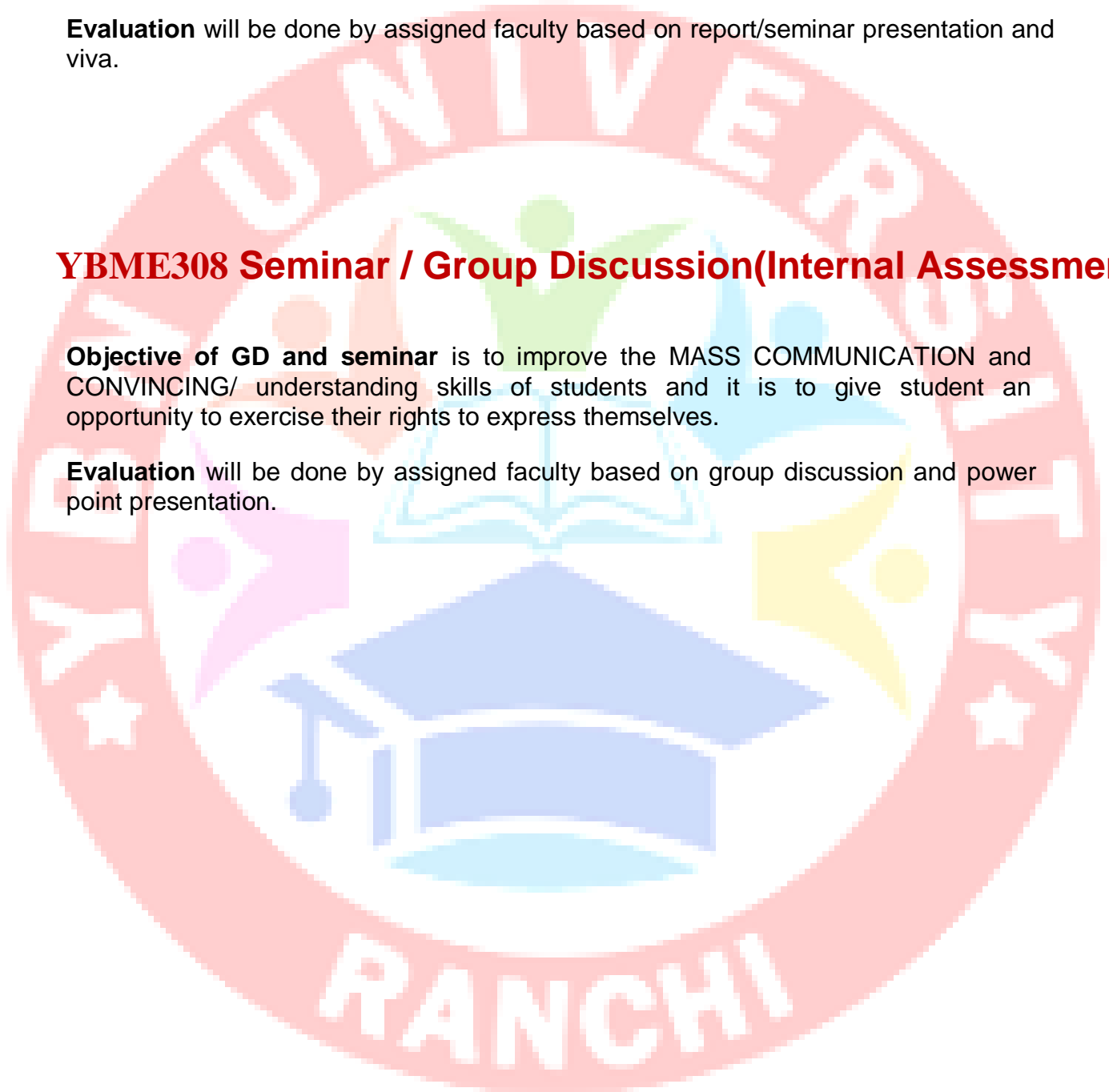
Objective of Self Study: is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

Evaluation will be done by assigned faculty based on report/seminar presentation and viva.

YBME308 Seminar / Group Discussion(Internal Assessment)

Objective of GD and seminar is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.



YBN UNIVERSITY, RANCHI, JHARKHAND
School of Engineering & Technology

B.Tech., Semester IV

Mechanical Engineering

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted							Credits Allotted Subject wise	Total Credits	Remarks		
			Theory Slot			Practical Slot		Total Marks	Period per week					
			End Sem.	Mid Sem. MST (Two tests average)	Quiz, Assignment	End Sem	Term work							
							Lab work & sessional	Assignment/quiz	L	T	P			
1	YBE401	Mathematics -III	70	20	10	-	-	-	100	3	1	-	04	
2	YBME402	Material Science and Metallurgy	70	20	10	-	-	-	100	3	1	-	04	
3	YBME403	Theory of M/C and Mechanism	70	20	10	30	10	10	150	3	1	2	06	
4	YBME404	Thermal Engg and gas dynamics	70	20	10	30	10	10	150	3	1	2	06	
5	YBME405	Fluid Mechanics	70	20	10	30	10	10	150	3	1	2	06	
6	YBME406	Dot Net	-	-	-	30	10	10	50	0	0	2	02	
7	YBME407	Self study (Internal Assessment)	-	-	-	-	-	50	50	0	0	2	02	Grand Total
8.	YBME408	Seminar / Group Discussion (Internal Assessment)	-	-	-	-	-	50	50	0	0	2	02	
		Total	350	100	50	120	40	140	800	15	5	12	32	800

MST: Mid Semester Tests Taken at Least twice Per Semester L:Lecture- T:Tutorial- P: Practical

YBE401 - ENGINEERING MATHEMATICS III

Unit-1

Functions of complex variables : Analytic functions, Harmonic Conjugate, Cauchy-Riemann Equations, Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem , Application of Residues theorem for evaluation of real integrals

Unit II

Errors & Approximations, Solution of Algebraic & Trancedental Equations (Regula Falsi , Newton-Raphson, Iterative, Secant Method), Solution of simultaneous linear equatins by Gauss Elimination, Gauss Jordan, Crou't's methods , Jacobi's and Gauss-Siedel Iterative methods

Unit III

Difference Operators, Interpolation (Newton Forward & Backward Formulae, Central Interpolation Formulae, Lagrange's and divided difference formulae), Numerical Differentiation and Numerical Integration.

Unit IV

Solution of Ordinary Differential Equations(Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector method), Correlation and Regression, Curve Fitting (Method of Least Square).

Unit V

Concept of Probability : Probability Mass function, Probability density function. Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution ,Gamma Distribution ,Beta Distribution ,Testing of Hypothesis |:Students t-test, Fisher's z-test, Chi-Square Method

Reference:

- (i) Numerical Methods using Matlab by J.H.Mathews and K.D. Fink, P.H.I.
- (ii) Numerical Methods for Scientific and Engg. Computation by MKJain, Iyengar and RK Jain, New Age International Publication
- (iii) Mathematical Methods by KV Surya narayan Rao, SCITECH Publucation
- (iv) Numerical Methods using Matlab by Yang,Wiley India
- (v) Pobability and Statistics by Ravichandran ,Wiley India
- (vi) Mathematical Statistics by George R., Springer

YBME402 Material Science and Metallurgy

Unit I

Crystal Atoms of Solid: Structure of atom binding in solids metallic, Vander walls, ionic and covalent, Space lattice and crystal system arrangement of atoms in BCC, FCC and HCP crystal. Manufacture of Refractory and Ferrous Metals: Properties uses and selection of acid, basic and natural refractory, metallurgical coke, Properties, types, uses and brief description of the manufacturing processes for iron and steel making.

Unit II

Plastic deformation of Metals: Point and line defects in crystals, their relation to mechanical properties, deformation of metal by slip and twinning stress strain curves of poly crystalline materials viz. mild steel cast iron and brass yield point phenomenon. Cold and hot working of metals and their effect on mechanical properties, annealing of cold worked metals, principles of re-crystallization and grain growth phenomenon, fracture in metal and alloys, ductile and brittle fracture, fatigue failure

Unit III

Alloy Formation and Binary Diagram: Phase in metal system solution and inter-metallic compounds. Hume-Rottery's rules, solidification of pure metals and alloy equilibrium diagrams of isomorphous, eutectic peritectic and eutectoid system, non-equilibrium cooling and coring iron, iron carbon equilibrium diagram.

Unit IV

Heat Treatment of Alloys Principles of Heat Treatment of Steel: TTT curves heat treating processes, normalizing, annealing spheroidizing, hardening, tempering, case hardening, aus-tempering, mar-tempering, precipitation hardening process with reference to Al, Cu alloys

Unit V

Properties of Material: Creep Fatigue etc., Introduction to cast iron and steel, Non Ferrous metals base alloys, Bronze, Brasses, Duralumin, and Bearing Metals. Plastics, Composites and ceramics: Various types of plastics, their properties and selection. Plastic molding technology, FRP, GRP resins adhesive, elastomers and their application. Powder Metallurgy: Property and Applications of Powder Metallurgy, Various process and methods of making products by powder Metallurgy techniques.

References:

1. Narula GK, KS and GuptaVK; Material science; TMH
2. Raghavan V; Material Science and Engineering, PHI Publication.
3. Raghavan V; Physical Metallurgy Principles and Practice; PHI
4. Rajendran V and Marikani; Material science; TMH
5. Srinivasan R; Engineering materials and Metallurgy; TMH
6. Navneet Gupta, Material Science & Engineering, Dhanpat Rai.
7. B. K. Agrawal, Introduction to Engineering Materials, TMH.

YBME403 Theory of M/C and Mechanism

Unit 1:

Mechanisms and Machines: Mechanism, machine, plane and space mechanisms, kinematic pairs, kinematic chains and their classification, degrees of freedom, Grubler's criterion, kinematic inversions of four bar mechanism and slider crank mechanism, equivalent linkages, pantograph, straight line motion mechanisms, Davis and Ackermann's steering mechanisms, Hooke's joint.

Unit 2:

Kinematic analysis of plane mechanisms using graphical and Cartesian vector notations: Planar kinematics of a rigid body, rigid body motion, translation, rotation about a fixed axis, absolute general plane motion. General case of plane motion, relative velocity method, velocity and acceleration analysis, instantaneous center and its application, Kennedy's theorem, relative motion, Coriolis component of acceleration; velocity and acceleration analysis using complex algebra (Raven's) method.

Unit 3 :Gears: Classification of gears, nomenclature, involutes and cycloidal tooth profile properties, synthesis of tooth profile for spur gears, tooth system, conjugate action, velocity of sliding, arc of contact, path of contact, contact ratio, interference and undercutting, helical, spiral, bevel and worm gears.

Unit 4:

Cams: Classification of followers and cams, radial cam nomenclature, analysis of follower motion (uniform, modified uniform, simple harmonic, parabolic, cycloidal), pressure angle, radius of curvature, synthesis of cam profile by graphical approach, cams with specified contours.

Gear Trains: Simple, compound, epicyclic gear trains; determination of gear speeds using vector, analytical and tabular method; torque calculations in simple, compound and epicyclic gear trains.

Unit 5:

Gyroscopic Action in Machines: angular velocity and acceleration, gyroscopic torque/ couple; gyroscopic effect on naval ships; stability of two and four wheel vehicles, rigid disc at an angle fixed to a rotating shaft

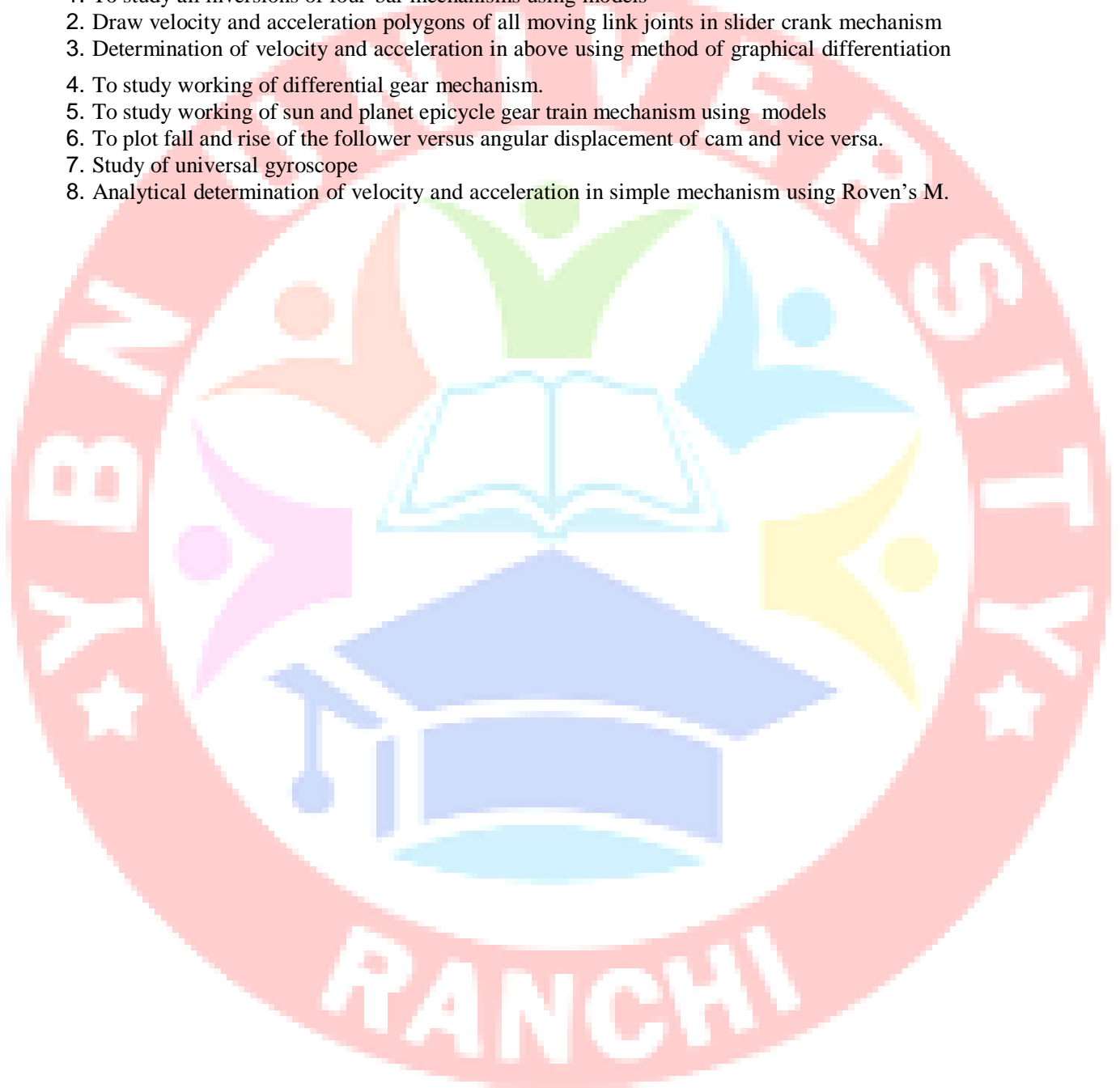
References:

1. Rattan SS; Theory of machines; TMH
2. Ambekar AG; Mechanism and Machine Theory; PHI.
3. Sharma CS; Purohit K; Theory of Mechanism and Machines; PHI.
4. Thomas Bevan; Theory of Machines; Pearson/ CBS PUB Delhi.

