

Gautam Buddha University, Greater Noida

School of Engineering (Mechanical Engineering)- ME 202

Degree	Course Name	Course Code	Marks:100
Integrated B. Tech. + M. Tech. / M.B.A.	Manufacturing Technology - II	ME 202	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
IV	3	3-0-0	3 Hours

Unit - I

Introduction to Manufacturing Technology and Powder Metallurgy:

Importance of manufacturing; Economic & technological considerations in manufacturing; Classification of manufacturing processes; Materials & manufacturing processes for common items.

Theory of powder metallurgy; Manufacture of metal Powders; Sintering; Secondary operations; Properties of finished parts; Design consideration and applications.

(08 Hours)

Unit – II

Metal Casting: Introduction: Brief History; Advantages and Limitations; Applications; Patterns; Pattern materials; Allowances; Types of pattern; Color code scheme; Sand casting processes: Green and dry sand casting process; types of sand; Molding sand and its properties; Molding sand composition; Cores; Use of cores; Core materials; Types of cores; Core prints; Chaplets.

(07 Hours)

Unit – III

Gating and Riser System: Element of gating systems; types of gates; Special Molding Processes: Carbon dioxide molding process; Investment casting process; Die casting process; shell molding process; Full molding process; Vacuum-Sealed casting process. Casting defects; Causes and remedies of defects.

(06 Hours)

Unit – IV

Metal Forming and Sheet Metal Working: Elastic and plastic deformation; Concept of strain hardening; Hot and cold working processes; Brief description of

Rolling; Forging; Extrusion; Swaging; Wire and tube drawing. Presses for sheet metal working; Part feeding systems; Elements of die; Punch and die clearances; Shearing mechanism in press work; Progressive; compound and combination dies; Applications of sheet formed products; Processes like blanking; Piercing; Punching; Trimming; etc. Forming processes like bending; Cup drawing; Coining; Embossing; etc. High energy rate forming processes.

(09 Hours)

Unit – V

Non-conventional Machining I: Introduction and need for micro machining (Non-conventional) processes; Classifications of non-conventional processes. Abrasive jet machining; Process parameters; Applications; Advantages and limitations. Ultrasonic machining (USM); Process parameters; Applications; Advantages and limitations. Water jet and Abrasive water jet Machining; Process parameters; Applications; Advantages and limitations.

(08 Hours)

Unit – VI

Non-conventional Machining II: Electro Chemical Machining; Process parameters; applications; advantages and limitations. Electro Discharge Machining; process parameters; applications; advantages and limitations. Electron Beam machining; process parameters; applications; advantages and limitations. Laser Beam Machining; process parameters; applications; advantages and limitations.

(07 Hours).

Recommended Books:

1. Fundamentals of Modern Manufacturing: Materials; Processes and Systems; Mikell P. Groover; Publisher Willey.
2. Manufacturing Technology – Metal cutting and machine Tools (Volume -1 & 2); P. N. Rao; Tata McGraw Hill; New Delhi.
3. Manufacturing Engineering & Technology; Kalpakjian; Pearson Pub.
4. Manufacturing science; Ghosh and Malik; East West Press.
5. Materials and Processes in Manufacturing; E. P. DeGarmo; J. T. Black and R.A. Kohser; Prentice Hall of India.
6. Modern machining processes; Pandey and Shan; Tata McGraw Hill Publications.
7. Principles of metal cutting; Sen and Bhattacharya; New Central Book.
8. Manufacturing analysis; Cook; Adisson-Wesley.

School of Engineering (Mechanical Engineering)- ME 204

Degree	Course Name	Course Code	Marks:100
Integrated B. Tech. + M. Tech. / M.B.A.	Dynamics of Machines	ME 204	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
IV	4	3-1-0	3 Hours

Unit – I

Friction: Types of friction; Coefficient of friction; Inclined plane; Friction of screw and nuts; Pivot and collar; Wedges; Uniform pressure and wear; Friction circle and friction axis - lubricated surfaces; Friction clutches - single disc or plate clutch; Multiple disc clutch; Cone and centrifugal clutch.

