

B.E. V SEMESTER MECHANICAL ENGINEERING							
COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)							
ME-5301	Dynamics of Machines	L	T	P	C	Max. Marks	Min. Marks
Exam Duration	3 Hours	3	-	2	4	70	22

Unit I

Engine Dynamics: Introduction, D'Alembert's principle, static force analysis, mass moment of inertia, inertia force and inertia torque, dynamically equivalent mass system, kinematic equivalence, correction couple, dynamic force analysis.

Flywheel: Turning moment diagram, coefficient of fluctuation of speed and energy, flywheel for punching press.

Unit II

Governors: Function of a governor, types of governors, principle of centrifugal and inertia governors, analysis of dead weight type and spring-loaded governor, governor characteristics, sensitiveness, stability, isochronism, hunting, effort and power of governor, controlling force diagram.

Unit III

Balancing of rotating masses: Static and dynamic balance, balancing of several masses revolving in the same plane, balancing of several masses revolving in different planes.

Unit IV

Balancing of reciprocating masses: Inertia effects of the reciprocating masses in the engine mechanism, primary and secondary unbalanced forces and couples due to reciprocating masses, partial balancing of locomotive, In-line engines, direct and reverse crank method, balancing of V-engine.

Unit V

Vibration: Introduction, types of vibration motion, types of free vibration, elements of vibration system, natural frequency of free longitudinal vibration, natural frequency of free transverse vibration, undamped free vibration, damped free vibration, damping factor, forced vibrations with harmonic excitation, frequency of under damped forced vibration, whirling of shaft.

Recommended Books:

1. Theory of Machines by Thomas Bevan; Pearson Education.
2. Theory of Machines by S.S. Rattan; Tata McGraw Hill.
3. Mechanism and Machine Theory by A.G. Ambekar; Prentice Hall of India.
4. Vibration and Noise Engineering by A.G. Ambekar; Prentice Hall of India.
5. Mechanical Vibration by Grover; New Chand and Bros.
6. Theory of Machines by R.S. Khurmi; S. Chand.



B.E. V SEMESTER MECHANICAL ENGINEERING							
COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)							
ME-5302	Machine Design – I	L	T	P	C	Max. Marks	Min. Marks
Exam Duration	3 Hours	3	-	2	4	70	22

Unit I

Basic Design Concepts and Considerations: Design and design process, design process steps and detailed morphology of design, design considerations: strength, manufacturing, maintenance, energy, environment and safety considerations, life cycle assessment basis of design, aesthetic and human consideration in design, shock and impact consideration in design, selection of material, factor of safety for steady and variable loads, reliability consideration in design.

Unit II

Stress Concentration and Fatigue: Causes of stress concentration, theoretical and actual stress concentration factor, notch sensitivity, mitigation of stress concentration, cyclic loading, rotating mirror beam method, endurance limit, S-N curve, loading effect, size effect, surface effect, design consideration for fatigue, Goodman's and modified Goodman's diagram, Soderberg's equation, Gerber's parabola, design for finite life, cumulative fatigue damage.

Unit III

Power Transmission

Shafts: Design of shaft under combined bending, twisting and axial loading, design of shaft for rigidity, design of shaft under fluctuating loads.

Keys and Coupling: Design of different types of keys, design of different types of couplings: muff coupling, compression coupling, flange couplings and flexible coupling.

Unit IV

Springs: Stresses and deflection equations of helical springs, design of compression and tension springs, torsion springs, fatigue loading of springs, surge in spring, design of leaf spring.

Power Screw: Design of power screw and power nut, complete design of screw jack.

Unit V

Brakes and Clutches: Materials for friction surfaces, uniform pressure and uniform wear theories, design of friction clutches: disc or plate clutch, cone clutch and centrifugal clutch, design of brakes: design of band brake, band and block brake, disc brake, internal expanding brake.

Recommended Books:

1. Mechanical Engineering Design by Shigley's; McGraw Hill.
2. Machine Design: An Integrated Approach by Norton L. Robert; Pearson Education.
3. Engineering Design by Dieter; Tata McGraw Hill.
4. Machine Design by Sharma and Agrawal; Kataria and Sons.
5. Design of Machine elements by Bhandari; Tata McGraw Hill.
6. Design of Machine elements by M.F. Spotts et al; Pearson education.

B.E. V SEMESTER MECHANICAL ENGINEERING							
COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)							
ME-5303	Machine Tools	L	T	P	C	Max. Marks	Min. Marks
Exam Duration	3 Hours	3	-	2	4	70	22

Unit I

Metal Cutting: Principles of metal cutting tool geometry, tool life, machinability and machinability index, tool wear Merchant's circle cutting force analysis, cutting materials and cutting fluids, economics of metal machining.