5. Rao JS and Dukkipati; Mechanism and Machine Theory; NewAge Delhi.
6. Dr.Jagdish Lal; Theory of Machines; Metropolitan Book Co; Delhi –
7. Ghosh,A.,Mallik,AK; Theory of Mechanisms & Machines, 2e,; Affiliated East West Press, Delhi.

List of experiments (expandable)

1. To study all inversions of four-bar mechanisms using models
2. Draw velocity and acceleration polygons of all moving link joints in slider crank mechanism
3. Determination of velocity and acceleration in above using method of graphical differentiation
4. To study working of differential gear mechanism.
5. To study working of sun and planet epicycle gear train mechanism using models
6. To plot fall and rise of the follower versus angular displacement of cam and vice versa.
7. Study of universal gyroscope
8. Analytical determination of velocity and acceleration in simple mechanism using Roven's M.



YBME404 Thermal Engg and gas dynamics

Unit I

Steam generators: classification, conventional boilers, high-pressure boilers-lamont, benson, loeffler and velox steam generators, performance and rating of boilers, equivalent evaporation, boiler efficiency, heat balance sheet, combustion in boilers, super critical boilers, fuel and ash handling, boiler draught, overview of boiler codes.

Unit II

Phase Change Cycles: Vapor Carnot cycle and its limitation, Rankin cycle, effect of boiler and Condenser pressure and superheat on end moisture and efficiency of ranking cycle, modified Rankin cycle, reheat cycle, perfect regenerative cycle, Ideal and actual regenerative cycle with single and multiple heaters, open and closed type of feed water heaters, regenerative-reheat cycle, supercritical pressure and binary-vapor cycle, work done and efficiency calculations.

Unit III

(A) Gas dynamics: speed of sound, in a fluid mach number, mach cone, stagnation properties, one-dimensional isentropic flow of ideal gases through variable area duct-mach number variation, area ratio as a function of mach number, mass flow rate and critical pressure ratio, effect of friction, velocity coefficient, coefficient of discharge, diffusers, normal shock.

(b) Steam nozzles: isentropic flow of vapors, flow of steam through nozzles, condition for maximum discharge, effect of friction, super-saturated flow.

Unit IV

Air compressors: working of reciprocating compressor, work input for single stage compression different, compression processes, effect of clearance, volumetric efficiency real indicator diagram, isentropic & isothermal and mechanical efficiency, multi stage compression, inter - cooling, condition for minimum work done, classification and working of rotary compressors.

Unit V

Steam condensers, cooling towers and heat exchangers: introduction, types of condensers, back pressure and its effect on plant performance air leakage and its effect on performance of condensers, various types of cooling towers, design of cooling towers, classification of heat exchangers, recuperates and regenerators .parallel flow, counter flow and cross flow exchangers, fouling factor, introduction to LMTD approach to design a heat exchanger.

References:

1. Nag PK; Power plant Engineering; TMH
2. Thermodynamics by Gordon J. Van Wylen
3. P.K.Nag; Basic and applied Thermodynamics; TMH
4. Ganesan; Gas turbines; TMH
5. Heat Engines by V.P. Vasandani & D. S. Kumar
6. R. Yadav Steam and Gas Turbines
7. R.Yadav Thermal Engg.
8. Kadambi & Manohar; An Introduction to Energy Conversion – Vol II. Energy conversion cycles

List of Experiments (Please Expand it) (Thermal Engg and gas dynamics):

1. Study of working of some of the high pressure boilers like Lamont or Benson
2. Study of Induced draft/forced and balanced draft by chimney
3. Determination of Calorific value of a fuel

4. Study of different types of steam turbines
5. Determination of efficiencies of condenser
6. Boiler trial to chalk out heat balance sheet
7. Determination of thermal efficiency of steam power plant
8. Determination of Airflow in ducts and pipes.
9. To find out efficiencies of a reciprocating air compressor and study of multistage Compressors .
10. Find Out heat transfer area of a parallel flow/counter flow heat exchanger



YBME405 Fluid Mechanics

Unit-I

Review of Fluid Properties: Engineering units of measurement, mass, density, specific weight, volume and gravity, surface tension, capillarity, viscosity, bulk modulus of elasticity, pressure and vapor pressure. Fluid Static's : Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems on gravity dams and Tainter gates); buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

Unit-II

Kinematics of Flow : Types of flow-ideal & real , steady & unsteady, uniform & non-uniform, one, two and three dimensional flow, path lines, streak-lines, streamlines and stream tubes; continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow netstheir utility & method of drawing flow nets.

Unit-III

Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow; momentum correction factor. The moment of momentum equation, forces on fixed and moving vanes and other applications. Fluid Measurements: Velocity measurement (Pitot tube, Prandtl tube, current meters etc.); flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venturi-meter, weirs and notches).

Unit-IV

Dimensional Analysis and Dynamic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, rotodynamic machines etc.)

Unit-V

Laminar Flow: Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, Stokes law, lubrication principles.

References: -

1. Modi & Seth; Fluid Mechanics; Standard Book House, Delhi
2. Streeter VL, Wylie EB, Bedford KW; Fluid Mechanics; TMH
3. Som and Biswas; Fluid Mechcnics and machinery; TMH
4. Cengal; Fluid Mechanics; TMH
5. White ; Fluid Mechanics ; TMH

6. Gupta; Fluid Mechanics; Pearson
7. JNIK DAKE; Essential of Engg Hyd; Afrikan Network & Sc Instt. (ANSTI)
8. R Mohanty; Fluid Mechanics; PHI

List of Experiments (Pl. expand it):

1. To determine the local point pressure with the help of pitot tube.
2. To find out the terminal velocity of a spherical body in water.
3. Calibration of Orifice meter and Venturi meter
4. Determination of C_c , C_v , C_d of Orifices
5. Calibration of Nozzle meter and Mouth Piece
6. Reynolds experiment for demonstration of stream lines & turbulent flow
7. Determination of meta-centric height
8. Determination of Friction Factor of a pipe
9. To study the characteristics of a centrifugal pump.
10. Verification of Impulse momentum principle.



YBME406 Dot Net

UNIT I

Introduction .NET framework, features of .Net framework, architecture and component of .Net, elements of .Net.

UNIT II

Basic Features Of C# Fundamentals, Classes and Objects, Inheritance and Polymorphism, Operator Overloading, Structures. **Advanced Features Of C#** Interfaces, Arrays, Indexers and Collections; Strings and Regular Expressions, Handling Exceptions, Delegates and Events.

UNIT III

Installing ASP.NET framework, overview of the ASP .net framework, overview of CLR, class library, overview of ASP.net control, understanding HTML controls, study of standard controls, validations controls, rich controls. **Windows Forms:** All about windows form, MDI form, creating windows applications, adding controls to forms, handling Events, and using various Tolls

UNIT IV

Understanding and handling controls events, **ADO.NET-** Component object model, ODBC, OLEDB, and SQL connected mode, disconnected mode, dataset, data-reader **Data base controls:** Overview of data access data control, using grid view controls, using details view and frame view controls, ado .net data readers, SQL data source control, object data source control, site map data source.

UNIT V

XML: Introducing XML, Structure, and syntax of XML, document type definition (DTD), XML Schema, Document object model, Presenting and Handling XML. xml data source, using navigation controls, introduction of web parts, using java script, Web Services

References:

1. C# for Programmers by [Harvey Deitel](#), [Paul Deitel](#), Pearson Education
2. Balagurusamy; Programming in C#; TMH
3. **Web Commerce Technology** Handbook by Daniel **Minoli**, Emma **Minoli** , TMH
4. Web Programming by Chris Bates, Wiley
5. XML Bible by Elliotte Rusty Harold ,
6. ASP .Net Complete Reference by McDonald, TMH.
7. ADO .Net Complete Reference by Odey, TMH

List of Experiments/ program (Pl. expand it):

1. Working with call backs and delegates in C#
2. Code access security with C#.
3. Creating a COM+ component with C#.
4. Creating a Windows Service with C#
5. Interacting with a Windows Service with C#
6. Using Reflection in C#
7. Sending Mail and SMTP Mail and C#

8. Perform String Manipulation with the String Builder and String Classes and C#:
9. Using the System .Net Web Client to Retrieve or Upload Data with C#
10. Reading and Writing XML Documents with the XML Text-Reader/-Writer Class and C#
11. Working with Page and forms using ASP .Net.
12. Data Sources access through ADO.Net,
13. Working with Data readers , Transactions
14. Creating Web Application.

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YBN UNIVERSITY, RANCHI, JHARKHAND

School of Engineering & Technology

B.Tech., Semester V

Mechanical Engineering

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Credits Allotted Subject wise	Total Credits	Remarks				
			Theory Slot			Practical Slot		Total Marks							
			End Sem.	Mid Sem. MST	Quiz, Assignment	End Sem	Term work		Period per week						
							Lab work & sessional	Assignment/quiz				L	T	P	
1	YBME501	Entrepreneurship and Management Concepts.	70	20	10	-	-	-	100	3	1	-	04		
2	YBME502	Turbo Machinery	70	20	10	-	-	-	100	3	1	-	04		
3	YBME503	Mechanical Measurement & control	70	20	10	30	10	10	150	3	1	2	06		
4	YBME504	Machine Component Design	70	20	10	30	10	10	150	3	1	2	06		
5	YBME505	Dynamics of Machines	70	20	10	30	10	10	150	3	1	2	06		
6	YBME506	RDBMS Lab	-	-	-	30	10	10	50	0	0	2	02		
7	YBME507	Self study (Internal Assessment)	-	-	-	-	-	50	50	0	0	2	02	Grand Total	
8.	YBME508	Seminar / Group Discussion (Internal Assessment)	-	-	-	-	-	50	50	0	0	2	02		
		Total	350	100	50	120	40	140	800	15	5	12	32	800	

MST: Mid Semester Tests Taken at Least twice Per Semester

L:Lecture-

T:Tutorial-

P: Practical

YBME501 - Entrepreneurship and Management Concepts

Unit-I:

System Concepts: Types, definition & characteristics; supra & subsystems, key component; boundary & interface complexity; feedback (pull) & feed forward (push) controls, open flexible-adaptive system, computer as closed system, law of requisite variety; system coupling, stresses and entropy; functional & cross functional system; Steven Alter's nine element work system model and its comparison with IPO (input-processing-output) model, structure and performance of work systems leading to customer delight.

Unit-II:

Management: Importance, definition and functions; schools of theories, knowledge driven learning organization and e-business; environment, uncertainty and adaptability; corporate culture, difficulties and levels of planning, BCG matrix, SWOT analysis, steps in decision making, structured and unstructured decision; dimensions of organizations, size/specialization, behavior formalization, authority centralization, departmentalization, span and line of control, technology and Minzberg organization typology, line, staff & matrix organization, coordination by task force, business process reengineering and process of change management, HR planning placement and training, MIS; attitudes and personality trait, overlap and differences between leader & manager, leadership grid, motivation, Maslow's need hierarchy and Herzberg two factor theory, expectation theory, learning process, team work and stress management.

Unit-III:

Marketing: Importance, definition, core concepts of need want and demand, exchange & relationships, product value, cost and satisfaction (goods and services) marketing environment; selling, marketing and societal marketing concepts; four P's, product, price, placement, promotion; consumer, business and industrial market, market targeting, advertising, publicity, CRM and market research.

Finance: Nature and scope, forms of business ownerships, balance sheet, profit and loss account, fund flow and cash flow statements, breakeven point (BEP) and financial ratio analysis, pay-back period, NPV and capital budgeting.

Unit-IV:

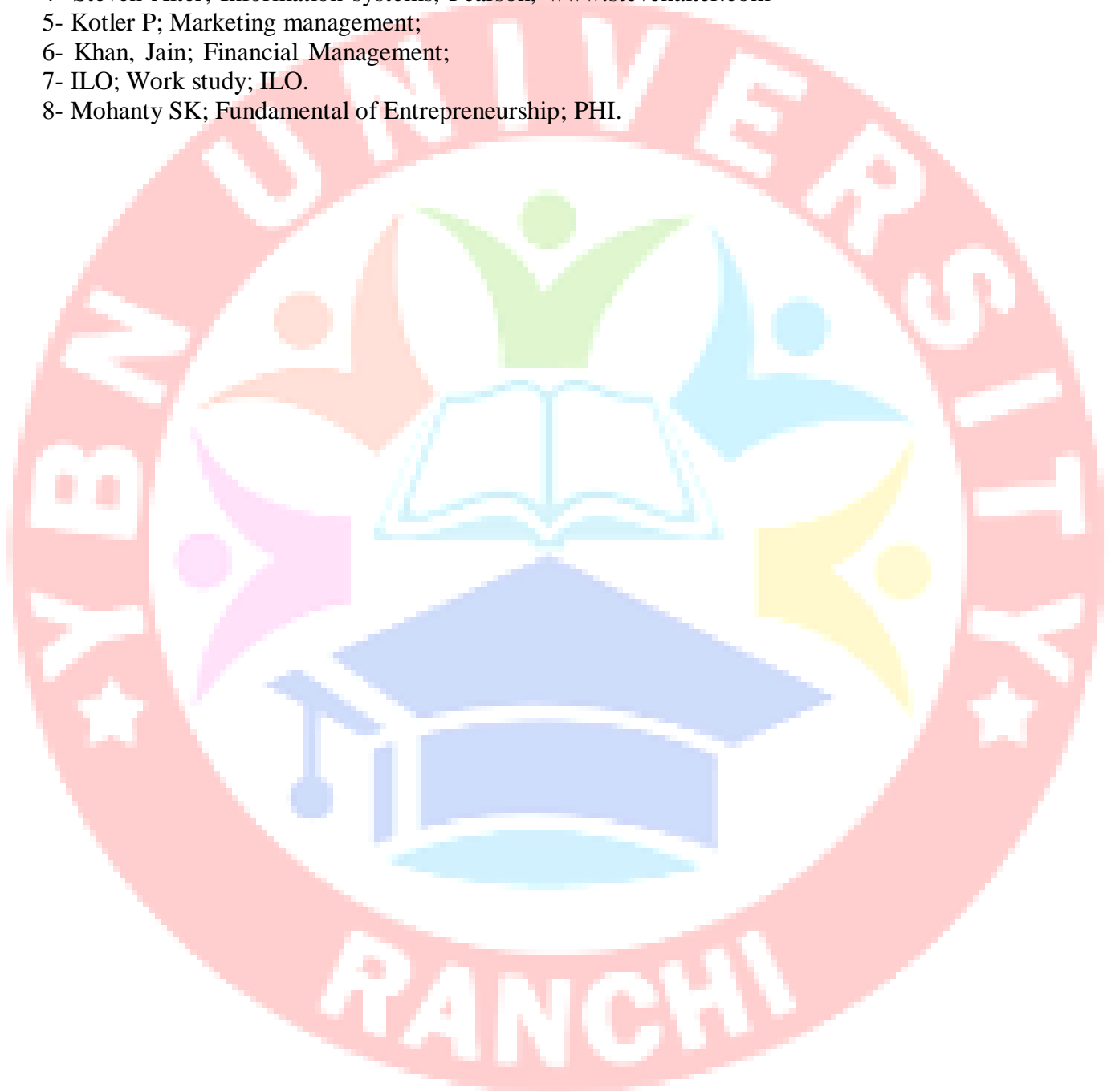
Productivity and Operations: Productivity, standard of living and happiness, types of productivity, operations (goods and services) Vs project management, production processes and layouts, steps in method improvement, time measurement, rating and various allowances; standard time and its utility, predetermined motion and time method, product and process specification, TQM, cost of quality, introduction to lean manufacturing (JIT), QFD, TPM & six sigma quality.