Precession: Introduction of the machine dynamics; Gyroscopic couple; Effect of precession motion on the stability of moving vehicles - motor car; Aero planes and ships; Stability of four-wheeler and two-wheelers moving on curved path.

(10 Hours)

Unit – II

Brakes and Dynamometers: Single block brakes; Pivoted block brake; Internal expanding brake; Band brake of vehicle; Raking of vehicle; Absorption Dynamometers; Transmission dynamometers - General description and method of operation.

(06 Hours)

Unit – III

Turning Moment Diagram and Flywheels: Turning moment diagram for two-stroke and four-stroke engine; Fluctuation of energy; Fly wheels; Coefficient of fluctuation of speed; Energy stored in flywheel; Dimensions of flywheel rim and their design.

(07 Hours)

Unit – IV

Governors: Centrifugal governors - Watt governor; Porter governor; Proell governor; Spring loaded governors - Hartnell governor; Hartung governor with auxiliary springs; Properties of governors - Sensitiveness; Isochronisms and Hunting. **(08 Hours)**

Unit – V

Balancing of Rotating Masses: Balancing of single mass rotating in same plane and different planes; Balancing of several masses rotating in same plane; Balancing of multiple masses rotating in different planes. **(07 Hours)**

Unit – VI

Balancing of Reciprocating Masses: Primary; Secondary; and higher balancing of reciprocating masses; Unbalanced forces and couples; Examination of multi cylinder in line and radial engines for primary and secondary balancing; locomotive balancing – Hammer blow; Swaying couple; Balancing of radial and V-engines. **(07 Hours)**

Recommended Books:

1. Theory of Mechanisms and Machines: Amitabha Ghosh and Ashok Kumar Malik; Third Edition Affiliated East-West Press.
2. Theory of Machines and Mechanisms: Joseph Edward Shigley and John Joseph Uicker; Jr. Second Edition; McGraw Hill.
3. Theory of Machines; Thomas Bevan; 3rd Ed.; CBS Publishers.
4. Theory of Machines; Jagdish Lal.
5. Theory and Machines: S.S. Rattan; Tata McGraw Hill.
6. Mechanism and Machine Theory: J. S. Rao and R.V. Duggipati Second Edition New age International.
7. Kinematics and Dynamics of Machines; Martin; G. H.; 3rd Ed.; McGraw Hill.
8. Mechanics of Machines: Elementary Theory and Examples; J. Hannah and R. C. Stephens; 4th Ed.; Viva Books.

School of Engineering (Mechanical Engineering)- ME 206

Degree	Course Name	Course Code	Marks:100
Integrated B. Tech. + M. Tech. / M.B.A.	Applied Thermodynamics	ME 206	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
IV	3	2-1-0	3 Hours

Unit - I

Fuels and Combustion: Classifications of fuels; Combustion in boiler and IC engines; Stoichimetric (or chemically correct) air fuel ratio; Analysis of products of combustion; Conversion of volumetric analysis into gravimetric analysis and vise-versa; Actual weight of air supplied; Use of moles for solution of combustion problems.

(04 Hours)

Unit - II

Properties of Steam and Steam Generators: Pure substance constant pressure formation of steam; Steam tables; Steam generators classification; Fire and water tube boilers; Description of cochran; Locomotive; Lancashire; Babcock and Wilcox boilers; Stirling boiler; Mountings and accessories; Economizer; Super heater etc; Modern high pressure boilers; Characteristics of high pressure boilers; Advantages of forced circulation; Steam accumulators; Boiler performance-equivalent evaporation; Boiler efficiency.

(06 Hours)

Unit - III

Vapour Power Cycles: Simple Rankine cycle; Methods of improving efficiency; Feed water heating (Bleeding); Reheat cycle; Combined reheat regenerative cycle; Ideal working fluid – binary vapour cycle; Combined power and heating cycles.

