

UNIVERSITY OF DELHI

Syllabus **of** **B.E. Mechanical Engineering** **at** **Delhi College of Engineering**

Semester I
Semester II
Semester III
Semester IV
Semester V
Semester VI
Semester VII
Semester VIII



Syllabus applicable for students seeking admissions to the B.E.
(Mechanical Engineering Course)

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FACULTY OF TECHNOLOGY
UNIVERSITY OF DELHI

NEW SCHEME OF EXAMINATION

1. There shall be the following four year Degree Courses under the Faculty of Technology :-

- (i) Bachelor of Engineering (Electrical)
- (ii) Bachelor of Engineering (Electronics and Communication)
- (iii) Bachelor of Engineering (Mechanical)
- (iv) Bachelor of Engineering (Civil)
- (v) Bachelor of Engineering (Production and Industrial)
- (vi) Bachelor of Engineering (Polymer Science and Chemical Technology)
- (vii) Bachelor of Engineering (Computer)
- (viii) Bachelor of Engineering (Instrumentation and Control)

2. In addition to the conditions laid down in Ordinance T, a candidate seeking admission to any of the above Courses of study for the Bachelor's Degree should satisfy the following conditions.

(a) Education Qualifications :-

A Candidate passing any one of the following examinations and securing 60 per cent or more marks in the aggregate of Physics, Chemistry and Mathematics shall be eligible for admission to the first Semester of Bachelor of Engineering Course provided he/she has passed in each subject separately—

- (i) Senior School Certificate Examination (12 Year Course of the Central Board of Secondary Education (C.B.S.E.), New Delhi.
- (ii) Indian School Certificate Examination (12-Year Course) of the Council for Indian School Certificate Examination, New Delhi.
- (iii) B.Sc. (Gen.) Group 'A' final Examination of the University of Delhi or equivalent examination.
- (iv) B.Sc. (Hons.) Examination in Physics, Chemistry and

(2)

- (v) Any other examination recognized as equivalent to the Senior School Certificate Examination of the C.B.S.E. by the University of Delhi.

A candidate must additionally have passed English as a subject of study either at the 10th class level or 12th class level (Core or Elective).

Note: There shall be no direct admission to any level of the Courses above the 1st Semester.

3. Under each B.E. Degree Course certain subjects are offered which can be classified as Theory/Practical/Drawing/Design/Project/Practical Training. Further classification is based on the relationship of the subjects with the degree courses admitted to, namely Humanities & Social Sciences/Basic Science/Allied Engineering, Departmental, Core, etc.

In addition to the above, a subject could be classified as a compulsory one or as one of the Prerequisite for another subject. The Committee of Courses and Studies of the concerned Department shall do this classification.

4. A student who joins the first semester will be automatically, deemed to have registered for the subjects which are listed under the first Semester of the SUGGESTED SCHEME OF LEARNING. Every student is required to register for the subjects to be taught in the second NW subsequent semesters. This process of registration shall start just before the start of next semester. The student will also indicate during registration of subject/subjects of earlier Semester (s) in which he/she desires to appear, if otherwise eligible. Such a student will be allowed to appear in the End Semester Examination and his/her marks of mid terms activities will remain unaltered since attendance is compulsory, a student will be permitted to register for course/courses which he can attend. The number of theory subjects permitted will not be more than five. The total duration of contact Periods should not ordinarily exceed thirty hours per week.
5. B.E. Degree shall be awarded if a student has earned a minimum of 220 credits as specified in each degree programme subject to break up and compulsory credit as mentioned therein. However, a student may register in subjects leading to a maximum of 240 credits in the entire course.

A student should keep a watch on his progress and register in those

(3)

papers in which he must earn the credit to satisfy the above requirement of the particular degree.

If a student earns more than a specified minimum credit for degree the best marks in the minimum credits (satisfying the above conditions) will be considered for the purpose of classification of result.

6. EVALUATION AND REVIEW

The Committee of Courses and Studies in each department shall specify the following for the degree course:

- (a) SUGGESTED SCHEME OF LEARNING :
- (b) Minimum credits needed for the degree course and break up in terms of classification of courses i.e. :
 - (i) Humanities and Social Sciences
 - (ii) Basic Sciences
 - (iii) Allied Engineering
 - (iv) Departmental Core
 - (v) Practical Training
 - (vi) Unspecified/Electives; and
 - (vii) Major Project

The Committee of Courses & Studies in each department shall appoint one or more Evaluation-cum-Review Committees each dealing with a group of subjects. This E.R.C. consist of the teachers who are likely to teach subjects in the group.

The E.R.C. has the following functions:

- (i) To recommend appointment of paper setters/examiners of various examinations at the start of each Semester.
- (ii) To get prepared quizzes, assignments, test papers etc. for the mid-term and the end semester examination and to get them evaluated. member of E.R.C., will do this job for his part of the work will be entrusted to some members of E.R.C.
- (iii) The mode of evaluation of the mid-term activities whose weightage shall be 30% and the end of term examination whose weightage shall be 70% (the mid-term activities will be of one mid term test or 20% weightage which will be supple-

mented by assignments, quizzes etc. for a theory course with weightage of 10%) For a practical Course, 30% weightage be given for internal evaluation and 70% for End Semester Examination. At the end of the Semester, the E.R.C. Chairman will send to the University the consolidated marks for the mid-term activities and the End semester in separate column for tabulation and for declaration of result.

- (iv) To consider the individual representation of students about evaluation and take the remedial action if needed. After scrutinizing the E.R.C. may alter the marks awarded upward/downward. The decision of the E.R.C. shall be final. The candidate shall apply for the same on prescribed proforma along with the evaluation fee prescribed by the University from time to time only for the End Semester Examination within seven days from the date of declaration of result.
- (v) To moderate the quiz/assignment/test papers given by each concerned teacher in his class with a view to maintain uniformity of standards and course coverage amongst various classes and to attain stipulated level of learning.
- (vi) To review and moderate the mid term and end of term results of each class with a view to maintain uniformity of standards and after finalisation, to submit the same for classification of the results.
- (vii) To lay guide-lines for teaching a subject

7. CLASSIFICATION OF RESULT :

A Student has to secure 40% or more marks in a subject evaluation to earn the credits assigned to the subject. A student after having secured the minimum credit as needed for the degree course will be eligible for the award of degree. The final result will be evaluated as below Each subject will carry 100 marks.

$$\text{Average Marks} = \frac{\Sigma (\text{Credits} \times \text{Marks Secured})}{\Sigma (\text{Credits})}$$

*(See clause 5 for best grades in the minimum credits).

The final result will be classified based on the average marks as follows :

First Class with Distinction 75% or more

First Class 60% or more but less than 75%

Second Class 50% or more but less than 60%

Pass Class 40% or more but less than 50%

8. A Student has to put in a minimum of 75% attendance separately in each subject for which he has registered. A relaxation up to a maximum of 25% may be given on the production of satisfactory evidence that:

(i) The student was busy in authorized activities.

(ii) The student was ill.

Note : (i) A student should submit the evidence to the above fact within three working days of resuming the studies. Certificates submitted later will not be considered.

(ii) No relaxation in attendance beyond 25% is permitted in any case.

(iii) The registration of a student stands cancelled if his attendance requirements are not satisfied in the subject.

9. The duration of the course is not less than 8 Semesters and the span is not more than 14 semesters.

A student who earns 15 credits or less at the end of the first semester will receive a warning for his/her poor performance, if he fails to earn at least 25 credits at the end of second semester, he has to leave the course and institution.

In case a student has not earned a minimum of 100 credits at the end of eight semester, his admission to the course and the institution stands cancelled. The admission stands cancelled at the end of 14th Semester in any case.

10. The institution/university may cancel the registration of all the subjects in a given Semester if :

(i) The student has not cleared the dues to the institution hostel.

(ii) a punishment is awarded leading to the cancellation

At discretion of the institution the result may be withheld even at the cancellation of the student stands.

11. There shall be a Central Advisory Committee consisting of the following:
 - (a) Dean, Faculty of Technology, (Chairman of the Committee)
 - (b) Heads of the Institutions
 - (c) Heads of the Departments in the Faculty of Technology.This Committee shall have the following functions :
 - (i) lay guidelines for the process of registration.
 - (ii) give an interpretation of the rule in case of difference of opinion which shall be binding on all.
12. Under very exceptional conditions minor relaxations in rules may be allowed and implemented by the Central Advisory Committee. However, same relaxation in rules can not be granted in a subsequent semester. In case the conditions warrant such a relaxation again, the rules shall have to be amended.

GENERAL NOTES:

1. For all Theory Papers (Code:TH) there is one mid-semester test of 30 marks (20+10 Assignments) and an end-semester exam of 3 hours duration for 70 marks. The total marks for the Theory Papers is thus 100.
2. For all Practical Papers (Code : PR) there is semester assessment of 30 marks and an endsemester exam of 3/4 hours duration for 70 marks. The total marks for the Practical Paper is thus 100.
3. For all valuation of Sessional (Code :Vs) there is Semester assessment of 100 marks. There is no end-Semester exam for these courses.
4. At VII and VIII Semester level there is assessment of Practical Training Reports by a duly constituted Board. The report is to be submitted by the student after eight weeks of Industrial Training undergone during summer/winter breaks. The total marks associated with each Practical Training Report is 100 marks of which 30 marks are awarded by the Department on the basis of supervision of Industrial Training.
5. At VIII Semester level there is assessment of Project Report by a duly constituted Board. The Report is to be submitted by the student of the Project Work performed at the VII and VIII Semester levels.

The total marks associated with the Project Report is 100 marks of which 30 marks are awarded by the Department on the basis of guidance of project work.