Unit V:

Entrepreneurship : Definition and concepts, characteristics, comparison with manager, classification, theories of entrepreneur, socio, economic, cultural and psychological; entrepreneur traits and behavior, roles in economic growth, employment, social stability, export promotion and indigenization, creating a venture, opportunity analysis competitive and technical factors, sources of funds, entrepreneur development program.

References:

- 1- Daft R; The new era of management; Cengage.
- 2- Bhat Anil, Arya kumar; Management: Principles ,Processes and Practices; Oxford higher edu. 3- Davis & Olson; Management Information System; TMH.
- 4- Steven Alter; Information systems, Pearson, www.stevenalter.com
- 5- Kotler P; Marketing management;
- 6- Khan, Jain; Financial Management;
- 7- ILO; Work study; ILO.
- 8- Mohanty SK; Fundamental of Entrepreneurship; PHI.



YBME502- Turbo Machinery

Unit I:

Energy transfer in turbo machines: application of first and second laws of thermodynamics to turbo machines, moment of momentum equation and Euler turbine equation, principles of impulse and reaction machines, degree of reaction, energy equation for relative velocities, one dimensional analysis only.

Unit II:

Steam turbines: impulse staging, velocity and pressure compounding, utilization factor, analysis for optimum U.F Curtis stage, and Rateau stage, include qualitative analysis, effect of blade and nozzle losses on vane efficiency, stage efficiency, analysis for optimum efficiency, mass flow and blade height. **Reactions staging:** Parson's stages, degree of reaction, nozzle efficiency, velocity coefficient, stator efficiency, carry over efficiency, stage efficiency, vane efficiency, conditions for optimum efficiency, speed ratio, axial thrust, reheat factor in turbines, problem of radial equilibrium, free and forced vortex types of flow, flow with constant reaction, governing and performance characteristics of steam turbines.

Unit III:

Water turbines: Classification, Pelton, Francis and Kaplan turbines, vector diagrams and work-done, draft tubes, governing of water turbines. **Centrifugal Pumps:** classification, advantage over reciprocating type, definition of mano-metric head, gross head, static head, vector diagram and work done. **Performance and characteristics:** Application of dimensional analysis and similarity to water turbines and centrifugal pumps, unit and specific quantities, selection of machines, Hydraulic, volumetric, mechanical and overall efficiencies, Main and operating characteristics of the machines, cavitations.

Unit IV:

Rotary Fans, Blowers and Compressors: Classification based on pressure rise, centrifugal and axial flow machines. **Centrifugal Blowers** Vane shape, velocity triangle, degree of reactions, slip coefficient, size and speed of machine, vane shape and stresses, efficiency, characteristics, fan laws and characteristics. **Centrifugal Compressor** – Vector diagrams, work done, temp and pressure ratio, slip factor, work input factor, pressure coefficient, Dimensions of inlet eye, impeller and diffuser. **Axial flow Compressors-** Vector diagrams, work done factor, temp and pressure ratio, degree of reaction, Dimensional Analysis, Characteristics, surging, Polytrophic and isentropic efficiencies.

Unit V:

Power Transmitting turbo machines: Application and general theory, their torque ratio, speed ratio, slip and efficiency, velocity diagrams, fluid coupling and Torque converter, characteristics, **Positive displacement machines** and turbo machines, their distinction. Positive displacement pumps with fixed and variable displacements, **Hydrostatic systems**, hydraulic intensifier, accumulator, press and crane.

References:

1. Venkanna BK; turbomachinery; PHI
2. Shepherd DG; Turbo machinery
3. Csanady; Turbo machines
4. Kadambi V Manohar Prasad; An introduction to EC Vol. III-Turbo machinery; Wiley Eastern Delhi
5. Bansal R. K; Fluid Mechanics & Fluid Machines;

YBME503- Mechanical Measurement & control

Unit-I:

Basic Concepts of Measurement: General measurement system; Experimental test plan: variables, parameters, noise and interference, replication and repetition; Calibration: Static calibration, dynamic calibration, static sensitivity, range, accuracy, precision and bias errors, sequential and random tests; Presenting data: Rectangular coordinate format, semi-log, full-log formats. Measurement System Behavior: General model for a dynamic measurement system and its special cases: zero order, first order, and second order system, determination of time constant and settling time, phase linearity.

Unit-II:

Statistics: Least square regression analysis and data outlier detection; Normal distribution and concept of standard deviation of the mean in finite data set, Uncertainty Analysis: Measurement errors; error sources: calibration, data acquisition, data reduction; Design stage uncertainty analysis; combining elemental errors; Bias & Precision errors; Error propagation, Higher order uncertainty analysis.

Unit-III:

Temperature Measurement: Temperature standards, Temperature scales; Thermometry based on thermal expansion: Liquid in glass thermometers, Bimetallic Thermometers; Electrical resistance thermometry: Resistance Temperature Detectors, Thermistors; Thermoelectric Temperature Measurement: Temperature measurement with thermocouples, thermocouple standards. Pressure and Velocity Measurement: Relative pressure scales, pressure reference instruments, barometer, manometer, deadweight tester, pressure gauges and transducers, total and static pressure measurement in moving fluids Flow measurement: Pressure differential meters: Orifice meter, Venturi meter, roto-meter.

Unit-IV:

Strain Measurement: Stress and strain, resistance strain gauges, gauge factor, strain gauge electrical circuits, multiple gauge bridge, bridge constant, apparent strain and temperature compensation, bending compensation. Motion, Force and Torque Measurement: Displacement measurement: Potentiometers, Linear variable differential transformers, rotary variable differential transformer; Velocity measurement: moving coil transducers; angular velocity measurement: electromagnetic techniques, stroboscopic measurement; Force measurement: load cells, piezoelectric load cells; Torque measurement: measurement of torque on rotating shafts, Power estimation from rotational speed and torque.

Unit-V:

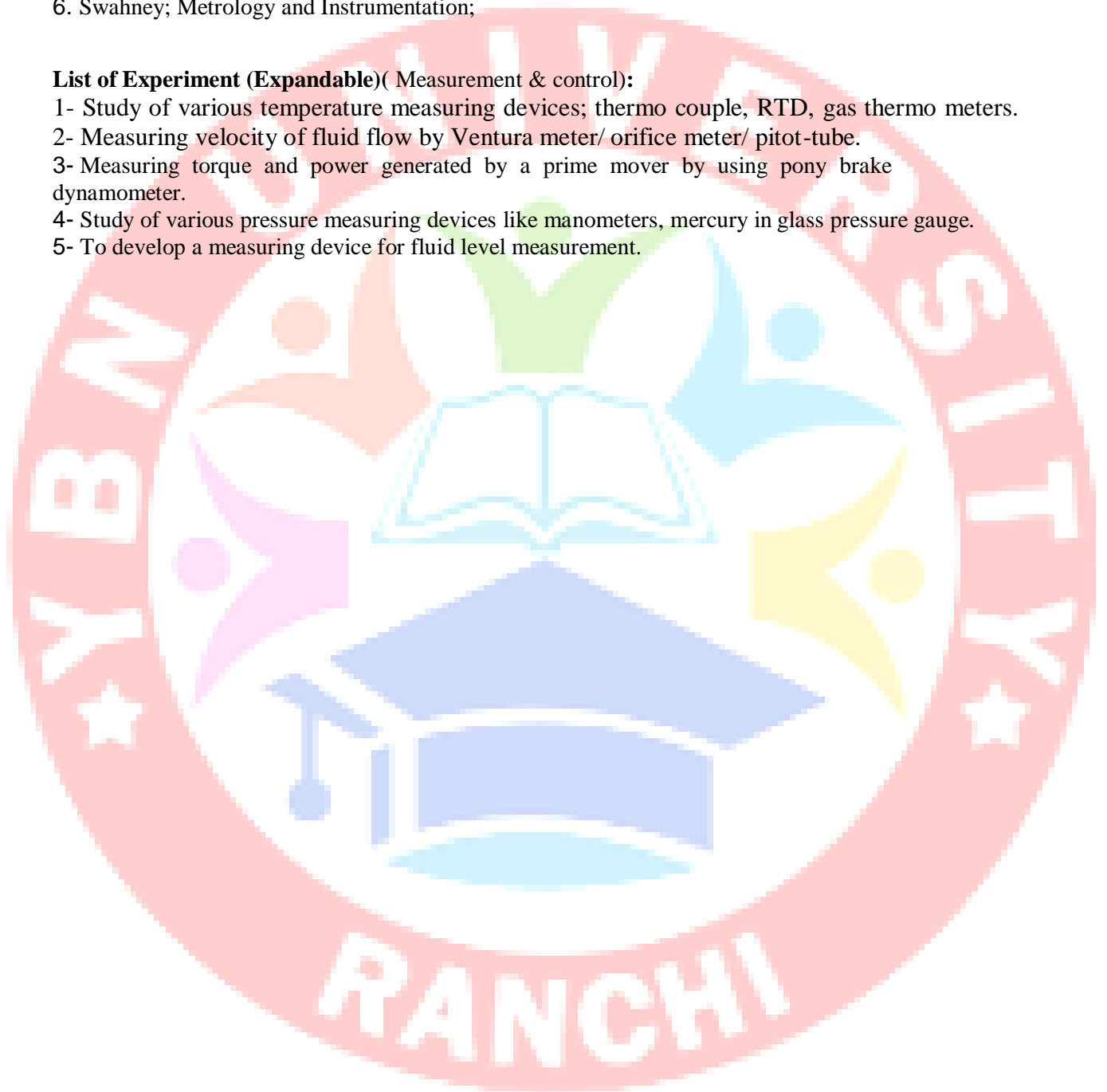
Introduction to control systems: Examples of control systems. Open loop and closed loop control, Mathematical modeling of dynamic systems: Transfer function, impulse response function, block diagram of closed loop system, block diagram reduction, Transient and steady state response analyses: First order systems, unit step and unit impulse response of first order systems, second order systems, unit step and unit impulse response of second order systems, transient response specifications, modeling of mechanical systems, modeling of electrical systems, signal flow graphs, modeling of fluid systems, liquid level systems, hydraulic systems, modeling of thermal systems.

References:

1. Nakra and Chowdhry; Measurement and Control; TMH
2. Figiola RS & Beasley DE; Theory and Design for Mechanical Measurements; 3e John Wiley
3. Katsuhiko Ogata; Modern Control Engineering, 4e Pearson Education, New Delhi
4. Gopal; Control Systems Principles and Design; Tata McGraw Hill, New Delhi.
5. Backwith and Buck; Mechanical Measurements.
6. Swahney; Metrology and Instrumentation;

List of Experiment (Expandable)(Measurement & control):

- 1- Study of various temperature measuring devices; thermo couple, RTD, gas thermo meters.
- 2- Measuring velocity of fluid flow by Ventura meter/ orifice meter/ pitot-tube.
- 3- Measuring torque and power generated by a prime mover by using pony brake dynamometer.
- 4- Study of various pressure measuring devices like manometers, mercury in glass pressure gauge.
- 5- To develop a measuring device for fluid level measurement.



YBME504- Machine Component Design

Unit I: Stress concentration and fatigue: causes of stress concentration; stress concentration in tension, bending and torsion; reduction of stress concentration, theoretical stress concentration factor, notch sensitivity, fatigue stress concentration factor, cyclic loading, endurance limit, S-N Curve, loading factor, size factor, surface factor. Design consideration for fatigue, Goodman and modified Goodman's diagram, Soderberg equation, Gerber parabola, design for finite life, cumulative fatigue damage factor.

Unit II: Shafts: Design of shaft under combined bending, twisting and axial loading; shock and fatigue factors, design for rigidity; Design of shaft subjected to dynamic load; Design of keys and shaft couplings.

Unit III: Springs: Design of helical compression and tension springs, consideration of dimensional and functional constraints, leaf springs and torsion springs; fatigue loading of springs, surge in spring; special springs, **Power Screws** design of power screw and power nut, differential and compound screw, design of simple screw jack.

Unit IV: Brakes & Clutches: Materials for friction surface, uniform pressure and uniform wear theories, Design of friction clutches: Disk, plate clutches, cone & centrifugal clutches. Design of brakes: Rope, band & block brake, Internal expanding brakes, Disk brakes.

Unit V Journal Bearing: Types of lubrication, viscosity, hydrodynamic theory, design factors, temperature and viscosity considerations, Reynold's equation, stable and unstable operation, heat dissipation and thermal equilibrium, boundary lubrication, dimensionless numbers, Design of journal bearings, **Rolling-element Bearings:** Types of rolling contact bearing, bearing friction and power loss, bearing life; Radial, thrust & axial loads; Static & dynamic load capacities; Selection of ball and roller bearings; lubrication and sealing.

References:

1. Shingley J.E; Machine Design; TMH
2. Sharma and Purohit; Design of Machine elements; PHI
3. Wentzell Timothy H; Machine Design; Cengage learning
4. Mubeen; Machine Design; Khanna Publisher
5. Ganesh Babu K and Srithar k; Design of Machine Elements; TMH
6. Sharma & Agrawal; Machine Design; Kataria & sons
7. Maleev; Machine Design;

List of Experiment (Pl. expand it):

Designing and sketching of components contained in the syllabus

YBME505- Dynamics of Machines

Unit 1: Dynamics of Engine Mechanisms: Displacement, velocity and acceleration of piston; turning moment on crankshaft, turning moment diagram; fluctuation of crankshaft speed, analysis of flywheel.

Unit 2: Governor Mechanisms: Types of governors, characteristics of centrifugal governors, gravity and spring controlled centrifugal governors, hunting of centrifugal governors, inertia governors.

Unit 3: Balancing of Inertia Forces and Moments in Machines: Balancing of rotating masses, two plane balancing, determination of balancing masses (graphical and analytical methods), balancing of rotors, balancing of internal combustion engines (single cylinder engines, in-line engines, V-twin engines, radial engines, Lanchester technique of engine balancing.

Unit 4: Friction: Frictional torque in pivots and collars by uniform pressure and uniform wear rate criteria. Boundary and fluid film lubrication, friction in journal and thrust bearings, concept of friction circle and axis, rolling friction. Clutches: Single plate and multi plate clutches, Cone clutches.

Unit 5 Belt drives; Velocity ratio, limiting ratio of tension; power transmitted; centrifugal effect on belts, maximum power transmitted by belt, initial tension, creep; chain and rope drives; **Brakes:** Band brake, block brakes, Internal and external shoe brakes, braking of vehicles.

Dynamometer: Different types and their applications.

Dynamic Analysis of Cams: Response of un-damped cam mechanism (analytical method), follower response analysis by phase-plane method, jump and cross-over shock.