(03 Hours)

Unit - IV

Nozzles: Types and utility of nozzles; Flow of steam through nozzles; Critical pressure and discharge; Area of throat and exit for maximum discharge; Effect of friction; Nozzle efficiency; Supersaturated flow. **(03 Hours)**

Unit - V

Steam Turbines: Impulse Steam Turbines; General description; Pressure and velocity compounding; Velocity diagram and work done; Effect of blade friction on velocity diagram; Stage efficiency and overall efficiency; Reheat factor and condition curve.

Reaction Turbines: Degree of reaction; Velocity diagrams; Blade efficiency and its derivation; Calculation of blade height; Back pressure and extraction turbines and cogeneration; Economic assessment; Methods of attachment of blades to turbine rotor; Losses in steam turbines; Governing of steam turbines; Labyrinth packing. **(08 Hours)**

Unit - VI

Condensers and Compressors: Different types; Dalton's law to condenser problems; Condenser and vacuum efficiencies; Cooling water calculations; Effect of air leakage; Methods to check and prevent air infiltration; Air compressor: stages of compression and efficiency. **(06 Hours)**

Recommended Books:

1. Basic and Applied Thermodynamics by Dr. P. K. Nag; Tata McGraw Hill.
2. Heat Engineering by Dr Vasandani and Dr D. S. Kumar; Metropolitan Book Co. Pvt. Ltd.; Delhi.
3. Thermal Engineering by P.L. Ballaney; Khanna Publishers; Delhi.
4. Engineering Thermodynamics: Work and Heat Transfer by Rogers and Mayhew; ELBS Publications.
5. Thermodynamics and Heat Engines Vol. I and II by R Yadav; Central Publishers; Allahabad.
6. Steam Turbine Theory and Practice by WAJ Keartan; ELBS Series.

School of Engineering (Mechanical Engineering)- ME 208

Degree	Course Name	Course Code	Marks:100
Integrated B. Tech. + M. Tech. / M.B.A.	Fluid Mechanics	ME 208	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
IV	3	3-1-0	3 Hours

Unit - I

Fluid Properties and Statics: Continuum concept; Properties of fluids; Newtonian and non Newtonian fluids; Pascal's Law; Hydraulic pressure; Pressure measurement; Manometer and micro-manometer; Pressure gauge; Forces on plane and curved surfaces; Centre of pressure; Equilibrium of submerged and floating bodies; Buoyancy; Meta-centric height; Fluid subjected to constant linear acceleration and to constant rotation. **(08 Hours)**

Unit - II

Kinematics of Fluid: Types of flow; Lagrangian and Eulerian approach; Path line; Streak line and stream line; Stream tube; Stream function and potential function; Flownet; Deformation of fluid elements; Vorticity and circulation.

(07 Hours)

Unit - III

Fluid Dynamics and its applications: Conservation equation of mass; Conservation equation of momentum and energy; Navier-Stokes; Euler and Bernaulli Equation; Reynolds transport theorem; Forces due to fluid flow over flat plates; Curved vanes and in the bends; Pitot tube; Venturi meter and orifice meters; Orifice and mouthpieces; Notches and weirs; Rotameter and other devices. **(08 Hours)**

Unit – IV

Dimensional Analysis and Similitude: Basic and Derived quantities; Similitude and dimensional analysis; Rayleigh's method; Buckingham π method; Non-dimensional parameters and model testing. **(07 Hours)**

Unit – V

Ideal Fluid Flow: Ideal flow identities; Flow over half body; Rankine Oval; Stationary and rotating cylinders; Magnus effect; D'Alembert's paradox.