6. The total credits in all scheme of Examinations to B.E. Courses upto VIII Semester will be 232 and the denominator for calculation of average marks for final result will be 220.
7. The Project and the Practical Training at VII & VIII Semester are mandatory.
8. Candidates securing 228 to 232 credits are declared to have passed the B.E. Final Examination.
9. Candidates securing 221 to 227, credits are declared to have passed the B.E. Final examination provided they skip/fail in not more than 4 credits in CORE.
10. Candidates securing exactly 220 credits are declared to have passed the B.E. Final examination, provided they skip/fail in not more than 4 credits in CORE, not more than 4 credits in Applied Engineering, and not more than 4 credits in APPLIED SCIENCES & HUMANITIES.

SUGGESTED SCHEME FOR B.E. MECHANICAL ENGINEERING

IME	5	4		Credits
TH1	ME101		Humanities	4
TH2	ME102		Mathematics I	4
TH3	ME103		Physics I	4
TH4	ME104		Chemistry	4
TH5	ME105		Manufacturing Processes	4
PR1	ME106		Engineering Drawing I	3
PR2	ME107		Physics	2
PR3	ME108		Chemistry	2
PR4	ME109		workshop practice I	2
				29
2ME	4	4		
TH1	ME 111		Engg. Economic & Accountancy	4
TH2	ME 112		Mathematics II	4
TH3	ME 113		Physics II	4
TH4	ME 114		Engg. Materials & Thermodynamics	4

PR1	ME 115	Workshop Practice II	4
PR2	ME 116	Engineering Drawing II	2
PR3	ME 117	Physics II	2
PR4	ME 118	Engg. materials & Thermodynamics	2
			25
3ME	5 4		
TH1	ME 201	Mathematics III	
TH2	ME 202	Numerical Analysis & Comp' Prog.	4
TH3	ME 203	Mechanics	
TH4	ME 204	Electricals Technology I	4
TH5	ME 205	Manufacturing Machines	4
PR1	ME 206	Workshop Practice III	2
PR2	ME 207	Mechanics	2
PR3	ME 208	Engineering Drawing III	3
PR4	ME 209	Electrical Technology I	2
			29
4ME	5 4		
TH1	ME 211	Thermal Engineering I	4
TH2	ME 212	Mechanics of Solids I	4
TH3	ME 213	Kinematics of Machines	4
TH4	ME 214	Electrical Technology II	4
TH5	ME 215	Electronics	4
PR1	ME 216	Workshop practice IV	2
PR2	ME 217	Thermal Engineering I	2
PR3	ME 218	Mech. of solids/Kin of Machines	4
PR4	ME 219	Electrical Tech II/Electronics	4
5ME	5 4		
TH1	ME 301	Instrumentation	4
TH2	ME 302	Mechanics of Solids II	4
TH3	ME 303	Dynamics of Machines	4
TH4	ME 304	Fluid Mechanics	4
TH5	ME 305	Thermal Engineering II	4
PR1	ME 306	Instrumentation/Dyn of Machines	4
PR2	ME 307	Mechanics of solids II	2
PR3	ME 308	Fluid Mechanics/Thermal Engg. II	4
PR4	ME 309	Practical Training (Duration 4 weeks in Summer break in College Workshop)	2
6ME	5 3	1	

(9)

TH1	ME 311	Production sys Management	4
TH2	ME 312	Sci of Engg. Manufacture I	4
TH3	ME 313	Fluid Systems	
TH4	ME 314	Machine Design I	4
TH5	ME 315	Metallurgy	
PR1	ME 316	Sci of Engg. Manu. I/Metallurgy	4
PR2	ME 317	Fluid Systems	2
PR3	ME 318	Machine Design I	3
PR4	ME 319	Report Writing & Seminar	1
			30
7ME	4	4	
TH1	ME 401	Refrigeration & Air & Conditioning	4
TH2	ME 402	Heat Transfer	4
TH3	ME 403	Sci of Engg. Manufacture II	4
TH4	ME 404	Machine Design II	4
PR1	ME 405	Refn & Air Cond/Heat Transfer	4
PR2	ME 406	Sci of Engg. Manufacture II	2
PR3	ME 407	Machine Design II	3
PR4	ME 408	Practical Training	4
			29
8ME	3	3	
TH1	ME 411	Industrial Engineering	4
TH2	ME	Elective I	4
TH3	ME	Elective II	4
PR1	ME	Elective I + II	2
PR2	ME 444	Project	8
PR3	ME 445	Practical Training	4
			26
Total			232

Electives I & II :- Any two papers from any one of the following Groups :-

Group	Code for Theory Papers	Code for Practical Papers	Subjects
A	ME 412	ME 428	Automotive Engineering
	ME 413	ME 429	Power Plant Practice
	ME 414	ME 430	Solar Energy
	ME 415	ME 431	Nuclear energy
	ME 416	ME 432	Combustion Engine Emission

B	ME 417	ME 433	Metrology
	ME 418	ME 434	Industrial Quality Control
	ME 419	ME 435	Materials Management
	ME 420	ME 436	Value Engg.
C	ME 421	ME 437	Experimental Stress Analysis
	ME 422	ME 438	Fracture Mechanics
	ME 423	ME 439	Elastics & Plastic Behaviour of Engg. Materials
	ME 424	ME 440	Fluidic & Fluid Power Control
	ME 425	ME 441	Analysis and Synthesis of Linkages
	ME 426	ME 442	Gear Technology
	ME 427	ME 443	Pressure Vessel Design

B.E. (MECHANICAL ENGG.) SYLLABUS

B.E. (Mechanical Engineering)

B.E. (Mech. Engg.) I Semester Examination

LTP

Theory Paper I ME-101 -HUMANITIES-(ENGLISH)
(Common to PE/CE/EE/EC-101)

310

(A) Text : Essay, Short Stories, One Act Plays :
Editors : R.K. Kpushik & S.C. Bhatia
Published by Oxford University Press

The following chapters are prescribed for study.

(i) Essays:

1. Nehru the Democrat : by M.Chalpathi Rau.
2. Boros: E.V. Lucas
3. Freedom: by George Bernard Shaw.
4. What I require from Life: by J.B.S. Haldane
5. Student Mobs: J.B. Priestley.

(ii) Short Stories

1. The Fortune Teller : by Karol Capek.
2. Grief: by Anton Chekov.
3. The Doll's House: Katherine Mansfield

(iii) One Act Plays :

1. A Marriage Proposal : by Anton Chekov.
2. The Boy comes Home : by A.A. Milne.

(B) English Language Practice :

Applied Grammar : Common errors, Use of words, Synonyms and Antonyms; Formation of words-Prefixes and Suffixes.

Presentation of Technical Information : Technical description of :

- (i) Simple Objects tools and appliances
- (ii) processes and operations
- (iii) Scientific principles.

COMPOSITION Comprehension, Dialogues-Conversational and Colloquial idiom.

Spoken English : Practice in self expression; Talks, Lecture-ttef and speeches.

B.E. (Mech. Engg.) I Semester Examination

Theory Paper II-ME 102-Mathematics I (Common to Electrical Engg.)

Electronics and Comm. Engg., Civil Engg., Prod. Engg.)

LTP
310

Algebra : Partial fractions; Hyperbolic and inverse hyperbolic functions; De Moivre's Theorem and its applications; Relations between circular and hyperbolic functions; Positive term infinite series and their convergences (Comparison and Ratio test), Alternating series.

Differential Calculus : Derivatives of hyperbolic functions, successive differentiation and Leibnitz's theorem, Taylor's and Maclaurin's series; Maxima and minima of functions of one variable; Curvature and radius of curvature, points of inflexion.

Integral Calculus : Integration by partial fractions; Integration of forms \sqrt{R} , $1/\sqrt{R}$ where $R = ax^2 + bx + c$;

Properties of definite Integrals; Reduction formulae; Application of Integration to areas, lengths of arcs, Surface and volume of solids of revolution, Trapezoidal and Simpson's rules.

B.E. (Mech. Engg.) I Semester Examination

LTP

Theory Paper IV 103

312

PHYSICS-I

COMMON TO (E/M/C)

Relativity :	Absolute and inertial frames of reference, Newtonian and Galilean relativity Galilean transformation, Michelson merely experiment and its implications Einsteins Theory of relativity, Lorentz transformations, Einstlins law of addition of velocities. Mass variation with velocity, concept of energy and momentum as Einsteins mass energy relation.
Inverse Square law of forcea	Fundamental interactions. Electromagnetic gravitational interaction. Force and potentials Central Forcer.
Invariance and symmetry Principal :	Invariance of a Physical quantity, laws of conservation of momentum, energy and charge, concept of symmetry and its implications
Waves and oscillations :	Free damped and forced oscillatory motions. Resonant vibrations with applications, shapness of responce quality factors. Formation of waves in strings rods and air, accoustic waves, accoustic impedence, transmission through partitions, ultra-sonics and its applications.
Interference of Light :	Wave theory of light superposition principle. Double slit experiment, bi-prism and Newton's rings. Theory of interference in thin films, Interference filters, Michelson's interforemeter.
Diffraction of Light :	Preshel and Fraunherfer class of diffraction. Diffraction at straight edge cornics spirle Fraunhofer diffraction at a single slit and its exlension for number of slits, diffraction grating, Resolving power of optical instrument telescope, prism and grating.
Polarization of Light :	Elementry aspect of e.m. Theory of light, Polasization, reflecting and tramission Brewster law, polarization due to pile of plates and double refraction Elliptically and circularly polaized light. Nicol prism quartee and half wave plates.
Polarimeters	half shade & Bi-quartz.