References:

1. Ambekar, AG; Mechanism and Machine Theory; PHI
2. Rattan SS; Theory of machines; TMH
3. Sharma and Purohit; Design of Machine elements; PHI
4. Bevan; Theory of Machines;
5. Ghosh and Mallik; Theory of Mechanisms and Machines; Affiliated East-West Press, Delhi
6. Norton RL; kinematics and dynamics of machinery; TMH
7. Grover; Mechanical Vibrations
8. Balaney; Theory of Machines by
9. Theory of Vibrations by Thomson

List of Experiment (Pl. expand it):

- 1- Study of various models of governors.
- 2- Study of gyroscopic motion and calculation of value of gyroscopic couple.
- 3- Study of various types of Cams and followers and drawing the cam profile with the help of test kit.
- 4- Study of various first order vibration systems.
- 5- To study working of friction clutches using models

YBME506- RDBMS Lab

UNIT-I

Introduction : Advantage of DBMS approach, various view of data, data independence, schema and sub-schema, primary concepts of data models, Database languages, transaction management, Database administrator and users, data dictionary, overall system architecture. **ER model:** basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables.

UNIT-II

Domains, Relations and keys: domains, relations, kind of relations, relational database, various types of keys, candidate, primary, alternate and foreign keys.

Relational Algebra & SQL: The structure, relational algebra with extended operations, modifications of Database, idea of relational calculus, basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, modification of Database, join relation, DDL in SQL.

UNIT-III

Relational Dependencies and Normalization: basic definitions, trivial and non trivial dependencies, closure set of dependencies and of attributes, irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, first second, third Normal forms, dependency preservation, BCNF, multivalued dependencies and forms normal form dependency and fifth normal forms. **Distributed Database:** basic idea, distributed data storage, data replication, data fragmentation horizontal, vertical and mixed fragmentation.

UNIT-IV

Emerging Fields in DBMS : object oriented Database-basic idea and the model, object structure, object class, inheritance, multiple inheritance, object identity, data warehousing-terminology, definitions, characteristics, data mining and it's overview, Database on www, multimedia Database-difference with conventional DBMS, issues, similarity based retrieved continuous media data, multimedia data formats, video servers.

Unit V

Storage structure and file organizations: Overview of physical storage media, magnetic disks performance and optimization, basic idea of RAID, organization, organization of records in files, basic concepts of indexing, ordered indices, basic idea of B-tree and B+-tree organization.

Network and hierarchical models: basic idea, data structure diagrams, DBTG model, implementations, tree structure diagram, implementation techniques, comparison of the three models.

References:

1. A Silberschatz, H.F. Korth, Sudersan "Database System Concept"=, MGH Publication.
2. C.J. Date "An introduction to Database System"=6th ed. Elmasri & Navathe "Fundamentals of Database system"- IIIed.

YBN UNIVERSITY, RANCHI, JHARKHAND
School of Engineering & Technology

B.Tech., Semester VI

Mechanical Engineering

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Credits Allotted Subject wise	Total Credits	Remark			
			Theory Slot			Practical Slot		Total Marks						
			End Sem.	Mid Sem. MST	Quiz, Assignment	End Sem	Term work		Period per week					
							Lab work & sessional	Assignment/quiz	L	T		P		
1	YBME601	Operations Management	70	20	10	-	-	-	100	3	1	-	04	
2	YBME602	Power Plant Engg	70	20	10	-	-	-	100	3	1	-	04	
3	YBME603	Metal Cutting and CNC machines	70	20	10	30	10	10	150	3	1	2	06	
4	YBME604	IC engines	70	20	10	30	10	10	150	3	1	2	06	
5	YBME605	Heat and Mass Transfer	70	20	10	30	10	10	150	3	1	2	06	
6	YBME606	Computer Aided Engg	-	-	-	30	10	10	50	0	0	2	02	
7	YBME607	Self study (Internal Assessment)	-	-	-	-	-	50	50	0	0	2	02	Grand Total
8.	YBME608	Seminar Group Discussion (Internal Assessment)	-	-	-	-	-	50	50	0	0	2	02	
		Total	350	100	50	120	40	140	800	15	5	12	32	800

MST: Mid Semester Tests Taken at Least twice Per Semester

L: Lecture -

T: Tutorial -

P: Practical

YBME601 – Operations Management

Unit 1

Operations Management (OM): Definition, history, industrial and IT revolution (ERP); tangible and service products continuum, employment shift from agriculture, manufacturing to service; customer orientation; basic process formats on product volume-variety graph; concept of raw process time, critical WIP, bottle neck thrupt and cycle-time with example of Penny-Fab- 1,2; Little's law, best and worst case performance, thrupt and cycle time formula in practical- worst-case; criteria of performance, decision area, business strategy, environment scan, SWOT, Porters' five forces, core competency, competitive priorities of cost, quality, time and flexibility, order winners; production strategy of Make To Order-MTO, MTS and ATO (assemble to order); productivity, standard of living and happiness.

Unit 2

Product:-Life Cycle and PLC management; design steps, evolution and innovation, traditional v/s concurrent design, form and functional design, simplification and standardization, differentiation/mass customization, modular design, design for mfg and environment (DFM, DFE), technologies used in design. Service characteristics and classification based on people- things v/s direct-indirect service actions, service triangle of customer, provider and system; technical and functional (delivery) service quality and other service performance factors, Valerie's service quality model; globalization of services.

Unit 3

Processes: transformation and value addition, selection based on cost, quality and flexibility considerations; reliability, bath-tub curve, series and parallel components, MTBF; availability and maintainability, preventive maintenance, TPM; value analysis; replacement models; Quality-definition, Taguchi loss function, cost of quality, chain action of improving quality to productivity to motivation and low cost; product and process specs; the funnel-marble experiment and variance reduction, process capability, six sigma and its implementation by DMAIC, QFD, TQM and ISO-9000.

Unit 4

Plant-facilities: Impact of organization strategies on choice of region and site, existing or new organization, decision-affecting factors for location, load distance, dimensional and factor analysis methods, Brown-Gibson model, foreign locations, non-profit govt. services (health, school) locations. facility layout objectives and factors, basic layouts, merits and optimization; subjective relationship ranking method, computer programs CRAFT and 3-d modeling; problems of inventories flow and operators in process layout and inflexibility in product layout, flexible cellular layout, group technology; capacity and equipment selection, importance of spare capacity to reduce Q-length and cycle time.

Unit 5

Programs/ procedures of production control (PPC): corporate and production planning process, aggregate plan, master production schedule and material planning; matching supply to demand fluctuations over time horizon, Forecasting elements, time series, regression, causal and Delphi methods; use of LP in aggregate plan and HMMS model, assembly line balancing, elemental task, station time and cycle time, balance delays; sequencing, Johnson method for n-

job 2/3 m/c, NP hard job-shop sequencing, heuristic dispatch rules; synchronous mfg, TOC, drum-buffer-rope and focus on bottleneck as control point; JIT lean mfg, Kanban and CONWIP shop floor controls, Kaizen.

References:

1. Chary SN; Production and Operations Management; TMH
 2. Hopp W and Spearman M; Factory Physics; TMH
 3. Gitlow Howard et al; Quality Management; TMH
 4. Stevenson W J; Operations Management; TMH
 5. Khanna RB; Production and Operations Management; PHI
 6. Vollman, Berry et al; Manufacturing planning and control for SCM; TMH.
 7. Chase Richard B et al; Operations management; SIE-TMH
- Adam EE and Ebert RJ; Production and Operations Management Concepts...; PHI Learnin



YBME602 – Power Plant Engineering

Unit I:

Introduction to methods of converting various energy sources to electric power, direct conversion methods renewable energy sources, solar, wind, tidal, geothermal, bio-thermal, biogas and hybrid energy systems, fuel cells, thermoelectric modules, MHD-Converter.

Unit II:

Fossil fuel steam stations: Basic principles of siting and station design, effect of climatic factors on station and equipment design, choice of steam cycle and main equipment, recent trends in turbine and boiler sizes and steam conditions, plant design and layout, outdoor and indoor plant, system components, fuel handling, burning systems, element of feed water treatment plant, condensing plant and circulating water systems, cooling towers, turbine room and auxiliary plant equipment., instrumentation, testing and plant heat balance.

Unit III:

Nuclear Power Station: Importance of nuclear power development in the world and Indian context, Review of atomic structure and radio activity, binding energy concept, fission and fusion reaction, fissionable and fertile materials, thermal neutron fission, important nuclear fuels, moderators and coolants, their relative merits, thermal and fast breeder reactors, principles of reactor control, safety and reliability features.

Unit IV:

Hydro-Power Station: Elements of Hydrological computations, rainfall run off, flow and power duration curves, mass curves, storage capacity, salient features of various types of hydro stations, component such as dams, spillways, intake systems, head works, pressure tunnels, penstocks, reservoir, balancing reservoirs, Micro and pico hydro machines, selection of hydraulic turbines for power stations, selection of site.

Unit V:

Power Station Economics: Estimation and prediction of load. Maximum demand, load factor, diversity factor, plant factor and their influence on plant design, operation and economics; comparison of hydro and nuclear power plants typical cost structures, simple problems on cost analysis, economic performance and tariffs, interconnected system and their advantages, elements of load dispatch in interconnected systems.

References:

- 1- Nag PK; Power plant Engg; TMH
- 2- Al-Wakil MM; Power plant Technology; TMH
- 3- Sharma PC; Power plant Engg; Kataria and sons, Delhi
- 4- Domkundwar; Power Plant Engg; Dhanpatrai & sons.
- 5- Rajput RK; A text book of Power plant Engg.; Laxmi Publications.
- 6- Yadav R; Steam and gas turbine and power plant engg by

YBME603 – Metal Cutting and CNC M/C

Unit I: Lathe: Classification of machine tools and their basic components; lathe- specification, components & accessories, various operations on lathes, capstan & turret lathes, tool layout, methods of thread production, machining time, single point cutting tools, tool signature and nomenclature

Unit II: Grinding: Types of grinding machines, surface, cylindrical and internal grinding, grinding wheels, specifications, wheel turning and dressing without eccentricity, centre-less grinding.

Unit III: Milling: Vertical, horizontal and universal type machines, specifications and classifications of milling machines, universal dividing head plain and different indexing, gear cutting, milling cutters.

Drilling & Broaching: Fixed spindle, radial and universal drilling machines, drilling time, broaching principle, broaches and broaching machines.

Unit IV: Shapers: Classification and specifications, principle parts, quick return mechanism, shaper operations, speed feed, depth of cut, machining time. Surface qualities, equipment used for rating surfaces, rms. CLA value, causes for surface irregularities.

Gear Cutting: Die casting, methods of forming gears, generating process, Gear shaping, gear shaving, gear grinding gear testing.

Unit V: Mechatronics: Introduction to control systems, analog control, transfer function, procedure for writing transfer function, signal flow diagram, introduction to electronic components like switches, magnetic type, electromagnetic type, transducers and other sensors, servo motors, basics of CD-ROM players, PLC, applications, CNC machines.

References:

1. Rao PN; Manufacturing Technology vol I and II; TMH
2. Hazra Chadhary; Workshop Tech.II; Media Promoter and Pub
3. Lindberg RA; Processes and Materials of Manufacturing; PHI.
4. Raghuvanshi;BS; Work shop technology Vol-I, II; Dhanpat Rai Delhi
5. Alciatori DG, Histan MB; Introduction to Mechatronics and Measurement system; TMH
6. HMT; Production Processes; TMH

List of Experiment (Pl. expand it):

1. To make a job on lathe machine with all operations like turning, step turning, drilling , taper turning , thread cutting and knurling .
2. Study of center less grinding machine/ tool and cutter type grinding machine.
3. Study of horizontal/ universal milling machine, diving head and indexing mechanism of it.
4. To cut a spur gear on milling machine using rapid indexing method.
5. Study of radial drilling machine and preparing a job on it.
6. To study a shaper machine to learn about working of quick return mechanism.

YBME604 – Internal Combustion Engines

Unit I: Internal Combustion Engine: S.I. and C.I. engines of two and four stroke cycles, real cycle analysis of SI and CI engines, determination of engine dimensions, speed, fuel consumption, output, mean effective pressure, efficiency, factors effecting volumetric efficiency, heat balance, performance characteristics of SI and CI engines, cylinder arrangement, firing order, power balance for multi-cylinder engines, valve timing.

Unit II: Combustion in SI engines: Flame development and propagation, ignition lag, effect of air density, temperature, engine speed, turbulence and ignition timings, physical and chemical aspects of detonation, effect of engine and fuel variables on knocking tendency, knock rating of volatile fuels, octane number, H.U.C.R., action of dopes, pre-ignition, its causes and remedy, salient features of various type combustion chambers, valve timing and firing order.

Unit III: Combustion in C.I. Engines: Times base indicator diagrams and their study, various stages of combustion, delay period, diesel knock, octane number, knock inhibitors, salient features of various types of combustion chambers, fuel, ignition, cooling, exhaust and lubrication systems; Simple problems on fuel injection, various types of engines, their classification and salient features. Rotary I. C. engines, their principles of working.

Unit IV: I.C. Engine System: Fuels, ignition systems, cooling, exhaust/scavenging and lubrication system. Fuel metering in SI engine: Fuel injection in SI engine (MPFI & TBI), Theory of carburetion, simple problems on carburetion. Fuel metering in CI engines: Fuel injection in CI engine and simple problems, various types of engines, their classification and salient features.

Fuels: Conventional fuels and alternate fuels, engine exhaust emission, carbon monoxide, unburnt hydro carbon, oxides of nitrogen, smoke, density, measurement and control, hydrogen as alternate fuel.

Unit V: Supercharging: Effect of attitude on mixture strength and output of S.I. engines, low and high pressure super charging, exhaust, gas turbo-charging, supercharging of two stroke engines.

References:

1. Ganeshan V; Internal Combustion engines; TMH
2. Mathur ML & Sharma RP; A. Course in IC engines; DhanpatRai
3. Gupta HN; Fundamentals of IC Engines; PHI
4. Srinivasan S; Automotive Engines; TMH
5. Halderman JD and Mitchell CD; Automotive Engines theory and servicing; Pearson
6. DomKundwar; Internal Combustion Engines ; Dhanpat Rai Publications
7. Taylor GF; Internal Combustion Engines Theory & Practice; MIT Press
8. Richard Stone; Introduction to IC Engines; Society of Automotive Engr (Palgrave Mc Millan)

List of Experiments (Pl. expand it):

1. Determination of Valve timing diagram
2. Load test on Petrol Engine
3. Heat Balance of SI engine
4. Heat Balance of CI Engine
5. Study of Battery Ignition system and Electronic Ignition System
6. Study of Diesel fuel pump
7. Study of Diesel fuel injectors
8. Study of a Carburetors
9. Study of Fuel Injection system in SI Engine
10. Study of lubricating system in CI Engines



YBME605 – Heat & Mass Transfer

Unit-1 Basic Concepts: Modes of heat transfer, Fourier's law, Newton's law, Stefan Boltzman law; thermal resistance and conductance, analogy between flow of heat and electricity, combined heat transfer process; **Conduction:** Fourier heat conduction equation, its form in rectangular, cylindrical and spherical coordinates, thermal diffusivity, linear one dimensional steady state conduction through a slab, tubes, spherical shells and composite structures, electrical analogies, critical-insulation-thickness for pipes, effect of variable thermal conductivity.

Unit 2 Extended surfaces (fins): Heat transfer from a straight and annular fin (plate) for a uniform cross section; error in measurement of temperature in a thermometer well, fin efficiency, fin effectiveness, applications; **Unsteady heat conduction:** Transient and periodic conduction, heating and cooling of bodies with known temperatures distribution, systems with infinite thermal conductivity, response of thermocouples.