(07 Hours)

Unit - VI

In-compressible Flow: Reynold's Experiment; Laminar and turbulent flow; Darcy equation; Poiseuille flow; Couette flow; Hagen-Poiseuille flow; Friction factor and Moody's diagram; Flow through pipes; Losses in pipes and fittings; HGL and TEL; Aerofoil; Lift and drag; Flow separation. **(08 Hours)**

Recommended Books:

1. Fluid Mechanics; F. M. White; Mc Graw-Hill Publications.
2. Fundamental of Fluid Mechanics; B. R. Munson; D. F. Young and T. H. Okishi; Wiley India.
3. Foundation of Fluid Mechanics; Yuan; Prentice-Hall Publications.
4. Fluid Mechanics and Machines; S. K. Som; Tata McGraw Hill.
5. Fluid Mechanics; W. Streeter and Bedford; McGraw Hills Publications.

School of Engineering (Mechanical Engineering)- ME 210

Degree	Course Name	Course Code	Marks:100
Integrated B. Tech. + M. Tech. / M.B.A.	Engg. Measurements & Instrumentation	ME 210	SM+MT+ET 25+25+50
Semester	Credits	L-T-P	Exam.
IV	2	2-0-0	3 Hours

Unit - I

Generalized Measurement Systems: Introduction; Description of Stages in Measurements; Types of input to measuring instruments and instrument system; Classification of measuring instruments; Types of error; Types of uncertainties; Propagation of uncertainties in compound quantity; Static performance parameters: Accuracy; Precision; Resolution; Static sensitivity; Linearity; Hysteresis; Dead band; Backlash and drift.; Sources of error; Selection of a measuring instruments; Mechanical and electrical loading; Fundamentals dynamic characteristics; Generalized mathematical model of measuring systems. **(06 Hours)**

Unit - II

Measurement of Mechanical quantities: Force; Torque and pressure standards; Stresses and strains, Measuring methods; Comparative study of different types of forces and torque measuring systems; Description and working principle of different types of Transducers for measuring pressure; Measurements of high pressure and low pressure; Calibration method. **(05 Hours)**

Unit - III

Measurement of Flow: Introduction; Principle of operation of various obstruction meters for compressible and incompressible fluid flow measurement; Variable area meter and other important flow meters and visualization methods.

Measurement of Strain: Electric resistance strain gauges; Gauge construction and installation, Temperature compensation, Gauge sensitivities, Gauge factor, Corrections for transverse strain effects, Factors affecting gauge relation, Rosettes, Potentiometer and Wheatstone's bridge circuits for strain measurements.

(06 Hours)

Unit - IV

Measurement of Temperature: Measurements of low and medium temperatures pyrometers; Temperature indicators; Problems in temperature measurement.

Measurement of Humidity: Introduction; Different types of transducers for measurement of humidity; Their performance characteristics and limitations.

(05 Hours)

Unit - V

Measurement of Speed and Vibration: Velocity Acceleration; Speedometers; velocity measurement; Accelerometers; Encoders; calibration and uses; Different pick-ups and their limitations; Measurement of Radio-isotopes; Measurement of Radio activity.

(05 Hours)

Unit - VI

DAS and Signal Analysis: Data acquisition system via computers; The components of Data acquisition system; DAS Hardware; Selection criteria for choosing a DAS; Techniques for signal analysis.

(03 Hours)

Recommended Books:

1. Mechanical Measurement by Beckwith and Buck; Edn. 1965; Addison Wesley Publishing Co. Inc. London.
2. Measurement systems; Application and Design by Doebelin; Edn. 1976; Publisher Tata McGraw Hill.
3. Engineering Measurements and Instrumentation by Adams L.F. (Edition 1975; London English University Press.
4. Instrumentation Measurement and Analysis by B.C. Nakra; K.K. Choudhary; Edn. 1985; Publisher Tata McGraw Hill; New Delhi.
5. Automation; Production system & Computer Integrated Manufacturing by Mikell. P. Groover; 2nd edition 2001; Person Education Asia.
6. Instrumentation Devices and Systems By Rangan; Sharma; Tata McGraw Hill.
7. Data Acquisition & Signal Analysis By Beauchamp and George; Allen Yuen and Unwin Ltd.