Optical Instru- Cardinal points of a co-axial lens system, Defects as the
ments images, spherical and chromatic aberration Nodal slide
 assembly, Fye pieces

B.E. (Mech. Engg. I Semester Examination LTP
Theory paper TV-ME 104-Chemistry 313
(Common to PE/CE/EEC-104)

1. *Chemical kinetics* Rate constant; order and molecularity of a reaction; 1st, 2nd and 3rd order reactions. Methods of determining order of reactions; Activation energy; Effect of catalyst on reaction rate Industrial applications of catalysts.
2. *Electro-Chemistry* : Transport number; Galvanic Cells; E.M.E. and its measurement; Nernst equation of electrode potential; Reference and Indicator electrodes; PH measurements; solar energy.
3. *Phase Rule* : Phase Diagrams and phase transformations in Pb. Ag, Cu-Ni systems.
4. Thermal methods of Analysis : Elementary discussion of thermal analysis and Differential Scanning calorimetry.
5. Metal and Non-Metal Elements : & P--block elements; Bonding in complexes, Molecular explanations for magnetic properties and colour; Extraction and technical applications of titanium, Vanadium, Zirconium, Tungster and Uranium.
6. *Alloys* : Classification and necessity for making alloys; composition properties and uses of following alloys; Brass. Bronze. Gun Metal Duralumin; Effect of alloying elements like C. Ni. Cr, Mn, Si, V, Mo, EW, and Co on the properties of steel
7. *Electronic Effects* : Inductive effects; conjugation and resonanc and their effect on physical and chemical properties of molecules; Carbonion, Carbonium ions and free radicals.
8. *Organic Polymers* : Polymerisation; Effects of polymer structure on properties; Production properties and technical applications of some important thermoplastics and thermosetting resins, Natural rubber and elastomers (SBR, GR M, GR I, G.R.-F polyurethane and silicone) Molecular weights.
9. *Oils Fats, Waxes and Detergents* : Production and physicochemical properties of fatty acids and Glycerides; Manufacture of edible fats soap. Glycerin waxes, essential oils, perfumes and cosmetics.

B.E. I Semester Examination (Chemistry) (Common to all (Branches)**Practical-III ME/BE/EE/EC-108**

Based on course work corresponding to above.

B.E. (Mech. Engg.) I Semester Examination LTP

Theory Paper V—ME-105—Manufacturing Processes 303

(Common to PE/CE/EE/EC—105)

Materials : Composition, properties and uses of wrought iron, pig iron, cast iron, malleable iron, S.G. iron, carbon and alloy steels, copper Aluminium, lead, brass bronze, duralumin, bearing metals, high temperature metals cutting tool materials.

Casting Processes : Principles of metal casting; pattern materials, types and allowances, study of moulding sand, moulding, tools, moulding materials; classification of moulds, description, and operation of cupola; special casting processes e.g., die casting permanent mould casting; centrifugal casting, investment casting.

Smith and Forging : Basic operations e.g. upsetting fullering, flattening, drawing, swaging, tools and appliances, drop forging; press forging.

Metal Joining. Welding principles : Classification of welding techniques; Oxy-acetylene Gas Welding, equipment and field of application. Arc: Welding; Metal arc, Carbon arc, Submerged arc and atomic hydrogen arc welding. Electric: resistance welding; spot, Seam, Butt, Seam, and percussion welding. Flux : Composition, properties and function Electrodes.

Types of joints and edge preparation

Brazing and soldering.

Sheet Metal Work : Common processes, tools and equipment; metals used for sheets; standard specification for sheets.

Bench Work and Fitting : Fitting sawing, chipping, thread cutting (die), tapping, study of hand tools, marking and marking tools.

B.E. (Mech. Engg.) I Semester Examination LTP

Practical Paper I-ME 106 Engineering Drawing-I 003

Introduction : Instruments and their uses; lettering; construction and

uses of various scales: dimensioning as per I.S.I. 696-1972.

Engineering Curves : Parabola; Hyperbola; ellipse; cycloids; involute spiral; helix and loci of points of simple moving mechanisms (4 bars chain).

Projections : Straight lines, planes and solids; development of surfaces of right and oblique solids; section of solids; interpenetration and intersection of solids; isometric and oblique parallel projection of solids.

B.B. (Mech. Engg.) I Semester Examination LTP

Practical Paper II—ME 107 Physics-I 312

(Common to Electrical, Civil and Electronics & Communication Engineering)

Based on course work corresponding to ME 103 Physics-I

B.E. (Mech. Engg.) I Semester Examination LTP

Practical Paper-III ME 108 Chemistry (Common to Electrical, Civil, Engg. and Electronics & Communication 313

Based on course work corresponding to ME 104 Chemistry

B.E. (Mech. Engg.) I Semester Examination LTP

Practical Paper IV-ME 109 Workshop Practice-I 303

Based on course work corresponding to ME-105 Manufacturing Process.

Machine Shop Training for Electrical, Electronics and Civil Engineering

B.E. (Mech. Engg.) II Semester Examination LTP

Theory Paper I-ME III Engineering Economics & Accounting 320

Economics : Decision-making and forward-planning demand and forecasting, cost-output relationship, production function and cost planning of a firm; alternative objective of a firm; alternative objective of a firm; pricing and output decisions; profit and capital management, project evaluation analysis of inter-industry relations; macro-economics and

business. (With special reference to India) : planning and Industrialization in India.

Book Keeping : Principles of double entry system; bank reconciliation statement, single entry system; joint venture and consignment account.

Costing and Cost Control : Elements of cost and classification of costs, marginal cost, standard cost, concept of cost centres, overhead allocation cost variance analysis and cost control job process costing break even analysis

B.E. (Mech. Engg.) II Semester Examination LTP

Theory paper II-ME 112-Mathematics II 310

Differential Calculus : Partial differentiation. Total differentiation, Taylor's series for functions of two variables; Maxima and minima of functions of two or more variables.

Matrices : Inverse of a matrix; Rank of a matrix, Consistency and solution of simultaneous equations, Characteristic equations, Eigenvalues and Eigenvectors.

Integral Calculus : Double and triple integration, change of order of integration, Volumes of simple solids.

Differential equations : Linear differential equations of first order and first degree (Leibnitz and Bernoulli's forms) General Linear differential equations with constant coefficients, operator D, Complementary function, particular integral, simultaneous linear differential equations, Solution of differential equations in power series, Frobenius method.

Laplace Transformation : Laplace transformation, Inverse Laplace transformation, Convolution Theorem, Application to linear differential equations with constant Coefficients, Unit step function, Periodic functions.

B.E. (Mech. Engg.) I Semester Examination

Theory Paper IV-118-Physics-II

Kinetic Theory : Maxwell-Boltzmann distribution law, Mean free path, Equipartition of energy and sp., heat of gases, Vander waal equation, Critical constants, Joule-Thomson effect, Elementary cryogenics.

Electromagnetics : Gauss's theorem and its application, Dielectrics

and Energy in electrostatic field, Ampere's circuital theorem, Lorentz force and its applications, solenoid, self inductance of a solenoid and toroid, Mutual inductance and its determinations, Energy in magnetic field, Growth and decay of current in L-C-R circuits.

Spectroscopy : Constant deviation spectrograph Types of spectra, Origin of atomic spectra, Bohr theory and its extension, Infrared and ultraviolet radiations, X-rays and its applications in the study of crystal structure.

Nuclear Physic : Structure of nucleus, Binding energy, flow and fact neutrons, Particle detectors and accelerators, Artificial radioactivity, Fission and fusion, Nuclear reactors.

Lasers : Stimulated radiations, population inversion, laser action, properties and applications of laser light.

B.E. (Mech. Engg.) Semester Examination LTP

Theory Paper IV-ME 114-Engineering Materials/Thermodynamics 413

1. *Water Chemistry* : Hardness of water, determination of hardness and its removal; Boiler problems due to hard water and remedies against these problems; Water analysis.
2. *Fuels and Combustion* : Classification of fuels; Calorific value and its determination; Classification of coal; Analysis of coal; Carbonisation of coal; origin, composition and refining of petroleum; craching, synthetic and aviation gasoline; Power alcohol; Gasos-Natural, dry, wet, producer, water, coal, blast furnace and fuel.
3. *Lubricants* : Mechanism of lubrication, classification, preparation and properties of lubricants.
4. *Compositic Materials* : Necessity and type of composite materials; properties of composites; nature of interfacial reactions and interfacial stresses in composites; Manufacture of fibres, whiskers; filaments and technology of reinforcement, glase reinforced plastics.
5. *Adhesives* : Adhesives for wood and materials; Natural synthetic adhesives; Factors effecting the adhesiveness.
6. *Refractories* : Structure of the materials and refractiveness; Preparation, classification and general properties of refractories; Physico-Chemical factors effecting the use of refractories.

7. *Abrasives* : Natural and artificial abrasives; Manufacture properties and uses of commonly used abrasives.

Part-II Thermodynamics :

Concepts of system, Properties, equilibrium, Zeroth Law, heat and work, point and path function, First law of thermodynamics, non-flow and steady flow energy equations, second law of thermodynamics, reversibility, Clausius inequality, entropy, availability, Carnot theorems, Maxwell's relations.

Properties of Ideal Gases, properties of ideal gas mixtures, use of steam tables and Mollier diagram).

Real Gases. Law of corresponding states, Compressibility factor, equations of state.

B.E. (Mech. Engg.) II Semester Examination LTP

Practical Paper I-ME 115-Workshop Practice II 003

Based on course work corresponding to ME105-Manufacturing Processes.

B.E. (Mech. Engg.) II Semester Examination LTP

Practical Paper II-ME-116-Engineering Drawing-II 006

Introduction : Conventional representation of common feature and materials as per I.S.I. 696-1972, various rolled sections and their uses, screw threads; projection and forms of screw threads and their conventional representation as per I.S.I. 696-1972.

Free Hand Sketching and Scale Drawings : Components like cotter joint, knuckle joint; rivets and rivetted; pipe fittings joints; turnbuckle shaft couplings; flywheels; pulleys bush bearings; ball bearings.

Isometric views from Orthographic Projections of Machine components :

B.E. (Mech. Engg.) II Semester Examination LTP

Practical Paper III ME117-PHYSICS-II 002

Based on course work corresponding to ME113 PHYSICS II

B.E. (MECH. ENGG.) II Semester Examination LTP

Practical Paper-IV-ME118-Engineering Materials/Thermodynamics. 002

Based on course work corresponding to ME114-Engineering Materials/ Thermodynamics.

B.E. (MECH. ENGG.) II Semester Examination LTP

Theory Paper I-ME 201-Mathematics III 310

Differential Equations : Bessel's equations. Bessel functions of first kind, Recurrence relations; Legendre's equation. Legendre's polynomials, Rodrigu's formula.

Fourier Series : Fourier series, Euler's formulae, Even and odd functions, Functions having arbitrary period. Half-range expansions.

Vecior Analysis : Review of vector algebra, Triple products, Differentiation of vectors; operators grad, div and curl, their geometrical and physical significance, Integration of vectors, work done in vector fields, Green's, Stokes' and Gauss divergence theorem.

Functions of Complex Variables : Analytic functions, Harmonic conjugate, Conformal transformation of functions (simple problem) Cauchy's integral theorem and evaluation of real integrals.

B.E. (Mech. Engg.) III Semester Examination.

Theory Paper-II ME 202 Numerical Analysis and Computer Programming.

LTP

202

Numerical Analysis :

Solution of Algebraic and Transcendental Equations : Regula Falsi and Newton-Raphson's methods. Solution of simultaneous Equations Gaussian elimination, and Gauss-Seidel methods. Finite Differences Forward, Backward, and Central Differences. Interpolation : Lagrange's, Newton, and Central Difference formulae. Numerical, Differentiation. Numerical Quadrature : Simpson's rule and Gaussian Quadrature formulae. Solution of Ordinary Differential Equations Runge-Kutta Method.

Computer Programming : Computer languages: Basic concepts of Fortran language; Arithmetic expressions; Simple input and output statements; flow charts; Loop instructions; Format statements—I, F, E, X, H, T field specifications; Transfer of control statements-GO TO, Arithmetic IF; Logical IF; DO statement; subscripted variables.

Writing of programmes for simple problems like evaluation of func-

tions, summation of series, solution of equations by Newton-Raphson method, calculation of statistical characteristics, evaluation of definite integrals, simple operations on materials, solution of ordinary differential equation etc.

B.E. (Mech. Engg.) III. Semester Examination LTP

Theory Paper III-ME 203-Mechanics 312

Basic Laws of Mechanics : Important-Vector Quantities of Mechanics :—

Force moment of a force, couple Equivalent force system and free-Body. Diagrams of systems; equations of equilibrium, Frictional forces including rolling friction.

Moment of inertia of plans figures.

Kinetics : Rectilinear translation; analysis for a single particle and system of particles by D' Alembert's Principle and Energy Methods, Linear momentum of moment of momentum rotation of a rigid, body about a stationary axis, plane motion.

Lifting Machines :- Mechanical advantage, Velocity ratio, efficiency and law of machine.

B.E. (Mech. Eng.) III Semester Examination LTP

Theory Papers IV-ME-204 Electrical Technology-I 312

Instruments :- Principles of operation of moving coil and moving iron instruments, ammeters and voltmeters; introduction to dynamometer type wattmeter, single phase induction type-energy meters, megger.

D.C. Circuits : MKS and RMKS units, nature of resistance', variation of resistance with temperature, series-parallel connection; Kirchoff's laws, power and energy; star-delta transformation, superposition theorem. Thavenins theorem.

D.C. Generators.: Brief constructional details types; simple lap and wave winding, E.M.F. equation; armature reaction; losses and efficiency.

D.C. Motors: Principle of operation, back E.M.F. torque equation, types, characteristics; starting and speed control of D.C. Motors; applications.

A.C. Circuits : Generation of A.C. Voltage, average and values form factor, phase or diagrams; $R \frac{1}{4}$ $L \frac{1}{4}$ $C \frac{1}{4}$, series and parallel circuits the

concepts of impedance; J' notation, power factor and its importance; resonance, voltage, current and power in three phase balanced circuits. measurement of power in 3 phase circuits.

Transformers : Construction and principles of operation, equivalent electric circuit; voltage regulation and efficiency, parallel operations of single phase transformers. 3-phase connections; introduction to autotransformers; current and potential transformers.

B.E. (Mech. Engg.) III Semester Examination LTP

Theory Paper-VME-205 Manufacturing Machines. 203

Introduction to Machine Tools : Classification ~~and~~ ~~types~~; various cutting tools and cutting fluids; speed of cutting, feed rate, machining rate and machining time.

Lathe : Construction, important mechanisms viz., apron, tail stock, head-stock, feed box; specification, operations e.g., taper turning eccentric turning, screw cutting.

Drilling Machine Construction, feed mechanism; specification, geometry and nomenclature of twist drill, operations e.g. reaming, boring tapping.

Milling Machine : Construction, types specifications; cutters, dividing head, simple compound and differential indexing; various operations slab milling, angle cutting, slot milling fly milling, slit, gear milling spur and bevel, Tslot milling, nature of operations, up and down milling.

Shaper, Slotter, Planer; Construction, automatic feed mechanisms, quick return mechanisms; operations e.g., horizontal, vertical and inclined machining, spline cutting, keyway cutting contour machining.

Grinding Machines : M, n types and construction features, operations e.g., plane, cylindrical, internal and centreless grinding, tool and cutter grinding; grinding wheels-specifications, shapes, setting dressing truing.

Installation, of Machine Tools : Methods of installation, foundation, safety measures.

B.E. (Mech. Engg.) III Semester Examination LTP

Practical Paper I ME 206-Workshop Practics-III 003

Based on course work.

Corresponding to ME 205 Manufacturing Machines.

B.E. (Mech. Engg.) III Semester Examination LTP

Practical Paper II ME 207 Mechanics. 312

Based on course work corresponding to ME 202-Mechanics.

B.E. (Mech. Engg.) III Semester Examination LTP

Practical Paper III ME 208 Engineering Drawing-III 006

Introduction : Tolerances; conventions for surface roughness as per I.S.I. : 696-1972.

Assembly Drawings : Scale drawings from detailed information or from free hand sketches and detailed drawing from the given assembly of more complicated machined parts of steam engines; internal-combustion engines; boiler mountings; machine tools and fixtures.

B.E. (Mech. Engg.) VIII Semester Examination LTP

Practical Paper IV-ME 209-Electrical Technology-I 002

Based on course work corresponding to ME 204-Electrical Technology-I.

B.E. (Mech. Engg.) IV Semester Examination LTP

Theory Paper II-ME 211-Thermal Engineering 312

I.C. Engines : Air standard Otto, Diesel and dual combustion cycles; Two and four stroke operation of S.I. and C.I. engines; valve timing diagrams; Load Testing.

Air Compressors : Reciprocating air compressor, single and multi stage compressors, clearance and volumetric efficiency. Centrifugal and axial flow Compressors, velocity diagrams, surging, compressor performance.

Air Vapour Mixtures : Psychrometric properties of air, Dew point, Relative humidity and Wet Bulb Temperature; Psychrometric Chart and simple psychrometric processes.

Boilers : Elementary boilers Cochran, Lancashire, Locomotive and Babcock & Wilcox boilers; boiler mountings and accessories; draft systems; combustion calculations, boiler efficiency and heat balance.

Steam Engine : Operation of simple steam engine with slide valve;

indicator diagrams, IHP, BHP, compounding of steam engines. Types of condensers.

B.E. (Mech. Engg.) IV Semester Examination LTP

Theory Paper II-ME 212-Mechanics of Solids-I 302

Analysis of and Strain.

Stress tensor; three stress invariants. Three Principal stress. Strain Tensor; Strain invariants and principal strains. Plane stress and plane strain states in cartesian co-ordinates

Stress and strain in bars of varying sections.

Compound Bars and temperature stresses.

Stresses in Compound bars carrying axial loads and subjected to temperature variations.

Strain Energy : Strain Energy under tension, compression of bars of uniform and varying sections stresses due to sudden and impact loads

S.F. and BM diagram of : Cantilevers and beams under concentrated and uniformly distributed loads. beams with & without overhangs; point of contraflexure.

Theory of simple bending : Stresses in beams and Cantilevers under simple bending. flitched beams; boom of uniform strength.

Slope and Deflection of : Cantilevers, beams under concentrated and uniformly distributed loads.

Columns : Combined direct and bending stresses in columns.

Torsion :- Stresses and strains in pure torsion of solid and hollow circular shafts; power transmitted by shafts.

Springs :-Close-Coiled, spiral and leaf spring under torque and Moment.

Introduction to Plasticity : Various theories of failure and their significance. Ideally plastic solid.

Material Testing : Mechanical properties of materials under tension, compression, torsion, bending and impact.

B.E. (Mech Engg.) IV Semester Examination LTP

Theory Paper III-ME 213 Kinematics of Machines 302

Velocity and Acceleration Introduction to simple mechanisms, displacement, Velocity and acceleration curves, velocities of different points. In mechanisms, relative velocity method and instantaneous centre method, three centre in line theorem, graphical methods of finding acceleration of different points in mechanisms, acceleration in slider, crank mechanism, Klein's analytical analysis of reciprocating engine mechanism, coriolis component of acceleration.

Mechanisms with lower pairs, Description of straight line mechanisms like Peaucellier's mechanism and Hart mechanism (2) Engine indicator mechanism steering mechanism of Vehicles, Hooke's joint etc.

Friction :- Pivot and collar friction, clutches, belt and rope drives axis, boundary friction, film lubrication, rolling friction.

Cams : Classification, uniform acceleration and S.H.M. type construction of camprofile.

Toothed Gearing : Geometry of tooth profiles, cycloidal and involute profile, minimum number of teeth on opinion, interference, arc of contact, terminology for helical gears.

Gear Trains : Simple, Compound and epicyclic gear trains.

B.E. (Mech. Engg.) IV Semester Examination LTP

Theory Paper IV-M.E. 214-Electrical Technology-II 312

Synchronous Generator : Construction, types, e.m.f equation, armature reaction, synchronous impedance, voltage regulation (synchronous impedance method only); parallel operation, effect of change of steam supply and excitation on machine performance, Elementary idea cooling of generators.

Synchronous Motors Principles of operation, phasor diagram, operation with varying excitation and power factor, V-Curves hunting methods of starting and applications.

Induction Motors : Types construction, rotation, magnetic field, principles of operation, torque-slip curves, equivalent diagram circle diagram and its determination from OC and SC tests, Methods of starting and speed control high torque motors.

Single Phase Motors : Principles of single phase induction motors, Universal motor, applications.

Rectifiers : Principles of working of mercury arc rectifiers, solid state rectifiers.

Utilization : Method of industrial electrical heating, illumination laws, definition, characteristics of filament and discharge lamps, simple lighting calculations.

Economics : Simple tariffs, economics of power utilization, load cycle and its influence on energy efficiency.

Supply Systems : Elementary idea of transmission lines, distribution system, introduction to domestic and industrial wiring, earthing.

B.E. (Mech. Engg.) IV Semester Examination LTP

Theory Paper V-ME 215-Electronics. 321

Electronic devices, Semiconductors, covalent bond, intrinsic and extrinsic semiconductors, characteristics of P.N. junction diodes and junction transistors, characteristics of zener diode, silicon controlled rectifier, field effect transistor, vacuum tubes and voltage regulator tubes.

Amplifiers : Hybrid parameters, transistor equivalent circuit, common emitter hybrid equivalent circuit, stability of operating point, triode and field effect transistor equivalent circuit and line, R.C. coupled amplifiers, and efforts of cascading, audio power amplifiers, emitter and source followers.

Feedback Amplifiers and Oscillator: Principles of negative feedback amplifiers, simple scheme for conventional Oscillator circuits, free running multivibrator.

Rectifiers and Power Supplies : Halfwave, full wave and regulator, Electronics Instruments V, T, V, M, C, R, D. - Strain gauge.

B.E. (Mech. Engg.) IV Semester Examination LTP

Practical Paper-I-ME 216-Workshop Practice-IV 003

Advanced exercises based on course work corresponding to ME-205 manufacturing Machines.

B.E. (Mech. Engg.) IV Semester Examination LTP

Practical Paper I ME-217-Thermal Engg. I 002

Based on course work corresponding to M.E. 211-Thermal Engg - I.

BE. (Mech. Engg.) IV Semester Examination LTP

Practical Paper III-ME-218 Mechanics of Solids. 002

Kinematics of machines.

Based on course work corresponding to ME-212-Mechanics of Solids-I and ME-213-Kinematics of Machine.

B.E. (Mech. Engg.) IV Semester Examination

Practical Paper IV-ME-219

Electrical Technology/Electronics

Based on Course work corresponding to ME-214-Electrical Technology-II and ME-215-Electronics

B.E. (Mech. Engg.) V Semester Examination LTP

Theory Paper-I-ME-301 Instrumentation 312

Generalized Measuring System : Transducers of different types and their usages Intermediate or signal Conditioning devices like amplifiers, integrating and differentiating circuits. Display devices like voltmeters. C.R.O and V.T.V.M., and recorders.

Basic Characteristics and Response of Measuring Instrument under and Dynamic Conditions.

Measurement of : Displacement Strains, Velocity, acceleration, temperature pressure and fluid flow.

Misc. Instruments : Tolesurf, Stroboscope, extensometers.

Controls : Elements of automatic control, simple concept, and their application.

B.E. (Mech. Engg.) V Semester Examination LTP

Practical Paper ME-302-Meohanics of Solid II 312

Strain Energy Methods :—

Strain energy in torsion and bending; Maxwell's reciprocal theorem, Castigliano's theorem for statically determinate structures.

Fixed and Continuous Beams : BM and SF diagrams; Clapoyron's Theorm of 3 moments; slope and deflection; sinking of supports.

Bending of Beams :-

Asymmetrical bending of straight bars; Bending of curved bars. Stresses in crane hooks and T and I sections.

Shells : Thin and thick cylinders under internal fluid pressure, Wire winding of thin cylinders. Stresses in shrink fit hub and shaft.

Anti-Symmetric problems : Rotating discs of uniform thickness. Disc of variable thickness, Rotating shafts and cylinders.

Torsion :— Torsion of bars of non-circular cross sections. Membrane analogy. Thin-Walled tubes, Thin rectangular sections.

Columns : Elastic stability, theory of long columns. Different end conditions. Rankine Gordon formula and other empirical formulae.

Introduction to Experimental Stress Analysis :- Principles of photoelastic analysis; Stress optic law. Plane and circular polariscope; isoclinics and isochromatic lines; calibration. Plane.

B.E. (Mech. Engg.) V Semester Examination LTP

Theory Paper III-ME-303-Dynamics of Machines 312

Flywheels : Turning moment diagrams for I.C. Engines, steam engine and power presses, speed and energy fluctuations.

Governors : Functions of a governor, types of governor, weight loaded, spring loaded, efforts and power of a governor controlling force diagrams.

Gyroscopes : Principles of gyroscope, gyroscopic couple and its effect on two wheel and four wheel vehicles and ships.

Balancing : Balancing of rotating parts and primary balancing of reciprocating parts, primary and secondary balancing of in-line engines, partial balancing of locomotive engines and its effect, balancing machines.

Vibrations : Free vibrations of a body with single degree of freedom; transverse vibration of beams with uniform and concentrated loads by Rayleigh method; torsional free Vibrations of two rotor system, three rotor system and geared systems; damped free vibrations with viscous damping; logarithmic decrement; response of damped spring mass system to a harmonic force; whirling of shafts, vibration isolation and vibration of mass supported on foundations subject to vibrations; vibration simulation.

B.E. (Mech. Engg.) V Semester Examination LTP

Theory Paper IV-ME 304-Fluid Mechanics. 312

Introduction : Fluid and flow: Continuum: Fluid Properties.

Fluid Statics : Pressure variation in a static fluid; hydrostatic forces on plane and curved surfaces; stability of submerged and floating bodies.

Fluid Kinematics : General description of fluid motion; steadiness and uniformity of flow : stream lines and path lines; Lagrangian and Eulerian view points; continuity equation, particle acceleration, velocity gradient; rotation and rate of strain.

Fluid Dynamics : Euler's equations, Bernoulli's equation and its applications, energy and Momentum equations and their applications.

Ideal Fluid Flow : Irrotational Flow, velocity potential and stream function; circulation; simple flows-uniform flow, source, sink vortex, doublet; free and forced vortices.

Dimensional Analysis : Buckingham's theorem, non-dimensional parameters, theory of similarity and the application of similarity laws to fluid flow problems.

Viscous Flows : Laminar flow between parallel surfaces and through circular pipes, Momentum and kinetic energy correction factors; power absorbed in viscous resistance; film lubrication; turbulent flow through pipe lines, pipes in series and parallel, hydraulic and energy grade lines; siphon; loss due to sudden enlargement and contraction; drag and lift, boundary layer concepts, drag coefficient as a function of Reynolds number.

Compressible Flows : one dimensional analysis, velocity of pressure wave stagnation quantities, nozzle flow, normal shock.

B.E. (Mech. Engg.) VI Semester Examination LTP

Theory Paper V-ME-305-Thermal Engineering-II 312

Rankine Cycle Application of Rankin. Cycle to power generation, effect of steam Pressure, temperature and back pressure on heat rate; regenerative feed heating cycle and reheating.

High Pressure Boilers : Firing techniques-chain grate stoker, pulverised fuel firing, cyclone furnace, natural, controlled and mono tube circulation systems; functional importance of components of steam generator.

Steam Turbines : Flow of steam through nozzles, effect of friction and supersaturation; classification of turbines, velocity diagrams, condition line and reheat factor; governing of steam turbines.

Condenser :- Constructional details and working of surface condenser air removal; cooling water circuit.

I.C. Engines : Detonation, preignition and knocking; combustion calculations, rating of fuels; carburetion and fuel injection, scavenging and supercharging, lubrication and cooling systems; engine performance testing

Gas Turbines : Gas power cycles, thermal refinements, performances of gas turbines; principles of jet propulsion, turbojet and turbo-prop. engines, rocket engines.

B.E. (Mech. Engg.) V Semester Examination LTP

Practical Paper I-ME 306-Instrumentation 312

Based on course corresponding to ME 301 Instrumentation

B.E. (Mech. Engg.) V Semester Examination LTP

Practical Paper II-ME 307 Mechanic of Solids II/DOM 312

Based on Course work corresponding to ME 302 Mechanics of Solids-II and ME 303 DOM.

B.E. (Mech. Engg.) V. Semester Examination LTP

Practical Paper III-ME-308 Fluid Mechanics 312

Thermal Engg-II.

Based on course work corresponding to ME 304 Fluid Mechanics

ME 305 Thermal Engg. II.

B.E. (Mech. Engg.) V Semester Examination

Valuation of Sessional Marks I-ME-309-Practical Training.

Based on training undergone at the end of IV Semester Examination

B.E. (Mech. Engg.) VI Semester Examination LTP

Theory Paper I-ME 311-Production System Management 310

Definitions :- System, Production Production System, Production Concern, Company objectives, Production systems engineering.

Product Design :- Steps in Product and service design, characteristics of good design. Design simplification standardisation.

Capacity Planning :-Capacity and its measures, steps in capacity planning. Estimation of Industrial Demands, Calculation of aggregate demand. Identification of alternative strategies, choice of best strategy. Forecasting Techniques.

Overall process planning Detailed Process Planning, Organisational Planning-Steps in organisational planning, Management activities.

Plant Location Planning : Factors affecting choice of location, steps in plant location Installation phase; project planning, building, construction, Equipment installation Staffing & Training.

Resource Planning:- Human Resource planning, Equipment planning, Financial Planning.

Employee Morale Maintenance Planning :- Steps. in morale maintenance, Planning service conditions, Planning working conditions, Behaviour Science, Behaviour Management.

Plant Maintenance Planning : Preventive maintenance, steps in plant maintenance planning, Equipment inspection, Equipment replacement, simulation in replacement studies.

Operational Control : Fundamentals of Control, Organisation and methods, productivity. Review Phase; steps in review phase; Appraisal of internal factors;

Quantitative Techniques : Decision making, Techniques, linear programming, Network Analysis, queuing theory, simulation and Dynamic programming.

Role of Computer in integration of Production system functions.

B.E. (Mech. Engg.) VI Semester Examination LTP

Theory Paper II-ME-312 Science of Engineering 312

Manufacture-I

Casting Processes :- Properties of moulding sands, sand testing; gating and risering system; moulding, machines and foundry mechanization, melting of metal for casting; permanent mould and casting methods; special casting techniques; continuous casting; casting defects, inspection of castings; salvage of defective castings.

Welding-Electric arc welding equipment, electrode specification and selection: principles, equipment and applications of inert gas shielded arc welding, electrodeless welding, plasma arc welding, electron beam welding, laser welding, ultrasonic welding and electroslag welding; standard welding symbols; oxygen cutting and arc cutting of metals.

Cold Working of Metals :- Wire drawing and spinning operation;

types of presses, press operations; elementary principles of design of shearing, drawing and bending dies; forces and pressures involved materials of dies and punches; cold chocking of metals; introduction to high velocity forming.

Hot Working of Metals : Forging temperature and flow line considerations; upset forging, drop forging, press forging, their characteristics; extrusion processes extrusion speeds, temperatures and pressures; hotrolling of metals closed die forging.

Plastic Moulding :- Thermo plastics and thermo-setting plastics; Moulding and extrusion processes; machines for moulding.

B.E. (Mech. Engg.) VI Semester Examination LTP

Theory Paper III-ME 313-Fluid Systems 312

Introduction :- Euler's equation for turbomachines; impulse and reaction forces due to fluid systems on stationary and moving system of vanes; jet propulsion.

Water Turbines :- Classification; Pelton, Francis, Propellar and Kaplan turbines; velocity triangles; efficiency; draft tubes, governing

Pumps : Centrifugal pumps velocity triangles; efficiency, turbine pumps; and mixed flow pumps, positive displacement pumps reciprocating, gear and vane pumps.

Performance of Fluid: Machines :- Similarity laws applied to rotodynamic machines; specific speed, unit quantities; characteristic curves; un of models; cavitation and attendant problems in turbomachines; selection of turbines; hydro electric plants.

Hydraulic Power Transmission :- Transmission of hydraulic power through pipe lines; water hammer; precautions against water hammer in turbine and pump installations; hydraulic ram.

Miscellaneous Hydraulic Machines :- Accumulators; Intensifiers, presses, cranes; fluid coupling torque convertor.

B.E. (Mech. Engg.) VI Semester Examination LTP

Theory Paper IV-ME 314-Machine Design-I 304

Introduction Principles of mechanical design; influence of production processes on design; design for steady fluctuating and dynamic stresses; stress concentration; election of materials; miscellaneous considerations

like wear, environment human and aesthetic aspects-Systematic Design Approach.

Design of Elements : Cottered and Knuckle joints ; screw fastenings; bolted and riveted connections under direct loads and eccentric loads; welded joints; levers, shifts, keys and couplings; pipes cylinders; translation screws, close coiled helical springs, spur gears.

Metal Fits and Tolerances : Unilateral and bilateral tolerances; interference and transition fits, hole and shaft basis; economics of wide and close tolerances.

B.E. (Mech. Engg.) VI Semester Examination LTP

Theory Paper V-ME 315-Metallurgy 302

Structure of Metals : Crystal structure, lattices, imperfections; elementary treatment of point and line defects and their relation to mechanical properties.

Deformation : Slip, twinning; effect of cold and hot working on mechanical properties; principles of recovery; recrystallisation, grain growth.

Fracture : Fracture of metals and alloys, brittle and ductile, fracture, fatigue failure, effect of alloying elements, design considerations.

Creep : Basic consideration in the selection of materials for high and low temperature service; creep curve; effect of material variables on creep properties; brittle failure at low temperatures **SOLIDIFICATION.** Phases in metal systems, solidification of metals and alloys; solid solution, eutectic eutectoid and intermetallic compounds. Iron-carbon equilibrium diagrams.

Heat Treatment : Principles and purpose of heat treatment of plain carbon steels; annealing; normalising, hardening, tempering, isothermal treatment and case hardening precipitation hardening of aluminium alloys.

Materials : Plain Carbon steels, effect of alloying elements, properties uses and heat treatment of tools, stainless, spring and wear resisting steels, production, composition, properties, and use of non-ferrous alloys e.g., brasses, bronzes, duralumin, die-casting and bearing alloys.

Power Metallurgy :- Principles, techniques application and advantage. Surface treatment.

B.E. (Mech. Engg.) VI Semester Examination LTP

Practical Paper I-ME 316—science of Engineering 002

Manufacture-I/Metallurgy

Based on the course corresponding to ME-312-Science of Engineering Manufacture-I/ME 315 Metallurgy.

Practical Paper II ME 317 Fluid Systems LTP

Based on course work corresponding to ME-313 312

Fluid Systems

B.E. (Mech. Engg.) VI Semester Examination LTP

Practical Paper-III-ME 318 Machine Design-I 305

Based on course work corresponding to ME 314-Machine Design-I

B.E. (Mech. Engg.) VI Semester Examination

Valuation of Sessional Marks-IMF 309 Report Writing

Individual Investigation Reports, Committee report, technical project report, group discussion, Seminar.

B.E. (Mech. Engg.) VII Semester Examination LTP

Theory Paper I ME-401-Refrigeration and Airconditioning 312

Refrigeration : Air refrigeration systems, air cycle refrigeration of aircraft, various compression refrigeration cycle, basic component of the plant, properties and choice of refrigerants, multiple compression and evaporation systems, cascading, vapour absorption cycle, electrolux system steam jet refrigeration, vortex tube, application of refrigeration systems cascading, vapour absorption cycle, electrolux system, steam jet refrigeration, vortex tube, application of refrigeration systems.

Airconditioning : Psychrometric processes, applied psychrometry, comfort airconditioning, ventilation requirements, cooling and dehumidification systems, estimation of cooling and heating loads, air handling air distribution, duct design, industrial air conditioning.

Controls : Instrumentation and automatic controls required for refrigeration and air-conditioning.

BE (Mech. Engg.) VIT Semester Examination LTP

Theory Paper II-ME 402-Heat Transfer. 312

Conduction : One-dimensional steady-State conduction through

homogeneous and composite plane walls, cylinders and spheres; effects of variable conductivity; critical thickness of insulation; heat dissipation to environment, heat transfer from fins, of uniform cross section; one dimensional unsteady-state conduction; heating and cooling of bodies with negligible internal resistance; thermocouples; sudden change in surface temperature of thick plane wall cylinder or sphere.

Convection :- Concept of hydrodynamic and thermal boundary layers, momentum and energy equation for boundary layers on a flat plate application of dimensional analysis to free and forced convection; important dimensionless number; heat transfer during boiling and condensation

Radiation : Thermal radiation; Kirchoff's laws; Planck's distribution law; Wiens displacement law; Stefan-Boltzmann's relation, Configuration factors; radiant interchange between black and grey surfaces; radiation shielding; solar radiation;

Heat Exchangers : Combined heat transfer analysis; overall heat transfer coefficient; types of heat exchangers; LMTD AND NTU methods of heat exchanger design; simple heat exchanger calculations.

B.E. (Mech. Engg.) VII Semester Examination LTP

Theory Paper III-ME 403 Science of Engineering 312

Manufacture-II

Theory of Metal cutting : Definition and nomenclature of a single point tool, cutting action of a single point tool, chipformation, types of chips, chip control, machineability and its criteria Merchant's theory of cutting forces at tool point mechanism of friction at toolchip interface limitations and modifications of Merchant's theory; cutting temperature, cutting fluids and their physical action; measurement of force and power in metal cutting; effect of tool geometry on force system, relationship between forces cutting speed, feed-rate and depth of cut cutting to materials tool wear and tool failure; analysis of milling and grinding processes.

Principles of Machine tools; Classification of machine tools; various types of drives used on machine tools, layout of gearboxes for speed and feed changes kinematic principles of drives for common type of machine tools viz., centre lathe, capstan and turret lathes, automatic lathes, drilling and bearing machine, shaping slotting, planning boring, broaching, grindlapping, boring superfinishing; recent developments in machine tools, N.C. machine tools, transfer lines gear manufacturing.

Sources of error : Temperature variation; cumulative errors: errors due to elastic deformation and human elements: inherent error of machine tool, process capability.

Jig & Fixture : General design Principles; location, accuracy, clamping and indexing devices, Economics of Jigs and fixtures, Introduction to non-conventional machining.

Metrology: Standard of length: slip gauges length.

B.E. (Mech. Engg.) VII Semester Examination LTP

Theory Paper IV ME 204-Machine Design-II 304

Friction Clutches and Brakes : Common friction materials, shoe, band, cone and disc brakes their characteristics and design; friction Clutches:

Bearing and Lubrication Types of sliding bearing, materials, type of lubrication, design of sliding bearing; selection and application of rolling bearing seals.

Mechanical-Drives : Selection, of transmission; belt and chain drives; helical, bevel and worm gears.

Hoisting Elements : Wire ropes, hooks, pulleys and connected elements.

Engine Parts : Connecting rod; crank and crank shafts; Design and drawing of more of assemblies of the above elements such as: single cylinder I.C. engine; automatic, transmission, brakes and clutches mechanical hoists, hydraulic riveter, centrifugal pump.

B.E. (Mech. Engg.) VII Semester Examination LTP

Practical Paper I-ME 405-Refrigeration and 312

Air-conditioning/Heat Transfer

Based on course work corresponding to ME-402-Heat Transfer.

B.E. (Mech. Engg.) VII Semester Examination LTP

Practical Paper II-ME-Science of Engineering 312

Manufacture-II

Based on course work corresponding to ME 404-Science of engg. Manuf.-II

B.E. (Mech. Engg.) VII Semester Examination

Practical Paper III-ME-407-Machine Design-II

Based on course work corresponding to ME-404

Machine Design-II

B.E. (Mech. Engg.) VII Semester Examination

Practical Paper IV— ME — 408-Practical Training.

Based on the report on 8 weeks practical training in industry undergone at the end of VI Semester.

B.E. (Mech. Engg.) VIII Semester Examination

LTP

Theory Paper I-ME-411 Industrial Engineering

410

Industrial Engineering : Definition and Scope

Production Planning and Control : Forecasting, importance problems time series analysis, time series calculations, correlation; allocation of resources, resource scheduling; routing machine interference problem; detatching as a function of production control; shop direction, work card, move card, inspection card and reports; control boards and charts; expediting and follow up; importance of quantitative methods in production of planning.

Inventory Control : Concepts of inventory control; inventory models with certainty and risk; relationship between inventory and production control.

Work Study : Process analysis; motion study; method improvement process charts; time study, micro-motion study; work sampling; rating, concept, methods of rating, standard time; elementary idea of PMT system, advantages and failacies.

Plant Layout :- Principles of plant layout, basic types of layout and their merits and demerits, use of quantitative methods in layout problems; materials handling equipment; line, balancing techniques.

Inspection and Quality Control :- Organization for quality control; receiving, in process, and final inspection; use of statistical methods to control the quality, concept of control charts and sampling inspection.

B.E. (Mech. Engg.) VIII Semester Examination

LTP

Theory Paper II-III ME-412-Automotive Engineering

413/2

Power Plants : Selection of power plant for automotive vehicle.

requirements of the vehicle, characteristics of various power plants (petrol engines, Diesel engines, Gas Turbines); constructional details of diesel and petrol engines, crank shafts, connecting rod, piston, valves, cam manifolds, aircleaners, mufflers, radiators, and oil filters.

Vehicular Performance : Load, air and grade resistance; matching of engine output and demand horse power, performance requirements of various vehicles like Passenger cars, heavy duty trucks etc. performance characteristics of internal combustion engines, drive effectiveness relationship for 2 wheel and 4-wheel drive vehicle.

Transmission Systems : Description and working of manually operated gear boxes like sliding mesh, constant mesh, synchromesh, and epicyclic; hydraulic torque convertor and its construction working and performance, semi-automatic and fully automatic transmission, Hydraumatic transmission, analysis differentials, and live axles, construction world and requirements of overdrive.

Steering Systems : Steering geometry. Ackerman steering. centre point steering, power steering.

Suspension : Independent suspension, perpendicular arm type, parallelem, type, dead axlesuspension, live axle suspension, air-suspension, shock absorbers.

Wheels, Tyres and Brakes : Wheel and tyre requirements, tyre dynamics; mechanical and hydraulic brakes, shoe arrangements and analysis, discbrakes, braking effectiveness relationship for 4-wheel drive.

B.E. (Mech. Engg.) VIII Semester Examination LTP

Theory Paper II-III-ME 413-Power Plant Practice. 413/2

Steam Generator, Plant :- Fuel handling systems, Indian coala combustion of coal in, furnaces.; fluidised bed combustion; influence of operating conditions on layout of evaporator, superheater, reheater and economiser; dust collectors; ash disposal, fans and draft systems.

Turbine Plant : Layout of turbine plant room, corrosion in condentors and boilers, food water treatment; feed heating and deacration system; cooling water systems and cooling towers.

Control : Important instruments on steam generator and turbine; drum water level control, combustion control and super beat temperature control; testing of power plants and heat balance.

Other Power Plant : General layout of I.C. Engines and turbine power

plants, types, gas turbine plants, fields of application, Nuclear power plants, power reactors and nuclear steam turbines: peak load power generation methods.

Economics : Planning for power generation in India, super thermal Power Plants estimation of cost of power generation; choice plant and site.

B.E. (Mech. Engg.) VIII Semester Examination LTP

Theory Paper II-III-ME-414-Solar Energy 413/2

Selected topics in Heat Transfer : Heat transfer modes, properties and radiation characteristics of opaque and partially transparent media.

Solar Radiation :- Origin, nature and availability of solar radiation, measurement of solar radiation data and its estimation, effects of receiving surface orientation and motion.

Components, process and system modes : Design consideration and performance of flat plate and focussing collectors : energy storage components-water storage, packed bed and and phase-change energy storage; mathematical models of various solar systems and components.

Application :- Solar water heating, solar air heaters, solar space-heating and cooling, solar pumps, solar thermal power, solar furnaces and solar distillation.

D.E. (Mech. Engg.) VIII Semester Examination LTP

Theory Paper I & II ME 415 Nuclear Engineering 413/2

Introduction to Nuclear Physics: Basic atomic structure, Mass energy equivalent, Nuclear reactions in fissions and fusion and energy release.

Nuclear power reactors : Types of fuels, moderators coolants shielding Types of thermal reactors such as BWR, PWR, PHWR, HTGR, etc. Fast Breeder reactors, Layouts.

Nuclear steam Cycles, Nuclear steam turbine. Super heat, Gas turbine cycles for Nuclear Power Generation.

Power plant instrumentation and Controls. Reactor Control start up & shut down, safety arrangements. Waste disposal and reprocessing.

Status of fusion reactor research.

B.E. (Mech. Engg.) VIII Semester Examination LTP

Theory Paper II-III ME 416 Combustion Engines 413/2

Emissions

Engine Fundamentals : Cycle analysis, Fuels, Types of hydro Carbons. Gasolene specifications. Effect of Engine parameters on performance, Carburation, Engine Vehicle Road performance, Road performance and fuel economy.

Emissions and Air pollution : Automotive Emmissions and their role in air pollution. Photochemical smog. Chomisty of smog formation. Combustion in Homogeneous mixtures, Emission Formation. Incomplete Combustion Formation of I+C. Carbon monoxide and oxides of nitrogen. Aidehyde emissions.

Influence of Design and operating variables on gasolene engine exhaust emissions.

Hydrocarbon Evaporative Emissions. Various sources and method of their control. Canisters for controlling evaporative emissions Emission control systems for gasolene engines : Blowby control closed PCV system. Reduction of Exhaust Emissions. Various methods Fuels system design

Exhaust Treatment devices : Air injection into exhaust system. Thermal reactors, Catalytic converter.

Stratified charge engines. Honda CVCC engine.

Diesel engine combustion Emissions : Sources of Emissions during combustion. Effect of Air injection timing on Performance and formation. D.I. and I.D.I. engines emissions.

Methods of reducing emissions, Exhaust gas recirculation smoke emission from diesel engines.

Emission Instruments : Non-Dispersive Infrared analyser, Gaschronotograph, Flame Ionisation Detector. Chemiluminescent analyser.

B.B. (Mech. Engg.) VIII Semester Examination LTP

Theory Paper I-II-ME-417 Metrology 413/2

Standards : Line and end standards, generation and calibration of the line and standards, wavelength as standard of length.

Limit Gauses : Principles of limit gauging for plain and threaded work, taper limit gauges.

Linear Measurements : Use of slip gauges, length bar gauges, principle and working of mechanical, electrical, optical and pneumatic comparators; universal measuring.

Angular and Circular Measurements : Principles usage calibration of sine bar, angle gauges, spirit level, clinometer and auto collimator; optical dividing head, circular division tester, calibration of polygons.

Flatness : Methods of checking flatness of a surface.

Screw Threads : Measurement of the elements of screw threads.

Gear Measurements : Involute geometry, the involute function, methods of testing pitch, concentricity and form of tooth, testing machines and instruments, rolling base circle and master profile principles.

Machine Tool Alignment : Methods and instruments for the testing of straightness, flatness, squareness, alignment of axes with particular reference to lathe milling, shaping and drilling machines. (methods of checking large assemblies, fixtures and machinery, calibration and maintenance of instruments of daily use.

Optics in Metrology ; Principles of optical instruments viz. projectors, Microscopes and autocollimators, optometers, types of instruments and their applications, phenomenon of interference, optical flats interpretation of fringe-patterns measurement of flatness, parallelism and squareness by interference methods, measurement of slip gauges, interferometer.

Surface Texture : Assessment : Standard for surface finish, measuring and recording instruments for micro surface variations.

B.E. (Mech. Engg.) VIII Semester Examination

LTP

Theory Paper-II-III-ME-417-Industrial Quality Control

413/2

Quality : Concepts, quality system, inspection and control of quality, quality costs, scope and objective of statistical methods.

Probability Theory : Random experiments, sample spaces, elementary theory of sets; probability; addition, multiplication and Bayes' theorems on probability, Binomial, Poisson, Hypergeometric distributions and their properties.

Models for the Universe : Normal distribution and its properties, use of normal area tables; negative exponential distribution, central limit theorem.

Testing of Hypothesis : Chisquare test : Z-Test, T-test, F-test, confidence limits for process average and dispersion; specifications and tolerances, process capability.

Control Charts : Control charts for variables and attributes; runs and trends case studies, interpretation of out of control points.

Acceptance Sampling Plans : Fundamental concepts, single, double, multiple and sequential sampling plans by attributes; acceptance sampling by variables; concepts of reliability and life testing.