Unit 3 Convection: Introduction, free and forced convection; principle of dimensional analysis, Buckingham 'pie' theorem, application of dimensional analysis of free and forced convection, empirical correlations for laminar and turbulent flow over flat plate and tubular geometry; calculation of convective heat transfer coefficient using data book.

Unit 4 Heat exchangers: Types- parallel flow, counter flow; evaporator and condensers, overall heat transfers coefficient, fouling factors, log-mean temperature difference (LMTD), method of heat exchanger analysis, effectiveness of heat exchanger, NTU method; **Mass transfer:** Fick's law, equi-molar diffusion, diffusion coefficient, analogy with heat transfer, diffusion of vapour in a stationary medium.

Unit 5 Thermal radiation: Nature of radiation, emissive power, absorption, transmission, reflection and emission of radiation, Planck's distribution law, radiation from real surfaces; radiation heat exchange between black and gray surfaces, shape factor, analogical electrical network, radiation shields.

Boiling and condensation: Film wise and drop wise condensation; Nusselt theory for film wise condensation on a vertical plate and its modification for horizontal tubes; boiling heat transfer phenomenon, regimes of boiling, boiling correlations.

References:

1. Sukhatme SP; Heat and mass transfer; University Press Hyderabad
2. Holman JP; Heat transfer; TMH
3. Nag PK; heat and Mass Transfer; TMH
4. Dutta BK; Heat Transfer Principles And App; PHI Learning
5. Mills AF and Ganesan V; Heat transfer; Pearson
6. Cengel Yunus A; Heat and Mass transfer;TMH
7. Yadav R; Heat and Mass Transfer; Central India pub-Allahabad
8. Baehr HD;Stephan K; Heat and Mass Transfer; MacMillan Pub
9. Incropera FP and Dewitt DP; Heat and Mass transfer; Wiley

List of Experiments (Pl. expand it):

- 1 Conduction through a rod to determine thermal conductivity of material
- 2 Forced and free convection over circular cylinder
- 3 Free convection from extended surfaces
- 4 Parallel flow and counter flow heat exchanger effectiveness and heat transfer rate
- 5 Calibration of thermocouple

YBME606 – Computer Aided Engineering (CAE)

Unit 1 Methods to solve engineering problems- analytical, numerical, experimental, their merits and comparison, discretization into smaller elements and effect of size/ shape on accuracy, importance of meshing, boundary conditions, Computer Aided Engineering (CAE) and design, chain-bumping-stages vs concurrent-collaborative design cycles, computer as enabler for concurrent design and Finite Element Method (FEM), degree of freedom (DOF), mechanical systems with mass, damper and spring, stiffness constant K for tensile, bending and torsion; Practical applications of FEA in new design, optimization/ cost-cutting and failure analysis,

Unit 2 Types of analysis in CAE, static (linear/ non linear), dynamic, buckling, thermal, fatigue, crash NVH and CFD, review of normal, shear, torsion, stress-strain; types of forces and moments, tri-axial stresses, moment of inertia, how to do meshing, 1-2-3-d elements and length of elements; force stiffness and displacement matrix, Rayleigh-Ritz and Galerkin FEM; analytical and FEM solution for single rod element and two rod assembly.

Unit 3 Two-dimension meshing and elements for sheet work and thin shells, effect of mesh density and biasing in critical region, comparison between tria and quad elements, quality checks, jacobian, distortion, stretch, free edge, duplicate node and shell normal.

Unit 4 Three-dimension meshing and elements, only 3 DOF, algorithm for tria to tetra conversion, floating and fixed trias, quality checks for tetra meshing, brick meshing and quality checks, special elements and techniques, introduction to weld, bolt, bearing and shrink fit simulations, CAE and test data correlations, post processing techniques

Unit 5 Review of linear optimization, process and product optimization, design for manufacturing (DFM) aspects in product development, use of morphing technique in FEA, classical design for infinite life and design for warranty life, warranty yard meetings and functional roles, climatic conditions and design abuses, case studies.

References:

1. Gokhle Nitin; et al; Practical Finite Element Analysis; Finite to Infinite, 686 Budhwar Peth, Pune.
2. Logan DL ; A First Course in Finite element Method; Cengage
3. Krishnamoorthy; Finite Element Analysis, theory and programming; TMH
4. Buchanan; Finite Element Analysis; Schaum series; TMH
5. Seshu P; Textbook of Finite Element Analysis; PHI.
6. Chennakesava RA; Finite Element Methods-Basic Concepts and App; PHI Learning
7. Reddy JN; An introduction to finite element method; TMH
8. Desai Chandrakant S et al; Introduction to finite element Method; CBS Pub
9. Hutton D; Fundamentals of Finite Element Analysis; TMH
10. Zienkiewicz; The finite element Method; TMH
11. Martin and Graham; Introduction to finite element Analysis (Theory and App.)
12. Rao, S.S., The Finite Element Method in Engineering; Peragamon Press, Oxford.
13. Robert DC., David DM et al, Concepts and Application of Finite Element Analysis; John Wiley.
14. Chandrupatla, T.R. an Belegundu, A.D., Introduction to Finite Elements in Engineering, PHI

YBN UNIVERSITY, RANCHI, JHARKHAND
School of Engineering & Technology

B.Tech., Semester VII

Mechanical Engineering

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Credits Allotted Subject wise	Total Credits	Remark				
			Theory Slot			Practical Slot						Total Marks			
			End Sem.	Mid Sem. MST	Quiz, Assignment	End Sem	Term work								
							Lab work & sessional	Assignment/quiz							
Period per week			L	T	P										
1	YBME701	Elective -I	70	20	10	-	-	-	100	3	1	-	04		
2	YBME702	Elective -II	70	20	10	-	-	-	100	3	1	-	04		
3	YBME703	Mechanical Vibration & Noise Engineering	70	20	10	30	10	10	150	3	1	2	06		
4	YBME704	Automobile Engg	70	20	10	30	10	10	150	3	1	2	06		
5	YBME705	O R & Supply Chain	70	20	10	30	10	10	150	3	1	2	06		
6	YBME706	Minor Project and seminar	-	-	-	60	20	20	100	0	0	4	04		
7	YBME707	Industrial Training (2 Week)	-	-	-	30	10	10	50	0	0	2	02	Grand Total	
		Total	350	100	50	180	60	60	800	15	5	12	32	800	

YBME701 Elective –I

- 701(A) Design of Heat Exchange
- 701(B) Computer Aided Engineering and FEM
- 701(C) Industrial Robotics
- 701(D) Work Study & Ergonomics

YBME702 Elective II

- 702 (A) Renewable Energy System
- 702 (B) Project management
- 702 (C) Total Quality Management and SQC
- 702 (D) MIS, ERP and e- Business

YBME701 Elective –I (YBME701 (A) – Design of Heat Exchangers)

UNIT 1: Introduction: Types of heat exchangers heat transfer laws applied to heat exchangers convection Coefficients, resistance caused by the walls and by fouling, overall heat transfer coefficient.

Unit 2: Thermal & hydraulic design of commonly used heat exchangers : LMTD & NTU Methods, correction factors, Double pipe heat exchangers , shell and tube heat exchangers, condensers , Evaporators ,Cooling and dehumidifying coils ,cooling towers, evaporative condensers ,design of air washers, desert coolers.

Unit 3: TEMA standard: Tubular heat exchangers TEMA standard heat-exchanger-nomenclature, selection criteria for different types of shells and front and rear head ends; geometrical characteristics of TEMA heat exchangers.

Unit 4: Review of mechanical Design, Materials of Construction, corrosion damage, testing and inspection.

Unit 5: Heat Pipe: Basics & its mathematical model, micro Heat Exchangers⁰, Use of Software in heat exchanger design.

References:

1. Kern D Q, Kraus A D; Extended Surface Heat Transfer; TMH.
2. Kays, Compact Heat Exchangers and London, TMH.
3. Kokac, Heat Exchangers- Thermal Hydraulic fundamentals and design;TMH.
4. Tubular Exchanger Manufacturer Association (TEMA), and other codes

YBME701 Elective –I (YBME701 (B) – Computer Aided engineering and FEM

Unit-I Introduction : Structural analysis, objectives, static, Dynamic and kinematics analyses, Skeletal and continuum structures, Modeling of infinite d.o.f. system into finite d.o.f. system, Basic steps in finite element problem formulation, General applicability of the method.

Unit-II Element Types and Characteristics : Discretization of the domain, Basic element shapes, Aspect ratio, Shape functions, Generalized co-ordinates and nodal shape functions; ID bar and beam elements, 2D rectangular and triangular elements; axis-symmetric elements.

Unit-III Assembly of Elements and Matrices : Concept of element assembly, Global and local coordinate systems, Band width and its effects, Banded and skyline assembly, Boundary conditions, Solution of simultaneous equations, Gaussian elimination and Cholesky decomposition methods, Numerical integration, One and 2D applications.

Unit-IV Higher Order and iso-parametric Elements: One dimensional quadratic and cubic elements, Use of natural co-ordinate system, Area co-ordinate system continuity and convergence requirements, 2D rectangular and triangular requirement.

Unit-V Static Analysis: Analysis of trusses and frames, Analysis of machine subassemblies, Use commercial software packages, Advantages and limitations

Unit-VI Dynamic Analysis: Hamilton's principle, Derivation of equilibrium, Consistent and lumped mass matrices, Derivation of mass matrices for ID elements, Determination of natural frequencies and mode shapes, Use of commercial software packages.

References:

1. Gokhle Nitin; et al; Practical Finite Element Analysis; Finite to Infinite, 686 Budhwar Peth, Pune.
2. Logan DL ; A First Course in Finite element Method; Cengage
3. Krishnamoorthy; Finite Element Analysis, theory and programming; TMH
4. Buchanan; Finite Element Analysis; Schaum series; TMH
5. Seshu P; Textbook of Finite Element Analysis; PHI.
6. Chennakesava RA; Finite Element Methods-Basic Concepts and App; PHI Learning
7. Reddy JN; An introduction to finite element method; TMH
8. Desai Chandrakant S et al; Introduction to finite element Method; CBS Pub
9. Hutton D; Fundamentals of Finite Element Analysis; TMH
10. Zienkiewicz; The finite element Method; TMH
11. Martin and Graham; Introduction to finite element Analysis (Theory and App.)
12. Rao, S.S., The Finite Element Method in Engineering; Peragamon Press, Oxford.
13. Robert DC., David DM et al, Concepts and Application of Finite Element Analysis; John Wiley.
14. Chandrupatla, T.R. an Belegundu, A.D., Introduction to Finite Elements in Engineering, PHI

YBME701 Elective –I (YBME701 (C) – Industrial Robotics

Unit I Introduction: Need and importance, basic concepts, structure and classification of industrial robots, terminology of robot motion, motion characteristics, resolution, accuracy, repeatability, robot applications.

Unit II End Effectors and Drive systems: Drive systems for robots, salient features and comparison, different types of end effectors, design, applications.

Unit III Sensors: Sensor evaluation and selection □ Piezoelectric sensors □ linear position and displacement sensing, revolvers, encoders, velocity measurement, proximity, tactile, compliance and range sensing. Image Processing and object recognition.

Unit IV Robot Programming: Teaching of robots, manual, walk through, teach pendant, off line programming concepts and languages, applications.

Unit V Safety and Economy of Robots: Work cycle time analysis, economics and effectiveness of robots, safety systems and devices, concepts of testing methods and acceptance rule for industrial robots.

References:

1. Mittal RK, Nagrath IJ; Robotics and Control; TMH
2. Groover M.P, Weiss M, Nagel, Odrey NG; Industrial Robotics-The Appl□; TMH
3. Groover M.P; CAM and Automation; PHI Learning
4. Spong Mark and Vidyasagar; Robot Modelling and control; Wiley India
5. Yoshikava ; Foundations of Robotics- analysis and Control; PHI Learning;
6. Murphy ; Introduction to AI Robotics; PHI Learning
7. FU KS, Gonzalez RC, Lee CSG; Robotics □Control, sensing□; TMH
8. Shimon, K; Handbook of Industrial Robots; John Wiley & Sons,.
9. Ghosal Ashitava; Robotics Fundamental concepts and analysis; Oxford
10. Saha S; Introduction to Robotics; TMH
11. Yu Kozyhev; Industrial Robots Handbook; MIR Pub.

YBME701 Elective –I (YBME701 (D) – Work Study and Ergonomics

Unit 1 Method study: purpose of work study, its objectives, procedure and applications; method study definition and basic procedure, selection of job, various recording techniques like outline process charts, flow process charts, man machine charts, two handed process charts, string diagram, flow diagram, multiple activity chart, simo, cyclographs and chrono-cyclographs; critical examination, development, installation and maintenance of improved method; principles of motion economy and their application in work design; micro motion study, memo motion study and their use in methods study.

Unit 2 Work measurement: Introduction & definition, objectives and basic procedure of work measurement; application of work measurement in industries; time study: basic procedure, equipments needed, methods of measuring time, selection of jobs, breaking a job into elements; numbers of cycles to be timed; rating and methods of rating, allowances, calculation of standard time.

Work sampling: Basic procedure, design of work sampling study conducting work sampling study and establishment of standard-time.

Unit 3 Job evaluation and incentive schemes: Starlight line, Taylor, Merrick and Gantt incentive plans **Standard data system;** elemental and non-elemental predetermined motion systems, work factors system; Methods Time Measurement (MTM), MOST

Unit 4 Human factor engineering: Definition and history of development of human factors engineering, types & characteristics of man-machine-system, relative capabilities of human being and machines; development and use of human factor data; information input and processing: Introduction to information theory; factors effecting information reception and processing; coding and selecting of sensory inputs.

Unit 5 Display systems and anthropometric data: Display- types of visual display, visual indicators and warning signals; factorial and graphic display; general principles of auditory and tactual display, characteristics and selection.

Reference:

1. ILO; work-study; International Labour Organization
2. Khan MI; Industrial Ergonomics; PHI Learning
3. Barnes RM; Motion and Time Study; Wiley pub
4. Megaw ED; Contemporary ergonomics; Taylor & Francis
5. Sandera M and Mc Cormick E; Human Factors in Engg and design; MGHill
6. Currie RM; Work study; BIM publications
7. Mynard; Hand book of Industrial Engg;

YBME702 Elective –II (YBME702 (A) – Renewable Energy System

UNIT-I Solar Radiation: Extra-terrestrial and terrestrial, radiation measuring instrument, radiation measurement and predictions. **Solar thermal conversion:** Basics, Flat plate collectors-liquid and air type. Theory of flat plate collectors, selective coating, advanced collectors, Concentrators: optical design of concentrators, solar water heater, solar dryers, solar stills, solar cooling and refrigeration.

Solar photovoltaic: Principle of photovoltaic conversion of solar energy; Technology for fabrication of photovoltaic devices; Applications of solar cells in PV generation systems; Organic PV cells.

UNIT-II Wind energy characteristics and measurement: Metrology of wind speed distribution, wind speed statistics, Weibull, Rayleigh and Normal distribution, Measurement of wind data, Energy estimation of wind regimes; **Wind Energy Conversion:** Wind energy conversion principles; General introduction; Types and classification of WECS; Power, torque and speed characteristics; power curve of wind turbine, capacity factor, matching wind turbine with wind regimes; Application of wind energy.