Unit II

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

Unit III

Grinding: Types of grinding machines; surface, cylindrical and internal grinding, grinding wheels specifications, wheel truing and dressing without eccentricity, centre-less grinding, grinding methods.

Unit IV

Milling: Vertical, horizontal and universal type machines, specifications and classification of milling machines, universal dividing head, types of indexing methods, gear cutting, milling cutters.

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

Unit V

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

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

Recommended Books:

1. Metal Processing by O. Boston; John Wiley and Sons.
2. Workshop Technology II by HajraChoudhury; Media Promoters and Publisher.
3. Materials and Processes of Manufacture by Lindberg; Prentice Hall.
4. Workshop technology Vol-II by Raghuwanshi; DhanpatRai and Co.
5. Production Technology by HMT; Tata McGraw Hill.

B.E. V SEMESTER MECHANICAL ENGINEERING							
COURSE CONTENTS (AICTE FLEXIBLE CURRICULA)							
ME- 5311	Measurement Systems and Mechatronics	L	T	P	C	Max. Marks	Min. Marks
Exam Duration	3 Hours	3	-	2	4	70	22

Unit I

Basic Concepts of Measurement: Measurement methods, generalized measurement system and its functional elements, instrument types and its static and dynamic terms and characteristics, standard input types, zero, first and second order instruments, response of I and II order instruments to standard inputs.

Transducers: Classification, brief description of various transducers namely variable-resistance transducer, linear variable differential transformer (L.V.D.T.), capacitive transducer, piezoelectric transducer.

Unit II

Statistical Analysis: Introduction, causes and types of experimental errors, error analysis on a commonsense basis, uncertainty analysis, evaluation of uncertainties for complicated data reduction, statistical analysis of experimental data, probability distributions, Gaussian or normal error distribution, chi-square test of goodness of fit, method of least squares, correlation coefficient, standard deviation of the mean, graphical analysis and curve fitting, general considerations in data 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: thermocouples, thermocouple standards.

Pressure Measurement: Relative pressure scales, pressure reference instruments, barometer, manometer, deadweight tester, Bourdon-tube pressure gauge, low pressure measurements: McLeod gauge, Pirani-thermal conductivity gauge, Knudsen gauge.

Flow Measurement: Introduction, positive-displacement method, flow-obstruction methods: orifice meter, Venturi meter, nozzle meter; hot wire anemometer.

Unit IV

Force, Torque and Strain Measurement: Introduction, force measurement: load cells, piezoelectric load cells, torque measurement: measurement of torque on rotating shafts, power estimation from rotational speed and torque, strain measurement: introduction, electrical-resistance strain gages, measurement of resistance strain-gauge outputs.

Unit V

Introduction to Mechatronics: Introduction, embedded systems, design process for any system, traditional and mechatronics designs, control systems and feedback control, open and closed-loop control systems and their elements, analogue and digital control systems, sequential and programmable logic controller, examples of mechatronics systems.

BE IV SEMESTER ELECTRICAL ENGG.

COURSE CONTENTS (UEC SCHEME)

OE/EE-5351	Electrical Technology	L	T	P	C	Max. Marks	Min. Marks
	3 Hours	2	1	2	4	80	22
Duration							

Unit - 1

Synchronous machines: Principle of constructions, salient pole and turboalternators, their construction with respect to prime movers. Relation between speed, frequency and number of poles. E.M.F. equation elementary principle of armature reaction, idea of synchronous reactance. Regulation of alternators by synchronous impedance method. Power developed in an alternator synchronous motor vector diagram and principle of operation.

Unit - 2

Induction motor: Rotating magnetic field theory, basic principles of operation, types of induction motor, equivalent circuit, derivation of torque equation, relation between copper loss, power and torque, condition of maximum torque-simple problems on these topics. Methods of starting and speed control, torque slip characteristics. Elementary principle of single phase induction motor, different types and starting methods.

Unit - 3

Electrical power utilisation: Electric drives, choice of motor for paper mill, textile mills, rolling mills. Principle of resistance and induction type of electric furnace, electric and resistance welding, principle of welding transformers.

Unit - 4

Electric power system- choice of the site, elementary principle of load despatch. Maximum demand, load factor, different types of electricity tariffs. Different types of transmission towers, long and short transmission line. Calculation of regulation and efficiency for short A.C. transmission line.

Unit - 5

Electronic and control: Elementary description of gas diodes and triodes, characteristics of thyration. Principle of semi conductor diode, zener diode, transistor. Application of SCR in Electronic motor control. Use of semi conductor as timing switches.

References:

1. Alternating current machines - M.G. Say
2. Basic electrical engineering - Higinbathom.
3. Industrial Electric control - Bendict

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