B.E. (Mech. Engg.) VIII Semester Examination LTP

Theory Paper II-III ME 418-Process Engg. and Tool Design 413/2

Accuracy in Engineering Industries : Manufacturing errors and methods for obtaining the specified dimensions, setting up the blank for machining calculation of production tolerances in machining by automatic size Maintenance.

Computing Machining Allowances and In process dimensions of work pieces; Production techniques for typical machine parts.

Tool Design Consideration : Selection of tool materials, heat treatment Surface roughness, tolerances, tooling economics and safety as related to tool design.

Design of Cutting Tools : Basic principles of design of single Point and multiple point tools e.g., broaches, gear shaping tools, twist drills, reamers and milling cutters.

Jigs and Fixtures : Central design principles, location, accuracy; clamping and indexing devices; Design of drilling jigs.

1. Kovin V

Fundamentals of Process Engineering.

2. A STME

Fundamentals of Tool Design

B.E. (Mech. Engg.) VIII Semester Examination LTP

Theory Paper-II-III-ME-419-Materials Management 413/2

Introduction to Materials Management, Inventory Control Definition of Inventory, Types of Inventory, Storage and Issues, Records Layout, Inventory costs, Economic ordering Quantity, Maximum and safety stocks, State Inventory Models, Inventory Models, Make or buy decision, Reorder Points, Buffer stocks and service level, Inventory record keeping and related procedure, physical Inventory Verification Disposal of Surplus Inventories, Inventory Reports to Management, Classification and codi

fication, Standardization, Purchasing Policies and Principles, Vendor Rating, Purchase Procedure, Value Analysis, Quality Control.

B.E. (Mech. Engg.) VIII Semester Examination	LTP
Theory Paper II-III-ME-420 value Engineering	413/2
Value Engineering	LTP
	413/2

Concepts in value and cost Elements of product cost and/cost classification. Value analysis, procedure, parts classification, Patents, Product life-cycle and value oriented efforts, value engineering job plan, value tests, evaluation of value alternative, Investigations and recommendations, case studies.

B.E. (Mech. Engg.) VIII Semester Examination	LTP
Theory Paper II-III-ME-421 Experimental stress Analysis	413/2

Photoelasticity : The dimensional photoelasticity, field of application, Theory of light, polarisation, photoelastic effect, fundamental optical laws of photoelasticity; plans and circular polariscope; isoclinic and isochromatic lines; interpretation of photoelastic stress pattern, different methods of compensation; Complete analysis of stress pattern by standard methods; photoelastic materials; stress fringe and strain fringe constants; similarity laws; birefringent coatings.

Electric Strain Gauges; Gauge, construction and installation, temperature compensation, gauge sensitivity, factors affecting gauge behaviour, potentiometer and wheat Stone Bridge circuits for strain measurement.

Brittle Coating : Introduction, coating stresses, failure theories, different types of crack patterns, crack detection, calibration of coating stresses, composition of brittle coating, influence of various parameters, effect of biaxial stress field.

Introduction to, Moire Techniques :

B.E. (Mech. Engg.) VIII Semester Examination	LTP
Theory Paper II-III-ME 422-Fracture Mechanics	413/2

Introduction : Inter-disoinlinary approaches in fracture mechanics modes of deformation and failure.

Linear Elastic Fracture Mechanics : Stress concentrat on in the

vicinity of notches and cracks, Griffith's energy concept, Irwin's stress intensity approach, fracture toughness.

General Yielding Fracture Mechanic : Crack tip plastic zones, Wall & crack opening displacement concept.

Evaluation of Fracture Mechanics Parameters : Plane strain, fracture toughness testing i.e., K_{Ic} .

Micro Structure and Fracture Toughness : Physical significance of fracture toughness in relation to microstructure, principles for the development of fracture resistant materials.

Fracture Safe Design Principles : Transition temperature and fracture mechanics approach, K_{Ic} only

Fractured Surfaces : Acquaintance with some common fracture surfaces of various materials, like steels, C.I. non-ferrous alloys etc

B.E. (Mech. Engg.) VII Semester Examination

E.T.P

Theory paper II III-ME 423-Elastic and Plastic

Behaviour of Engineering Materials.

413/2

Mechanical Testing Study of stress strain diagrams of various materials; tension, compression, shear and ductility tests, and test and Erichson cupping tests and Rockwell, Brinell, Vickers hardness tests; microhardness, superficial and Shore's scleroscope tests.

Material Behaviour Beyond Elastic Limit : Inelastic action, yielding in crystals, dislocations, yielding in polycrystal, and amorphous material, strain hardening, discontinuous yielding.

Fracture : Study of ductile and brittle fracture: the ductile-brittle transition, notch effect and notch sensitivity and methods of protection against fracture.

Creep : Long-time constant load, constant-temperature creep tests, mechanism of creep rupture, graphical representation of long-time creep test data, empirical relations for creep behaviour, plastics flow rules for creep, creep relaxation in tension.

Fatigue : The nature of fatigue, mechanisms of fatigue, fatigue strength of metals, stress concentration, fatigue strength, fatigue failure under combined stress, cumulative fatigue damage due to varying amplitudes of stress, other factors affecting fatigue strength.

B.E. (Mech. Engg.) VIII Semester Examination	LTP
Theory Paper II-III-ME-424 Fluidics and Fluid Power Control	413/2

Fundamentals of Fluids : History of Fluidics, fluid mechanics of jet, principles of fluidic devices, nature and uses of fluidics devices, different types of fluidics devices; Boolean algebra and logic system; manufacture of fluidic devices and the applications of fluidics to medical industrial, nuclear and aero space.

Fluid Power Control : Fluid power systems Vs. other power systems, different types of fluids and their properties, pumps, valves, hydraulic motor and other components, as used in fluid power control systems; classification of circuits, open loop and closed loop circuits, description and use of simple circuits; standard fluid power graphic symbols.

B.E. (Mech. Engg.) VIII Semester Examination	LTP
Theory Paper II III-ME-425-Analysis and Synthesis of Linkages.	413/2

Introduction: Conventional symbols used in kinematic diagram
Degree of Freedom of Linkages : Types and number of synthesis; Grublers equation.

Centres and Centroides : Kennedy's theorem of three centres; determination of centres of a kinematic chain; fixed and moving centroides, velocities of points on a machine member by centre method and resolution method.

Design : 4 bar mechanisms of class I and Class II chains; similarity varying triangle; transmission angle; relative pole method; inversion method and Overlay method.

Couple Curves: Robert's Law Cognate linkages; Babillier theorem, Pole, polode, pole tangent and pole velocity, the Euler-Suavery Equation.

Finite Displacements : Rotation angle, pole triangle, centre system and its application for three point position link guiding; opposite pole quadrangle, four and five position link guiding; analytical design of 4-bar mechanism for coordinated motions of cranks; Freudenstein's equation

B.E (Prod. Engg.) VIII Semester Examination	LTP
Theory Paper II-III-ME-426-Gea@r Technology	413/2

Types of gears, Geometric and kinematic characteristics, Undercutting and Interference-correction, Non-Circular gears.

Design of Tools to make gear tooth.

Kinds and Cases of gear failures

Special Design Problems; Centre distance problem, profile modification problem, Combined bending and Torsion of pinions with large length to diameter ratio, high speed gearing.

Geneva Mechanisms (Analysis & Synthesis)

Gear Trains (Analysis and Synthesis)

Some examples of optional kinematic system Design; Gear Set design, Design of sub-system consisting of Geneva wheel and elliptical gears for reduction of Maximum acceleration of the wheel.

B.E. (Mech. Engg.) VIII Semester Examination LTP

Theory paper II-III ME 427. pressure Vessel Design 413/2

Introduction to pressure Vessels, Components and piping, Materials of construction, Welding & joint, Design loads and other design details Codes and specifications.

B.E. (Mech. Engg.) VIII Semester Examination

Practical paper I-Any two from any of the following groups :

Group A

ME 428 Automotive Engineering

Based on course work corresponding to ME 412 Automotive Engineering.

ME 429 Power Plant Practice

Based on course work corresponding to ME 413 Power Plant Practice.

ME 430 Solar Energy

Based on course work corresponding to ME 414 Solar Energy

ME 431 Nuclear Energy

Based on course work corresponding to ME 415.

ME 432 Combustion Engine Emissions.

Based on Course work corresponding to ME 416.

Group B

ME 433 Metrology

Based on Course work corresponding the ME 416 Metrology

ME 434 Industrial Quality Control

Based on Course work corresponding to ME 417 Industrial Quality Control

ME 435 Material Management

Based on Course work corresponding to ME 419 Material Manahement

ME 436 Value Engineering

Based on course work corresponding to ME 420 Value Engg.

Group C

ME 437 Experimental Stress Analysis.

Based on course work corresponding to ME 421 Experimental Stress Analysis.

ME 438 Fracture Mechanics.

Based on Course work corresponding to ME 422 Fracture Mechanics. ME 439 Elastic and Plastic Behaviour of Engineering Materials isased on course work corresponding to ME 423 Elastic and Plastic Behaviour of Engineering Materials.

ME 440 Fluidics and Fluid Power Control

Based on course work corresponding to ME 424 Fuids and Fluid Power Control.

ME 441 Analysis and Synthesis of Linkages.

Based on Course work corresponding to ME 425 Analysis and Synthesis of Linkages.

ME 443 Gear Technology

Based on Coursework corresponding to ME 426 Gear technology

(47)

ME 443 Pressure Vessel Design-Based on Course work corresponding to ME 427.

B.E. (Mech. Engg.) VIII Semester Examination

Valuation of Sessional Work I ME 444-Project

Based on the report on the project assigned to the student involving investigations, design, development fabrication etc.

B.E. (Mech. Engg.) VIII Semester Examination

Valuation of Sessional work II ME 445 Practical Training Report

Based on the report on 9 weeks training in Industry undergone after the VII Semester.