UNIT-III Production of biomass, photosynthesis-C3 & C4 plants on biomass production; Biomass resources assessment; Co₂ fixation potential of biomass; Classification of biomass; Physicochemical characteristics of biomass as fuel **Biomass conversion** routes: biochemical, chemical and thermo chemical Biochemical conversion of biomass to energy: anaerobic digestion, biogas production mechanism, technology, types of digesters, design of biogas plants, installation, operation and maintenance of biogas plants, biogas plant manure-utilization and manure values. Biomass Gasification: Different types, power generation from gasification, cost benefit analysis of power generation by gasification.

UNIT-IV Small Hydropower Systems: Overview of micro, mini and small hydro system; hydrology; Elements of turbine; Assessment of hydro power; selection and design criteria of turbines; site selection and civil works; speed and voltage regulation; Investment issue load management and tariff collection; Distribution and marketing issues. **Ocean Energy:** Ocean energy resources, ocean energy routes; Principle of ocean thermal energy conversion system, ocean thermal power plants. Principles of ocean wave energy and Tidal energy conversion.

UNIT-IV Geothermal energy: Origin of geothermal resources, type of geothermal energy deposits, site selection geothermal power plants; **Hydrogen Energy:** Hydrogen as a source of energy, Hydrogen production and storage. **Fuel Cells:** Types of fuel cell, fuel cell system and sub-system, Principle of working, basic thermodynamics

References:

1. Kothari, Singal & Rajan; Renewable Energy Sources and Emerging Technologies, PHI Learn
2. Khan, B H, Non Conventional Energy, TMH.
3. Sukhatme and Nayak, Solar Energy, Principles of Thermal Collection and Storage, TMH.
4. Tiwari and Ghosal, Renewable Energy Resources: basic principle & application, Narosa Publ
5. Koteswara Rao, Energy Resources, Conventional & Non-Conventional, BSP Publication.
6. Chetan Singh Solanki, Solar Photo voltaics: Fundamental, technologies and Application, PHIL
7. Abbasi Tanseem and Abbasi SA; Renewable Energy Sources; PHI Learning
8. Ravindranath NH and Hall DO, Biomass, Energy and Environment, Oxford University Press.
9. Duffie and Beckman, Solar Engineering of Thermal Process, Wiley
10. Nikolai, Khartchenko; Green Power; Tech Book International
11. Tester, Sustainable Energy-Choosing Among Options, PHI Learning.

YBME702 Elective –II

(YBME702 (B) –Project Management

Unit 1 Concepts of project management: Meaning, definition and characteristics of a project, technical and socio-cultural dimensions; project life cycle phases, project planning and graphic presentation; work breakdown structure, manageable tasks; size of network; blow down NW; identity and logic dummy activity; Fulkerson rule for numbering NW; time-scaled NW

Unit-2 NW analysis: PERT network; mean time and variances; probability to complete PERT project in specified time; CPM network; Event Occurrence Time (EOT); activity start/ finish times; forward and reverse path calculations, concept and calculation of floats; resource allocation and critical-chain; overview of MS-project-2000.

Unit-3 Project duration and control: Importance and options to accelerate project completion; timecost tradeoff; fixed variable and total costs; use of floats and cost optimization; project performance measures; project monitoring info and reports; project control process; Gant chart and control chart; cost-schedule S-graph; planned cost of work schedule (PV), budgeted/ earned cost of work completed (EV) and actual cost of work completed (AC); schedule and cost variances (SV, CV) forecasting final project costs.

Unit-4 Project organization, culture and leadership: projects within functional organization; dedicated project/ task-force teams; staff, matrix and network organization; choosing appropriate project organization; Organization culture; ten characteristics; cultural dimensions supportive to projects; social network and management by wandering around (MBWA); different traits of a manager and leader; managing project teams; five stage team development model; shared vision; conflicts; rewards; rejuvenating project teams; project stakeholders; concept of project partnering.

Unit-5 Strategic planning and project appraisal: Capital allocation key criteria; Porters competitive strategy model; BCG matrix; Strategic Position Action Evaluation (SPACE); time value of money; cash flows; payback period; IRR; cost of capital; NPV; social cost benefit analysis; UNIDO approach; project risks and financing.

References:

1. Prasana Chandra: Projects: planning Implementation control; TMH.
2. Gray Clifford F And Larson EW; Project The managerial Process; TMH
3. Panneerselven and Serthil kumar; Project management, PHI
4. Burke ; Project Management-Planning and control technics; Wiley India
5. Kamaraju R; Essentials of Project Management; PHI Learning
6. Jack R. Meredith, Project Management: a managerial approach, Wiley.
7. Choudhary ;Project Management; TMH
8. Srinath LS; PERT And CPM Principles and Appl; East West Press
9. Richman L; Project Management: Step By Step; PHI Learning
10. United Nations Industrial Development Organisation, Guide to practical project appraisal - social benefit cost analysis in developing countries, oxford & ibh

YBME702 Elective –II

(YBME702 (C) – Total Quality Management and SQC

Unit 1 Evolution of total quality management, historical perspective, teamwork, TQM and ISO 9000; information technology and Business Process Re-engineering (BPR); TPM and quality awards; aids and barriers to quality mgt, creating vision and initiating transformation, establishing programs for education and self coordination, policy setting and review, flowchart of policy mgt and relation with daily mgt. improvements, measurement of key indicators; quality mgt leader; cross functional teams and

Unit 2 Process- definition, variation and feedback, funnel-marble experiment- rules of adjustment and its effects, quality- definition, goalpost and kaizen view, quality of design, conformance and performance; Taguchi loss function, cost of quality, chain action of improving quality to productivity to motivation and low cost; Deming's theory of mgt, fourteen points and variance reduction; attributes enumerative and variables analytic studies.

Unit 3 SQC-Control charts: basic discrete and continuous distributions, measures of central tendency, variability and shapes, sampling, size and central value theorem, control chart structure, process plotting and stability, study of out-of-control evidences, defect detection and prevention, use of control charts in evaluating past, present and future trends; attribute control charts, count and classification charts, construction and interpretation of p , np , c and u charts, PDSA cycle(plan, do, study, act), and R charts, and s charts, individual and moving range chart, trial control limits and out of control points.

Unit 4 Process diagnostics: Between and Within Group variations, periodic and persistent disturbances, control chart patterns-natural, level-shift, cycle, wild, multi-universe, relationship and other out of control patterns; diagnosing a process, brainstorming; cause-effect, Ishikava, interrelationship, systematic and matrix diagrams; change concepts and waste elimination

Unit 5 Process improvement: Performance and technical specifications, attribute-process and variable-process capability studies; unstable and stable process capability studies and examples; attribute and variable improvement studies; Inspection: acceptance sampling(AS)- lot formation, single, double and multiple/sequential sampling plans, operating characteristic (OC) curve, producer and consumer risk, theoretical invalidation of AS, kp rule for stable and chaotic processes.

References:

1. Gitlow HS, Oppenheim et al; Quality Management; TMH
2. Gryna FM; Juran's Quality Planning and Analysis; TMH
3. Crosby Philips; Quality is still free; New Amer Library
4. Kulkarni VA and Bewoor AK; Quality Control; Wiley
5. Jankiraman B and Gopal RK; Total Quality Management- Text and Cases; PHI Learning
6. Sugandhi L and Samuel A; Total Quality Management; PHI Learning
7. Subburaj R; Total Quality Management; TMH
8. Naidu Babu and Rajendran; TQM; New age International pub;
9. Chase Richard B et al; Operations management; SIE-TMH
10. Chary SN; Production and Operations Management; TMH

ME-702 Elective –II

(ME-702 (D) – MIS ERP and e Business

UNIT 1 Management Information System (MIS) definition, Objectives and benefits, MIS as strategic tool, obstacles and challenges for MIS, functional and cross functional systems, hierarchical view of CBIS, structured and unstructured decision, Operation and mgt support, Decision process and MIS, info system components and activities, Value chain and MIS support.

UNIT 2 System concepts: types, definition, characteristics, feedback (Pull) and feed-forward (Push) control, system stress and entropy, computer as closed system, law of requisite variety, open and flexible (Adaptive) systems, work system model and comparison with input-process-output model, five views of work system: structure, performance, infrastructure, context and risk and their effect on product performance.

UNIT 3 Info concepts: define data, info, knowledge, intelligence and wisdom, Information characteristics and attributes, info measurement and probability, characteristics of human as info processor.

UNIT 4 Planning and control Concepts: terminologies, difficulties in planning, system analysis and development plan-purpose and participants, info planning, (SDLC) system development life cycle for inhouse and licensed sw, system investigation, analysis of needs, design and implementation phases, training of Operational personnel, evaluation, Control and Maintenance of Information Systems.

UNIT 5 E-business components and interrelationship, Evolution of Enterprise Resource Planning (ERP) from MRP, Supply chain management (SCM) and Customer relationship management (CRM), Integrated data model, strategic and operational issues in ERP, Business Process Re-Engineering (BPR), significance and functions, information technology and computer NW support to MIS.

References

1. Davis and Olson, Management Information Systems, TMH
2. James O Brian, Management Information Systems, TMH
3. Oz, Management Information Systems, Cengage
4. Alter Stevenson, Information Systems: Foundation of E-Business; (Prentice-Hall,USA)
5. Jayaraman, Business Process Re-Engineering, TMH.
6. Garg. V.K.; ERP, PHI
7. Kelkar SA; Management Information Systems A Concise Study; PHI Learning.
8. Radhakrishnan R and Balasuramanian S; Business Process Reengineering; PHI Learning.
9. Alex Leon ; ERP, TMH
10. Jawadekar WS; MIS- text and cases; TMH
11. Jaiswal M and Mital M; MIS; Oxford higher Edu India

YBME703- Mechanical Vibration and Noise Engineering

Unit 1: Fundamental Aspects of Vibrations: Vibration, main causes, advantages and disadvantages; engineering applications of vibration and noise; vector method of representing harmonic motion; characteristics of vibration, harmonic analysis and beats phenomenon, work done by harmonic forces on harmonic motion; periodic, non-harmonic functions- Fourier series analysis; evaluation of coefficients of Fourier series; elements of vibratory system; lumped and distributed parameter systems.

Undamped Free Vibrations: Derivation of differential equation of motion: the energy method, the method based on Newton's second law of motion, and Rayleigh's method. Solution of differential equation of motion: Natural frequency of vibration. Systems involving angular oscillations: the compound pendulum.

Unit 2: Damped Free Vibrations: Viscous damping: coefficient of damping; damping ratio; under damped, over damped and critically damped systems; logarithmic decrement; frequency of damped free vibration; Coulomb or dry friction damping; frequency, decay rate and comparison of viscous and Coulomb damping; solid and structural damping; slip or interfacial damping.

Unit 3: Harmonically excited Vibration: One degree of freedom- forced harmonic vibration; vector representation of forces; excitation due to rotating and reciprocating unbalance; vibration Isolation, force and motion transmissibility; absolute and relative motion of mass (Seismic Instruments).

Whirling Motion and Critical Speed : Whirling motion and Critical speed : Definitions and significance .Critical -speed of a vertical , light flexible shaft with single rotor : with and without damping .Critical speed of a shaft carrying multiple discs (without damping) , Secondary critical speed.

Unit 4: Systems With Two Degrees of Freedom : Un-damped free vibration of 2 d.o.f and Principal modes of vibration; torsion vibrations; Forced, Un-damped vibrations with harmonic excitation ; Coordinate coupling; Dynamic vibration absorber; torsion Vibration Absorber; Pendulum type of dynamic vibration.

Unit 5: Noise Engineering -Subjective response of sound: Frequency and sound dependent human response; the decibel scale; relationship between, sound pressure level (SPL), sound power level and sound intensity scale; relationship between addition, subtraction and averaging, sound spectra and Octave band analysis; loudness; weighting networks; equivalent sound level, auditory effects of noise; hazardous noise, exposure due to machines and equipments; hearing conservation and damage risk criteria, daily noise doze.

Noise: Sources, Isolation and Control: Major sources of noise on road and in industries, noise due to construction equipments and domestic appliances, industrial noise control, strategies- noise control at source (with or without sound enclosures), noise control along the path (with or without partitions and acoustic barriers); noise control at the receiver, ear defenders, earplugs, semi-insert protectors.

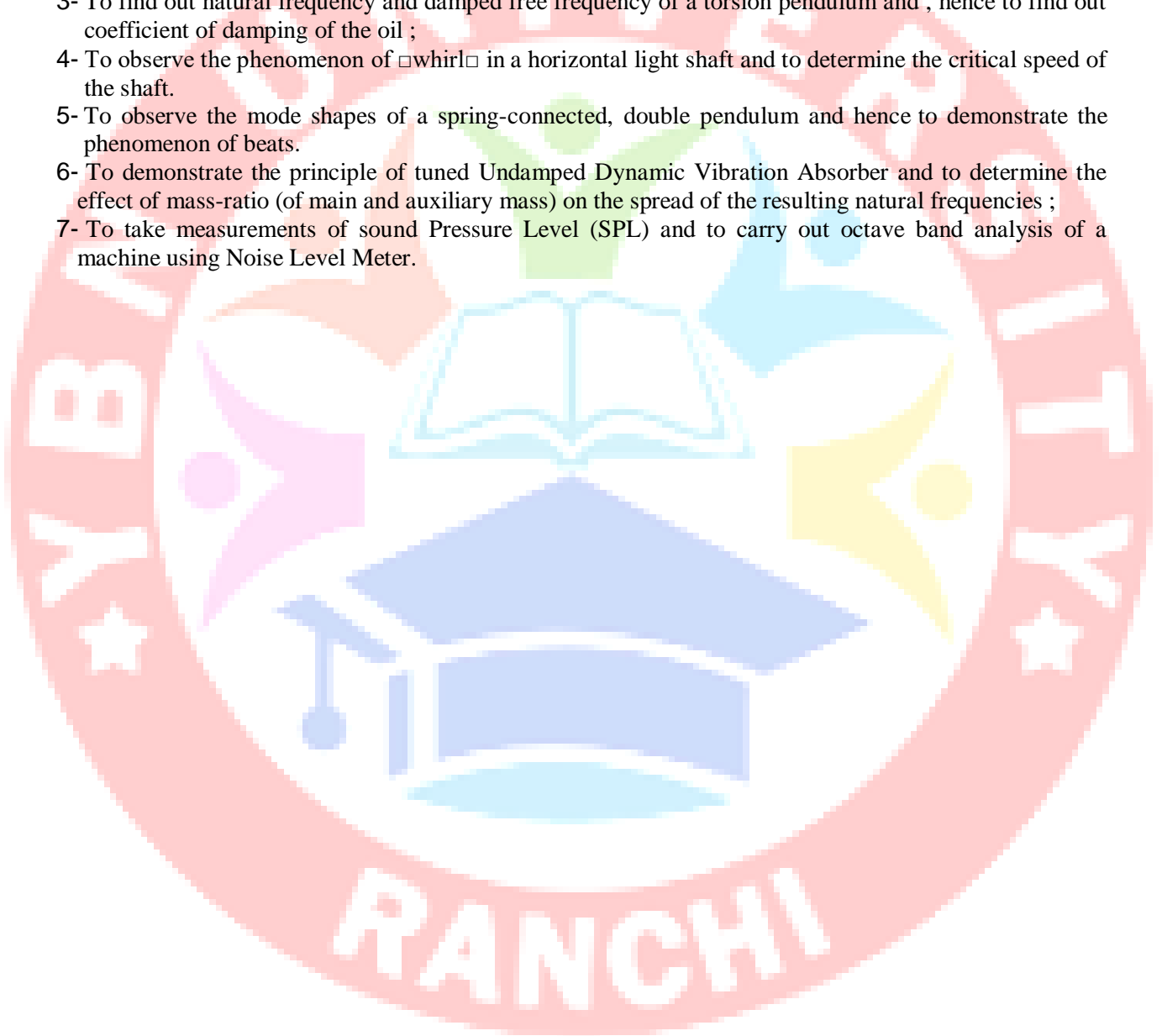
References:

- 1- Ambekar A.G., ' Mechanical Vibrations and Noise Engineering;
- PHI 2- Meirovitch Leonard; Element of Vibration Analysis; TMH
- 3- Dukikipati RV Srinivas J Text book of Mechanical Vibrations; PHI
- 4- Kelly SG and kudari SK; Mechanical Vibrations; Schaum Series; TMH
- 5- Thomson , W.T., Theory of Vibration with Applications , C.B.S Pub & distributors .

- 6- Singiresu Rao, "Mechanical Vibrations", Pearson Education .
7- G.K. Grover, " Mechanical Vibration , Nem chand and Bross , Roorkee .

List of experiments (please expand it):

- 1- To find out effect of load on natural frequency of vibrations of a lever pin supported at one end carrying adjustable load on a vertical screwed bar and spring supported at some intermediate point (i) When the dead weight of rods is neglected and (ii) when their dead weight is taken into account .
- 2- To find out frequency of damped free vibration and rate of decay of vibration-amplitude in the system.
- 3- To find out natural frequency and damped free frequency of a torsion pendulum and , hence to find out coefficient of damping of the oil ;
- 4- To observe the phenomenon of "whirl" in a horizontal light shaft and to determine the critical speed of the shaft.
- 5- To observe the mode shapes of a spring-connected, double pendulum and hence to demonstrate the phenomenon of beats.
- 6- To demonstrate the principle of tuned Undamped Dynamic Vibration Absorber and to determine the effect of mass-ratio (of main and auxiliary mass) on the spread of the resulting natural frequencies ;
- 7- To take measurements of sound Pressure Level (SPL) and to carry out octave band analysis of a machine using Noise Level Meter.



YBME704- Automobile Engineering

Unit-I: Chassis & Body Engg: Types, Technical details of commercial vehicles, types of chassis, lay out, types of frames, testing of frames for bending & torsion on unutilized body frame, vehicle body and their construction, driver's visibility and methods for improvement, safety aspects of vehicles, vehicle aerodynamics, optimization of body shape, driver's cab design, body materials, location of engine, front wheel and rear wheel drive, four wheel drive.

Unit-II: Steering System: front axle beam, stub axle, front wheel assembly, principles of types of wheel alignment, front wheel geometry viz. camber, Kingpin inclination, castor, toe-in and toe-out, condition for true rolling motion, centre point steering, directional stability of vehicles, steering gear, power steering, slip angle, cornering power, over steer & under steer, gyroscopic effect on steering gears.

Unit-III: Transmission System: Function and types of clutches, single plate, multi-plate clutch, roller & spring clutch, clutch lining and bonding, double declutching, types of gear Boxes, synchroniser, gear materials, determination of gear ratio for vehicles, gear box performance at different vehicle speed, automatic transmission, torque converters, fluid coupling, principle of hydrostatic drive, propeller shaft, constant velocity universal joints, differential gear box, rear axle construction.

Unit-IV: Suspension system : Basic suspension movements, Independent front & rear suspension, shock absorber, type of springs: leaf spring, coil spring, air spring, torsion bar, location of shackles, power calculations, resistance to vehicle motion during acceleration and breaking, power & torque curve, torque & mechanical efficiency at different vehicle speeds, weight transfer, braking systems, disc theory, mechanical, hydraulic & pneumatic power brake systems, performance, self-energisation, airbleeding of hydraulic brakes, types of wheels and tyres, tyre specifications, construction and material properties of tyres & tubes.

Unit-V: Electrical and Control Systems: storage battery, construction and operation of lead acid battery, testing of battery, principle of operation of starting mechanism, different drive systems, starter relay switch, regulator electric fuel gauge, fuel pump, horn, wiper, Lighting system, head light dazzling, signaling devices, battery operated vehicles, choppers. importance of maintenance, scheduled and unscheduled maintenance, wheel alignment, trouble Shooting probable causes & remedies of various systems, microprocessor based control system for automobile, intelligent automobile control systems.

Unit-VI: Emission standards and pollution control: Indian standards for automotive vehicles- Bharat I and II, Euro-I and Euro-II norms, fuel quality standards, environmental management systems for automotive vehicles, catalytic converters, fuel additives, and modern trends in automotive engine efficiency and emission control.

References:

1. Crouse , Automotive Mechanics TMH.
2. Srinivasan S; Automotive engines; TMH
3. Gupta HN; Internal Combustion Engines; PHI;
4. Joseph Heitner, Automotive Mechanics, Principles and Practices, CBS Pub.
5. Kripal Singh, Automotive Engineering Khanna Pub.

6. Newton & Steeds , Automotive Engineering
7. Emission standards from BIS and Euro □I and Euro-III

List of experiments (please expand it):

Study of chassis, suspension, steering mechanisms, transmission, gear-box, differential systems, and electrical systems of various light and heavy automotive vehicles;



YBME705- Operations Research and Supply Chain

Unit 1 Linear system and distribution models: Mathematical formulation of linear systems by LP, solution of LP for two variables only, special cases of transportation and assignment and its solution, Vogel's forward looking penalty method, cell evaluation degeneracy, use of SW Lindo, Tora, Excell.

Unit 2 Supply chain (SCM): Definition, importance, expenditure and opportunities in SCM; integration of inbound, outbound logistics and manufacturing to SCM, flow of material money and information, difficulties in SCM due to local v/s system wide (global) optimization and uncertainties in demand and transportation; Bull-whip effect; customer value; IT, info-sharing and strategic partnerships; plant and warehouse-network configuration; supply contracts and revenue sharing; outsourcing; transportation, cross docking and distribution, forecasting models in SCM; coordination and leadership issues; change of purchasing role and vendor rating, variability from multiple suppliers.

Unit 3 Inventory models: Necessity of inventory in process and safety stock, problem of excess inventory and cycle time ($=WIP/$ Throughput), JIT/ lean mfg; basic EOQ/ EPQ models for constant review Q-system(S,s); periodic review, base stock P-system; service level, lead time variance and safety stock;; ABC, VED and other analysis based on shelf life, movement, size, MRP technique and calculations, lot sizing in MRP, linking MRP with JIT; evolution of MRP to ERP to SCM and e-business.

Unit 4(a) Waiting Line Models Introduction, Input process, service mechanism, Queue discipline, single server (M/M/1) average length and times by Little's formula, optimum service rate; basic multiple server models (M/M/s)

(b) **Competitive strategy:** concept and terminology, assumptions, pure and mixed strategies, zero sum games, saddle point, dominance, graphical, algebraic and LP methods for solving game theory problems.

Unit 5: (a) Decision analysis: decision under certainty, risk probability and uncertainty; Hurwicz criteria; AHP- assigning weight and consistency test of AHP

(b) **Meta-heuristics** Definition of heuristic and meta-heuristic algorithms; introduction to Tabu search, Simulated Annealing and Genetic algorithms and solution of traveling salesman and non linear optimization problems.

References:

1. Hillier FS and Liberman GJ; Introduction to Operations Research concept and cases; TMH
2. Simchi-Levi, Keminsky; Designing and managing the supply chain; TMH.
3. Srinivasan G; Quantitative Models In Operations and SCM; PHI Learning
4. Mohanty RP and Deshmukh SG; Supply Chain Management; Wiley India
5. Taha H; Operations research; PHI
6. Sen RP; Operations Research-Algorithms and Applications; PHI Learning
7. Sharma JK; Operations Research; Macmillan
8. Ravindran , Philips and Solberg; Operations research; Wiley India
9. Vollman, Berry et al; Manufacturing planning and control for SCM; TMH.
10. Bowersox DJ, Closs DJ, Cooper MB; Supply Chain Logisti Mgt; TMH
11. Burt DN, Dobler DW, StarlingSL; World Class SCM; TMH
12. Bronson R ;Theory and problems of OR; Schaum Series; TMH

List of experiments (please expand it):

1. Use computer and software to solve problems contained in the syllabus
2. Case studies in SCM

YBME706- Minor Project

Provision of Minor project is made as preparation phase-I for major project or to take it as an independent small project. For details of project see ME-805- Major project



YBME707- Industrial Training

Objective of Industrial Training

The objective of undertaking industrial training is to provide work experience so that student's engineering knowledge is enhanced and employment prospects are improved. The student should take this course as a window to the real World and should try to learn as much as possible from real life experiences by involving and interacting with industry staff. Industrial training also provides an opportunity to students to select an engineering problem and possibly an industry guide for their Major Project in final semester.

Scheme of Studies:

Duration: Minimum 2 weeks in summer break after VI semester, assessment to be done in VII semester

Scheme of Examination:

For the assessment of industrial training undertaken by the students, following components are considered with their weightage.

(a) Term Work in Industry	Marks Allotted
Attendance and General Discipline	5
Daily diary Maintenance	5
Initiative and participative attitude during training	10
Assessment of training by Industrial Supervisor	10

Total	30*

(b) Practical/Oral Examination (Viva-Voce) in Institution Marks

1. Training Report	15
2. Seminar and cross questioning (defense)	15

Total	30

* - Marks of various components in industry should be awarded by the I/c of training in Industry but in special circumstances if not awarded by the industry then faculty in charge /T.P.O. will give the marks.

During training students will prepare a first draft of training report in consultation with section in charge. After training they will prepare final draft with the help of T.P.O. /Faculty of the Institute. Then they will present a seminar on their training and they will face viva-voce on training in the Institute.

YBN UNIVERSITY, RANCHI, JHARKHAND
School of Engineering & Technology

B.Tech., Semester VIII

Mechanical Engineering

S.No.	Subject Code	Subject Name & Title	Maximum Marks Allotted						Credits Allotted Subject wise	Total Credits	Remarks			
			Theory Slot			Practical Slot						Total Marks		
			End Sem.	Mid Sem. MST	Quiz, Assignment	End Sem	Term work		Period per week					
							Lab work & sessional	Assignment/quiz				L	T	P
1	YBME801	Elective -III	70	20	10	-	-	-	100	3	1	-	04	
2	YBME802	Machine Design	70	20	10	30	10	10	150	3	1	2	06	
3	YBME803	Refrigeration & AirConditioning	70	20	10	30	10	10	150	3	1	2	06	
4	YBME804	CAD/CAM/CIM	70	20	10	30	10	10	150	3	1	2	06	
5	YBME805	Major Project	-	-	-	120	40	40	200	-	-	8	08	
6	YBME806	Seminar and Group Discussion (Only Internal Assessment)	-	-	-	-	-	50	50	0	0	2	02	
		Total	280	80	40	210	70	120	800	12	4	16	32	800

ME 801 Elective –III

- 801(A) Energy Management & Audit.
- 801 (B) Tools Design and Machine Tools
- 801(C) Reliability & Maintenance
- 801(D) Simulation & Process Modeling.

YBME801(A) – Energy Management & Audit.

UNIT-I Energy Management: Concept of energy management, energy demand and supply, economic analysis; Duties and responsibilities of energy managers.

Energy Conservation: Basic concept, energy conservation in Household, Transportation, Agricultural, service and Industrial sectors, Lighting, HAVC.

UNIT-II Energy Audit: Definition, need and types of energy audit; Energy management (Audit) approach: Understanding energy cost, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirement; Fuel & energy substitution; Energy audit instruments; Energy conservation Act; Duties and responsibilities of energy manager and auditors.

UNIT-III Material energy balance: Facility as an energy system; Method for preparing process flow; material and energy balance diagrams.

Energy Action Planning: Key elements, force field analysis; Energy policy purpose, perspective, content, formulation, rectification

UNIT-IV Monitoring and Targeting: Definition monitoring & targeting; Data and information analysis.

Electrical Energy Management: energy conservation in motors, pumps and fan systems; energy efficient motors.

UNIT-IV Thermal energy management: Energy conservation in boilers, steam turbine and industrial heating system; Application of FBC; Cogeneration and waste heat recovery; Thermal insulation; Heat exchangers and heat pump; Building Energy Management.

References:

1. Murphy & Mckay, Energy Management, BSP Books Pvt. Ltd.
2. Smith CB; Energy Management Principle, Pergamon Press, New York.
3. Rajan GG, Optimising Energy Efficiency in Industry, TMH.
4. Callaghan P O, Energy Management, McGraw-Hill Book Company.
5. Amit Kumar Tyagi, Handbook on Energy Audit and Management, Tata Energy Research Institute.
6. Bureau of Energy Efficiency, Study material for energy Managers and Auditors: Paper I to V.
7. Hamies; Energy Auditing and Conservation: Method, Measurement, Hemisphere, Washington.
8. Witty, Larry C, Industrial Enegy Management Utilisation, Hemisphere Publishers, Washington
9. Kreith & Goswami, Energy Management and Conservation Handbook, CRC Press.

YBME801(B) – Tools Design and Machine Tools

Unit I Basic Features and Kinematics of Machine Tools: Features of basic machine tools; construction and operation, types of machine tools, machine tools motions, transmission- rotation in to rotation, rotation in to translation, kinematic-structures of machine tools: elementary, complex and compound structure, kinematic-features of gear shapers and gear hobbing machine.

Unit II Regulation of Speed: Design of gear boxes- need for variation of speed, selection of speed range, laws of stepped regulation, standardization of speeds, speed diagram, analysis of productivity loss, kinematic advantage of GP, structural diagrams, ray diagram and speed chart. Gear Drives: Belt and cone pulley, slip gear type, north gear drive, draw key gear drive, clutch type, mechanical step less drives, electrical drives; hydraulic drive.

Unit III Design of Metal working Tools: Design of press working tools, shearing, piercing, blanking, dies, compound die design principles for forging dies, bending, forming drawing dies, tooling for forging - design principles for forging dies, drop forging, upset forging, design principles and practice for rolling, roll press design.

Unit IV Design of Jigs and Fixtures: Principles of location, locating method and devices, principles of clamping, clamping devices, drilling jigs, types, drill bushes, fixture and economics, types of fixture, milling, grinding, broaching, assembly fixtures indexing jig and fixtures, indexing devices.

Unit V Design of Gauges and Inspection Features: Design of gauges for tolerance for dimensions and form inspection; dies and mould design for Ppastics & rubber parts: compression molding, transfer molding, blow molding.

References:

1. Mehta N.K.; Machine Tool Design and Numerical Control; TMH
2. Sen G.C, Bhattacharya A; Principles of Machine Tools; New Central Book Agency.
3. Donaldson; Tool Design T.M.H.
4. Jain KC and Chitale AK; Text Book Of Production Engineering; PHI Learning
5. Juneja, Sekhon and Seth; Fundamentals of Metal Cutting and Machine Tools; New Age.
6. Krar SF, Gill AR, Smid P; Technology of Machine Tools;TMH
7. Sharma P.C; Production Engineering; Chand S
8. Wilson; Fundamentals of Tool Design; ASTME
9. Paqwin J.R; Die Design Handbook; The Industrial Press-NY
10. ASTME; Die Design Hand Book; McGraw Hill
11. Archinov; Metal Cutting & Cutting Tool Design; MIR Publishers Moscow
12. Kempster M.H.A; Introduction to Jig and Tool Design; FLBS.

YBME801(C) – Reliability & Maintenance

Unit 1 Basic Concepts of Reliability: Probability distributions used in maintenance engineering- Binomial, Poisson, Exponential, Normal, Log-normal, Gamma and Weibull distribution; failure rate, hazard rate, failure modes, MTTR, MTBF, MTTF

Unit 2 System Reliability Models: System reliability n -component series systems, m -component parallel systems and combined system; standby systems; K-out-of-m systems; redundancy techniques in system design; event space, decomposition (Key Stone), cut and tie sets, Markov analysis, reliability and quality, unreliability, maintainability, availability

Unit 3 Maintenance Concepts and Strategies: Introduction, maintenance functions and objectives, maintenance planning and scheduling, maintenance organization.

General Introduction to Maintenance Types: Breakdown, emergency, corrective, predictive, and preventive; maintenance prevention; design-out maintenance, productive maintenance, shutdown maintenance and scheduled maintenance.

Unit 4 Condition Based Maintenance: Principles of CBM, pillars of condition monitoring, CBM implementation and benefits; condition monitoring techniques- visual monitoring, vibration monitoring, wear debris monitoring, corrosion monitoring, performance monitoring

Unit 5 Reliability Centered Maintenance (RCM):- Concept, methodology, benefits;

Total Productive Maintenance: Evolution of TPM, TPM objectives, concept, pillars of TPM. Failure Modes and Effects Analysis (FMEA)/ Failure Modes, Effects and Criticality Analysis (FMECA): Overview, elements of FMECA, applications and benefits, risk evaluation, risk priority numbers, criticality analysis, process FMEA, qualitative and quantitative approach to FMECA; design FMEA and steps for carrying out design FMEA

References:

1. Ebeling CE; An Introduction To Reliability & Maintainability Engg; TMH
2. Srinath L.S; Reliability Engineering; East West Press.
3. Naikan; Reliability engg and life testing; PHI
4. Kapur KC and Lamberson LR; Reliability in Engineering Design; Wiley India
5. Telang AD and Telang A; Comprehensive Maintenance Management; PHI
6. Mishra R.C; Reliability and Maintenance Engineering; New age International publisher.
7. Balaguruswamy; Reliability Engg; TMH
8. Dhillon; Engg Maintainability- How to design for Reliability and easy maintenance; PHI
9. Davidson John; The Reliability of mechanical system; Institution of Mech. Engineers, London
10. Patrick D.T and O.'Connor; Practical Reliability Engineerin; John Wiley and Sons
11. Modarre M; Reliability and Risk Analysis, Marcel Dekker Inc CRC Press

YBME801(D) – Simulation & Process Modeling.

Unit 1: Introduction to modeling and simulation: Modeling and simulation methodology, system modeling, concept of simulation; gaming; static, continuous and discrete event simulation.

Unit 2: Basic concept of probability, generation and characteristics of random variables, continuous and discrete variables and their distributions; mapping uniform random variables to other variable distributions; linear, nonlinear and stochastic models

Unit 3: Introduction to Queuing Theory: Characteristics of queuing system, Poisson's formula, birthdeath system, equilibrium of queuing system, analysis of M/M/1 queues. Introduction to multiple server Queue models M/M/c Application of queuing theory in manufacturing and computer system

Unit 4: System Dynamics modeling: Identification of problem situation, preparation of causal loop diagrams and flow diagrams, equation writing, level and rate relationship, Simulation of system dynamics models.

Unit 5: Verification and validation: Design of simulation experiments, validation of experimental models, testing and analysis. Simulation languages comparison and selection, study of simulation software - Arena, Pro-model, SIMULA, DYNAMO, STELLA, POWERSIM.

References:

1. Law AM and Kelton WD; Simulation Modeling and Analysis; TMH
2. Gordon G., System simulation, PHI Learning
3. Banks J; Hand book of Simulation; John Wiley.
4. Taha H, Operations Research; PHI.
5. Hillier FS, Liberman GJ; Introduction to OR; TMH.
6. Deo N; System Simulation with Digital Computer; PHI Learning
7. Harrell C, Ghosh B, Bowden R; Simulation Using Promodel; MG Hill
8. Seila, Ceric and Tadikmalla; Applied Simulation Modeling, Cengage
9. Payer T., Introduction to system simulation, McGraw Hill.
10. Sushil, System Dynamics, Wiley Eastern Ltd.
11. Spriet JA; Computer Aided Modeling and Simulation, Academic Press INC; USA

YBME802 – Machine Design

Note: PSG Design data book and/ or Mahadevan and Reddy's Mechanical design data book are to be provided/ permitted in exam hall (duly verified by authority)

Unit I Design of Belt, Rope and Chain Drives: Methods of power transmission, selection and design of flat belt and pulley; Selection of V-belts and sheave design; Design of chain drives, roller chain and its selection; Rope drives, design of rope drives, hoist ropes.

Unit II Spur and Helical Gears: Force analysis of gear tooth, modes of failure, beam strength, Lewis equation, form factor, formative gear and virtual number of teeth; Gear materials; Surface strength and wear of teeth; strength against wear; Design of straight tooth spur and Helical Gears.

Bevel Gears: Application of bevel, formative gear and virtual number of teeth; Force analysis; Lewis equation for bevel gears; Strength against wear; Design of bevel gear.

Unit III Design of I.C. Engine Components: General design considerations in I C engines; design of cylinder; design of piston and piston-rings; design of connecting rod; design of crankshaft.

Unit IV Design of Miscellaneous Components: design of Flanged coupling; Rigid coupling, Design of Pressure vessels subjects to internal pressure, external pressure, design of penetration, design of flanges, cone cylinder junctions ,Materials, Fabrication.

Unit V Optimization: Basic concept of optimization, classification of optimization, optimization techniques, engineering applications of optimization. Classical optimization techniques: unconstrained optimization single-variable optimization, multivariable optimization, solution by direct search method, solution by Lagrange-multipliers method.

References:

1. Shigley J.E.; Machine Design; TMH
2. Bhandari VB; Design of Machine Elements; TMH
3. Sharma CS and Purohit K; Design of Machine Elements; PHI Learning.
4. Hall and Somani; Machine Design; Schaum Series; TMH
5. Wentzell TH; Machine Design; Cengage Learning
6. Sharma & Agrawal; Machine Design; Katson
7. Kulkarni SG; Machine Design; TMH
8. Abdul Mubeen; Machine Design; Khanna Publishers
9. Juvinall RC, Marshek KM; Fundamentals of Machine Component Design; Wiley
10. Norton R; Design Of Machinery; TMH

List of Experiment (Pl. expand it):

Designing and sketching of components contained in the syllabus

YBME803 – Refrigeration & Air Conditioning

Unit-I Introduction: Principles and methods of refrigeration, freezing; mixture cooling by gas reversible expansion, throttling, evaporation, Joule Thomson effect and reverse Carnot cycle; unit of refrigeration, coefficient of performance, vortex tube & thermoelectric refrigeration, adiabatic demagnetization; air refrigeration cycles- Joule's cycle Boot-strap cycle, reduced ambient cycle and regenerative cooling cycles.

Unit-II Vapour compression system: Vapor compression cycle, p-h and t-s diagrams, deviations from theoretical cycle, sub-cooling and super heating, effects of condenser and evaporator pressure on cop; multi-pressure system: removal of flash gas, multiple expansion & compression with flash inter cooling; low temperature refrigeration: production of low temperatures, cascade system, dry ice, production of dry ice, air liquefaction system,.

Unit-III (a) Vapour absorption system: Theoretical and practical systems such as aqua-ammonia, electrolux & other systems; (b) **Steam jet refrigeration:** Principles and working, simple cycle of operation, description and working of simple system, (c) **refrigerants:** nomenclature & classification, desirable properties, common refrigeration, comparative study, leak detection methods, environment friendly refrigerants and refrigerant mixtures, brine and its properties

Unit-IV Psychrometric: Calculation of psychrometric properties of air by table and charts; psychrometric processes: sensible heating and cooling, evaporative cooling, cooling and dehumidification, heating and humidification, mixing of air stream, sensible heat factor; principle of air conditioning, requirements of comfort air conditioning, ventilation standards, infiltrated air load, fresh air load human comfort, effective temperature & chart, heat production & regulation of human body,

Unit-V Air conditioning loads: calculation of summer & winter air conditioning load, bypass factor of coil, calculation of supply air rate & its condition, room sensible heat factor, grand sensible heat factor, effective sensible heat factor, dehumidified air quantity. Problems on cooling load calculation. Air distribution and ventilation systems

References:

1. Arora CP; Refrigeration and Air Conditioning; TMH
2. Sapali SN; Refrigeration and Air Conditioning; PHI
3. Anantha narayan; Basic Refrigeration and Air conditioning; TMH
4. Manohar Prasad; Refrigeration and Air Conditioning; New Age Pub
5. Ameen; Refrigeration and Air Conditioning; PHI
6. Pita ; Air conditioning Principles and systems: an energy approach; PHI
7. Stoecker W.F, Jones J; Refrigeration and Air conditioning; Mc GH, Singapore
8. Jordan RC and Priester GB Refrigeration and Air Conditioning, PHI USA
9. Arora RC; Refrigeration and Air conditioning; PHI Learning

List of Experiments (Please Expand it):

Refrigeration and Air Conditioning

1. General Study of vapor compression refrigeration system.
2. General Study of Ice Plant
3. General Study and working of cold storage

4. General Study One tone Thermax refrigeration unit.
5. General Study of Water cooler
6. General Study of Psychrometers (Absorption type)
7. General Study of Leak Detectors (Halide Torch).
8. General Study and working of Gas charging Rig.
9. General Study of window Air Conditioner.
10. General Study and working of Vapor compression Air conditioning Test rig.
11. Experimentation on Cold Storage of Calculate COP & Heat Loss.
12. Experimentation on Vapor compression Air Conditioning test rig.
13. Changing of Refrigerant by using Gas Charging Kit.



YBME804 – CAD/CAM/CIM

Unit 1 Introduction: Information requirements of mfg organizations; business forecasting and aggregate production plan; MPS, MRP and shop floor/ Production Activity Control (PAC); Mfg as a system, productivity and wealth creation; production processes on volume-variety axes; importance of batch and job shop production; CIM definition and CIM wheel, evolution and benefits; CIM as a subset of Product Life Cycle (PLC) mgt; design for mfg (DFM) and concurrent engg; product design in conventional and CIM environment; terms like CAD, CAE, CAM, CAP, CAPP, CATD and CAQ.

Unit 2 Graphics and standards: Raster scan, coordinate systems for model (M/ WCS) user and display; database for graphic modeling; PDM, PIM, EDM; define EDM, features of EDM; basic transformations of geometry- translation, scaling, rotation and mirror; introduction to modeling software; need for CAD data standardization; developments in drawing data exchange formats; GKS, PHIGS, CORE, IGES, DXF STEP DMIS AND VDI; ISO standard for exchange of Product Model data-STEP and major area application protocols.

Unit 3 Geometric Modeling: Its use in analysis and mfg; 2D and 3D line, surface and volume models; linear extrusion and rotational sweep; Constructive Solid Geometry (CSG); basics of boundary presentation- spline, Bezier, b-spline, and NURBS; sculpture surfaces, classification, basics of coons, Bezier, b-spline and ruled surfaces; tweaking, constraint based parametric modeling; wire-frame modeling, definition of point, line and circle; polynomial curve fitting; introduction to rapid prototyping.

Unit 4 Numeric control and part programming: Principles of NC machines, CNC, DNC; NC modes of point to point, -line and 2D, 3D contouring; NC part programming; ISO standard for coding, preparatory functions(G)- motion, dwell, unit, preset, cutter compensation, coordinate and plane selection groups; miscellaneous (M) codes; CLDATA and tool path simulation; ISO codes for turning tools and holders; ATC, modular work holding and pallets; time and power estimation in milling, drilling and turning; adaptive control, sequence control and PLC; simple part programming examples.

Unit 5 Group Technology: Importance of batch and job shop production; merits of converting zigzag process layout flow to smooth flow in cellular layout, Production Flow Analysis (PFA) and clustering methods; concept of part families and coding; hierarchical, attribute and hybrid coding; OPITZ, MICLASS and DCLASS coding; FMS; material handling; robots, AGV and their programming; agile mfg; Computer Aided Process Planning (CAPP), variant/ retrieval and generative approach

References:

1. S.Kant Vajpay; Principles of CIM; PHI
2. Rao PN; CAD/CAM;TMH
3. Groover MP; Automation, Production Systems & CIM; P.H.I.
4. Rao PN, Tiwari NK, Kundra TK; Computer Aided Manufacturing; TMH
5. Alavudeen A, Venkateshwarn N; Computer Integrated Mfg; PHI
6. Radhakrishnan P, Subramanian S and Raju V; CAD/CAM/CIM; New age Pub

List of Experiments (please expand it):

1. 2D and 3D modeling on CAD software
2. Use of CAM software for writing CNC programs
3. Study of automatic and semi automatic control system and writing the electrical analogy.
4. Production & layout for GT for group of jobs to be manufactured
5. A case study / tutorial using CAPP Software
6. Writing M & G codes for given operations.
7. Robot and AGV programming



YBME805 Major Project

Objectives of the course Minor/Major Project are:

- **To provide students with a comprehensive experience for applying the knowledge gained so far by studying various courses.**
- To develop an inquiring aptitude and build confidence among students by working on solutions of small industrial problems.
- To give students an opportunity to do some thing creative and to assimilate real life work situation in institution.
- To adapt students for latest development and to handle independently new situations.
- To develop good expressions power and presentation abilities in students.

The focus of the Major Project is on preparing a working system or some design or understanding of a complex system using system analysis tools and submit it the same in the form of a write up i.e. detail project report. The student should select some real life problems for their project and maintain proper documentation of different stages of project such as need analysis market analysis, concept evaluation, requirement specification, objectives, work plan, analysis, design, implementation and test plan. Each student is required to prepare a project report and present the same at the final examination with a demonstration of the working system (if any)

Working schedule The faculty and student should work according to following schedule: Each student undertakes substantial and individual project in an approved area of the subject and supervised by a member of staff. The student must submit outline and action plan for the project execution (time schedule) and the same be approved by the concerned faculty.

Action plan for Major Project work and its evaluation scheme #(Suggestive)

Task/Process	Week	Evaluation	Marks For Term Work#
Orientation of students by HOD/Project Guide	1st	-	-
Literature survey and resource collection	2nd	-	-
Selection and finalization of topic before a committee*	3rd	Seminar-I	10
Detailing and preparation of Project (Modeling, Analysis and Design of Project work	4th to 5th	-	10
Development stage			
Testing, improvements, quality control of project	6th to 10th 11th	-	25
Acceptance testing	12th	-	10
Report Writing	13th to 15th	-	15
Presentation before a committee (including user manual, if any)	16th	- Seminar-II	30

* Committee comprises of HOD, all project supervisions including external guide from industry (if any)

The above marking scheme is suggestive, it can be changed to alternative scheme depending on the type of project, but the alternative scheme should be prepared in advance while finalizing the topic of project before a committee and explained to the concerned student as well.

NOTE: At every stage of action plan, students must submit a write up to the concerned guide: