GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3141901

Semester IV
MECHANICAL MEASUREMENT AND METROLOGY

Type of course: Basic Science

Prerequisite: Nil

Rationale:
Measurement and Metrology deals with the application of science in Mechanical Engineering. It provides a means of assessing the suitability of measuring instruments, their calibration, and the quality control of manufactured products.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

Content:

Sr. No.	Content	Hrs
1	**Introduction to Metrology, Linear and Angular Measurement:** Definition, objectives and concept of metrology, Need of inspection, Principles, process, methods of measurement, Classification and selection of measuring instruments and systems. Accuracy, precision and errors in measurement. System of measurement, Material Standard, Wavelength Standards, Subdivision of standards, Line and End standards, Classification of standards and Traceability, calibration of End bars, standardization. Slip gauges- Indian standards on slip gauge, method of selection of slip gauge, stack of slip gauge, adjustable slip gauge, wringing of slip gauge, care of slip gauge, slip gauge accessories, problems on building of slip gauges (M87, M112). Measurement of angles- sine bar, sine center, angle gauges, optical instruments for angular measurements, Auto collimator-applications for measuring straightness and squareness.	12
2	**System of Limits, Fits, Tolerance and Gauging:** Definition of tolerance, Specification in assembly, Principle of interchangeability and selective assembly, limits of size, Indian standards, concept of limits of size and tolerances, definition of fits, hole basis system, shaft basis system, types of fits and their designation (IS 919-1963), geometric tolerance, position-tolerances. Classification of gauges, brief concept of design of gauges (Taylor's principles), Wear allowance on	12

	gauges, Types of gauges-plain plug gauge, ring gauge, snap gauge, limit gauge and gauge materials. **Comparators:** Functional requirements, classification, mechanical- Johnson Mikrokator, sigma comparators, dial indicator, electrical- principles, , LVDT, Pneumatic- back pressure gauges, Solex comparators and optical comparators- Zeiss ultra-optimeter.	
3	**Measurement of screw thread and gear:** Terminology of screw threads, measurement of major diameter, minor diameter, pitch, angle and effective diameter of screw threads by 2-wire and 3- wire methods, best size wire. Screw thread gauges, Tool maker's microscope. Gear tooth terminology, tooth thickness measurement using constant chord method, addendum comparator method and base tangent method, measurement of pitch, concentricity, run out, and involute profile. Gear roll tester for composite error.	10
4	**Measurement systems and basic concepts of measurement methods:** Definition, significance of measurement, generalized measurement system, definitions and concept of accuracy, precision, calibration, threshold, sensitivity, hysteresis, repeatability, linearity, loading effect, system response-time delay. Errors in measurement, classification of errors. Transducers, transfer efficiency, primary and secondary transducers, electrical, mechanical, electronic transducers, advantages of each type transducers. **Intermediate modifying and terminating devices:** Mechanical systems, inherent problems, electrical intermediate modifying devices, input circuitry, ballast circuit, electronic amplifiers. Terminating devices, Cathode ray oscilloscope, Oscillographs. **Advances in metrology:** Basic concepts of lasers, advantages of lasers, laser interferometers, types, applications. Basic concepts of Coordinate Measuring Machines constructional features, applications.	12
5	**Force, Torque, Pressure, Strain and temperature Measurement:** Direct methods and indirect method, force measuring instruments Torque measuring instruments, Types of dynamometers, Absorption dynamometer, Prony brake and rope brake dynamometer, and power measuring instruments. Pressure measurement, principle, pitot tube, pressure gauges, pressure transducers, use of elastic members, Bridgeman gauge, McLeod gauge, Pirani gauge. Theory of strain gauges, types, electrical resistance strain gauge, preparation and mounting of strain gauges, gauge factor, methods of strain measurement. Temperature Compensation, Wheatstone bridge circuit, orientation of strain gauges for force and torque, Strain gauge based load cells and torque sensors. Resistance thermometers, thermocouple, law of thermocouple, materials used for construction, pyrometer, optical pyrometer.	14

w.e.f. AY 2018-19

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Bachelor of Engineering
Subject Code: 3141901

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	10	35	0	40	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Engineering Metrology and Measurements, Bentley, Pearson Education
2. Metrology and Measurement, Anand Bewoor & Vinay Kulkarni McGraw-Hill
3. Mechanical Measurements and Instrumentations, Er. R K Rajput, Kataria Publication(KATSON)
4. Mechanical Measurement and Metrology by R K Jain, Khanna Publisher Mechanical Measurement & Control by D.S. Kumar.
5. Industrial Instrumentation & Control by S K Singh, McGrawHill
6. Engineering Metrology and Measurement, N V Raghavendra and Krishnamurthy, Oxford University Press

Course Outcomes:

Students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	summarize various methods and terms used in mechanical measurements and metrology.	10
CO-2	measure mechanical quantities like Force, Temperature, Pressure, Velocity, Acceleration, Strain and Torque.	40
CO-3	apply concepts of metrology for gears, threads and surface finish.	35
CO-4	utilize various precision machines working based on Laser technology and coordinate measuring methods.	15

List of Experiments:

1. Basic understanding of measurements and metrology: concepts, application, advantage and future aspects
2. Performance on linear and angular measurements and check different characteristics of measurements
3. Performance on temperature measurements and check different characteristics of measurements and also do calibration
4. Performance on pressure measurements and check different characteristics of measurements and also do calibration

5. Performance on stress, strain and force measurements and check different characteristics of measurements and also do calibration
6. Performance on Speed/Velocity, acceleration measurements.
7. Performance on surface measurements.
8. Performance on measurements of gears and screw threads.

Major Equipment:

1. Temperature and pressure Measurements Equipments/Devices/Sensors.
2. Stress/Strain/Force Measurements Equipments/Devices/Sensors.
3. Surface Measurements Equipments/Devices/Sensors
4. Linear/Angular Measurements Equipments/Devices/Sensors
5. Resistive Potentiometer, Tachometers, Piezoelectric Accelerometer
6. Gears/Screw Threads Measurements Equipments/Devices/Sensors
7. Miscellaneous measurements equipments

List of Open Source Software/learning website:

1. http://nptel.ac.in/courses/112106138

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GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3141906
Semester – IV
Subject Name: Fluid Mechanics and Hydraulics Machines

Type of course: Fundamental

Prerequisite: Nil

Rationale: This course imparts fundamental knowledge regarding fluid, types, properties and basic governing equations in static and moving conditions. The course also provides the basic technical knowledge related to various fluid machines used in the practice.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

Content:

Sr. No.	Course Content	Total Hours
1	**Fluids and Their Properties:** Fluid classifications, hypothesis of continuum, shear stress in a moving fluid, molecular structure of material, density, viscosity, surface tension, capillary effect, vapor pressure, compressibility and the bulk modulus, pressure, Pascal's law of pressure at a point, variation of pressure vertically in a fluid under gravity, equality of pressure at the same level in a static fluid, general equation for the variation of pressure due to gravity from a point to point in a static fluid, pressure and head, hydrostatic paradox	8
2	**Static Forces on Surface and Buoyancy:** Fluid static, action of fluid pressure on surface, resultant force and center of pressure on a plane surface under uniform pressure and surface immersed in a liquid, pressure diagrams, forces on a curved surface due to hydrostatic pressure, buoyancy, equilibrium of floating bodies, stability of a submerged body and floating bodies, determination of the metacentric height, determination of the position of the metacenter relative to the center of buoyancy	8
3	**Motion of Fluid Particles and Streams:** Fluid flow, different types of flow, frames of reference, analyzing fluid flow, motion of a fluid particle, acceleration of a fluid particle, discharge and mean velocity, continuity of flow, continuity equations for 2-D and 3-D flow in Cartesian coordinates of system, rotational and irrotational flow, circulation and vorticity, streamlines and the stream functions, velocity potential and potential flow, relation between stream function and velocity potential, stream function and velocity potential for uniform flow, vortex flow	6
4	**The Energy Equation and its Application:** Momentum and fluid flow, Momentum equation for 2-D flow along a stream line, momentum correction factor, Euler's equation of motion along a stream line, mechanical energy of a flowing fluid, Bernoulli's theorem, kinetic energy correction factor, changes of pressure in tapering pipe, principle of venturimeter, orifice, rotameter, theory of notches and weirs	6
5	**Dimensional Analysis and Similarities:** Dimension reasoning, dimensional homogeneity, dimensional analysis using Rayleigh's method, Buckingham π-theorem, use of dimensionless	4

	numbers in experimental investigation, geometric similarity, dynamic similarity, kinematic similarity, model testing, model laws, undistorted and distorted models	
6	**Viscous and Turbulent Flow:** Reynolds' experiment, flow of viscous fluid through circular pipe-Hagen Poiseuille formula, flow of viscous fluid between two parallel fixed plates, power absorbed in viscous flow through - journal, foot step and collar bearing, turbulent flow expression for coefficient of friction -Darchy Weishbach equation, moody diagram, resistance of smooth and rough pipes, shear stress and velocity distribution in turbulent flow through pipes	6
7	**Flow through pipes**: Major and minor energy losses, hydraulic gradient and total energy lines, pipes in series and parallel, equivalent pipes, water hammer in pipes	4
8	**Impact of Jet and Hydraulic Turbines:** Force exerted on stationary flat and curved plates held normal, force exerted on moving plate held normal and on a plate when vane is moving in direction of jet, jet striking on curved vane tangentially at one tip and leaving at other end, classification of hydraulic turbines, impulse and reaction turbines, construction, working and analysis of Pelton, Francis and Kaplan turbines, draft tube, governing of the hydraulic turbines, cavitations, performance characteristics	10
9	**Centrifugal Pumps:** Pump classification and selection criterion, velocity vector diagrams, pump losses and efficiencies, net positive suction head, pressure rise in impeller, characteristic curves, priming	6
10	**Hydraulic Machines:** Hydraulic press, hydraulic accumulator, hydraulic intensifier, hydraulic crane, hydraulic jack, hydraulic lift, hydraulic ram, fluid couplings, fluid torque converter and air lift pump	2

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	25	25	20	5	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:
1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, S. K. Kataria & Sons
2. Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Laxmi Prakashan
3. Fluid Mechanics and Hydraulic Machines by R.K. Rajput, S.Chand & Co.
4. Theory and Applications of Fluid Mechanics by K. Subramanya, McGraw Education
5. Fluid Mechanics by Frank .M. White, McGraw Hill Education
6. Mechanics of Fluids by Shames, McGraw Hill Education

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Bachelor of Engineering
Subject Code: 3141906

Course Outcomes:

Students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	explain various fluid properties and behavior of fluid in static and dynamic mode.	30
CO-2	make use of dimensional analysis and interpret types of fluid flow.	15
CO-3	analyze theory of impact of jet and apply the same for hydraulic turbine.	20
CO-4	evaluate performance of centrifugal pumps	15

List of Experiments:
1. Verification of Bernoulli's theorem
2. To determine metacentric height by metacentric height apparatus.
3. To measure the velocity of flow using orifice meter and venturimeter.
4. To determine the coefficient of discharge through open channel flow over a notch.
5. To determine the different types of flow patterns by Reynolds' experiment.
6. To determine the friction factor for the different pipes.
7. To determine the loss coefficients for different pipe fittings.
8. To verify Impulse-momentum principle for impact of jet on stationary vane.
9. Performance test on Pelton turbine.
10. Performance test on Kaplan turbine.
11. Performance test on Francis turbine.
12. Performance test on centrifugal pump.

Major Equipment: Flow measuring devices and arrangements, Reynolds' apparatus, metacentric height apparatus, impact of jet apparatus, test rigs of Pelton, Francis and Kaplan turbine, test rigs of centrifugal pump and hydraulic ram

List of Open Source Software/learning website: http://nptel.ac.in/, http://www.nfpa.com/

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3141907
Semester – IV
FUNDAMENTAL OF MACHINE DESIGN

Type of course: Professional Core

Prerequisite: None**.**

Rationale: The course aims to impart basic skills of force and stress analysis for design of machine elements.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	**Basics of stress and strain**: 3 -D state of stress (Concept only) Normal/axial stresses: Tensile & compressive Stresses: Shear and complementary shear Strains: Linear, shear, lateral, thermal and volumetric. Hooke's law, Elastic Constants: Modulus of elasticity, Poisson's ratio, Modulus of rigidity and bulk modulus and relations between them with derivation.	07
2	**Moment of inertia of planar cross -sections:** Derivation of equation of moment of inertia of standard lamina using first principle, Parallel & perpendicular axes theorems, polar moment of inertia,	04
3	**Flexural stresses** – Theory of simple bending, Assumptions, derivation of equation of bending, neutral axis, determination of bending stresses, section modulus of rectangular & circular (solid & hollow), I,T, Angle, channel sections	04
4	**Torsion:** Derivation of equation of torsion, Assumptions, application of theory of torsion equation to solid & hollow circular shaft, torsional rigidity	03
5	**Introduction to Machine Design**: Design procedure, Selection of preferred sizes, Aesthetic and Ergonomic considerations in Design, Manufacturing considerations in Design, Mechanical Properties of Materials, Effect of Alloying elements and heat treatment on properties of steels, Materials Selection in Machine Design, Standardization	06
6	**Design Against Static Load**: Concepts of stresses and Strain, Combinations of Axial, Shear, Torsional and Bending loads; Theories of Failures: Distortion energy (von Mises), Maximum-Shear stress, Maximum Principal stress, Selection and Use of theories of failures; Factor of safety, Contact stresses, Crushing and Bearing stress. Application Problems: Eccentric Loading; Cotter and Knuckle Joints; Design and analysis of levers: Cranked, Bell crank, Foot, Rocker arm.	10
7	**Beams and Columns:** Different types of supports / end conditions, Revision of Stresses in beams: Effect of Section, Orientation, and type of loading; Deflection of beams for different loading conditions. Compressive axial loading of columns and struts, Slenderness	06

	ratio, Compressive stress and Buckling of members, Effect of end conditions; Euler's Formula, Applications, validity and limitations; Rankine's Formula, stresses in curved beam	
8	**Shafts and Keys:** Design of solid and hollow circular shaft subjected to torque and combined loading for rigidity and stiffness; Design of Keys and splines.	05
9	**Power Screws and Threaded Joints:** Forms of thread, Single and Multiple threaded screw, Terminology of power screw, Torque requirement of lifting/lowering, Self-locking, Efficiency of threads, coefficient of friction, design of screw and nut. Basic types of screw fastening, Cap and Set screw, Bolt of Uniform strength, locking devices, Terminology of Screw thread, Bolted Joint: Simple and Eccentric loading, Torque requirement for bolt tightening.	09
10	**Design Against Fluctuating Loads:** Stress Concentration, Endurance limit and Fatigue failure, Factors affecting endurance limit, S-N Diagram, Design for reversed stresses and cumulative damage, Fluctuating stresses: Soderberg, Gerber, Goodman and Modified Goodman criteria, Combined stresses	06

Reference Books:

1. Design of Machine Elements, V B Bhandari, 3/e, McGraw Hill.
2. A Textbook of Machine Design, P C Sharma and D K Aggarwal,S K Kataria & sons.
3. Shigley's Mechanical Engineering Design, R G Budnyas, J K Nisbett, McGraw Hill.
4. Fundamentals of Machine Component Design, R C Juvinall, 4/e, Wiley.
5. Machine Design: An Integrated Approach, R L Norton, Pearson
6. Strength of Materials, Part I & II, S Timoshenko, CBS publishers and distributers Pvt. Ltd.
7. Strength of Materials, Bansal R K, Laxmi publication.
8. Strength of Materials, Patnaik S, Hopkins D, Elsevier.
9. Engineering Mechanics, Bansal R K, Laxmi Publication.

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	15	10	40	15	-

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Course Outcome:

After learning the course the students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	understand fundamentals of material selection, strength of materials and loading patterns of machine elements.	20
CO-2	distinguish basic failure modes of machine elements.	15
CO-3	analyse beams and columns for stresses and deflection.	10

CO-4	design and analyse machine components under static loading.	40
CO-5	design and analyze machine components under variable loading.	15

List of Experiments:

Practical should be designed to include followings:

1. Detail and assembly of mechanism/machine.
2. Problems related to fundamentals of design (chapter no. 1 to 4)
3. Design and drawing of Joints and levers.
4. Design and drawing of screw jacks (Bottle neck and Toggle).
5. Design of machine components under fluctuates loading.
6. Case study for design of mechanical components.
7. 2D drawing of machine components using computer software.

Major Equipment:

1. Computational facility.
2. CAD Software like Fusion 360

List of Open Source Software/learning website:

1. http://nptel.ac.in
2. http://help.autodesk.com/view/fusion360/ENU/

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3141908
Semester – IV
Subject Name: Manufacturing Processes

Type of course: Engineering

Prerequisite: Zeal to learn the subject

Rationale: Manufacturing processes related to machining are included in this subject. All conventional manufacturing machines are included in this course to understand the basic concepts in machining science.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	5	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Basic Machine Tools and Metal Cutting Principles: Machine tools classification, working and auxiliary motions in machine tools, Primary cutting motions in machines tools, Cutting tool geometry and tool signature, cutting forces and power requirement in machining	4
2	Metal Cutting Lathes: Engine Lathes, construction all arrangement and principal units of engine lathes, type and size range of engine lathes, Operations carried on engine lathe , attachment extending the processing capacities of engine lathes, Types of lathe machines, Capstan and Turret lathes, Taper turning on lathe, Thread cutting on lathe using gear train and chasing dial, Alignment tests of lathes	10
3	Drilling Machines: Purpose and field of application of drilling machines, Types of drilling machines, Drilling and allied operation: drilling, boring, reaming, tapping, counter sinking, counter boring, spot facing; deep hole drilling, alignment tests of drilling machine.	6
4	Boring Machine: Purpose and filed of application, Horizontal boring machines, Precision boring machines.	3
5	Milling Machines: Purpose and types of milling machines, general purpose milling machines, different types of milling operations, milling cutters, attachments extending the processing capabilities of general purpose milling machines, Indexing, Helical milling operation and its set up, Alignment tests of milling machine.	8
6	Planers, Shapers and Slotters: Classification of planers, Shapers and Slotters, Attachments extending the processing capacities of planers, Shapers and Slotters, machine and tooling requirements	5
7	Sawing and Broaching Machines: Metal sawing classification: reciprocating sawing machines, circular sawing machines, band sawing machines, Types of broaching machines,	3

		advantage and limitations of broaching.	
8		Grinding Machines and Abrasives: Classification of grinding machines, cylindrical grinders, internal grinders, Surface grinders, tool and cutter grinders, center less grinders, Types of grinding wheels, wheel characteristics and wheel selection.	**6**

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	**25**	**25**	**10**	**15**	**5**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Workshop Technology Vol. I, II & III, WAJ Chapman.
2. Workshop Technology Vol. II, Hajra & Choudhari.
3. Manufacturing Processes, O.P. Khanna.
4. Production Technology, R. K. Jain.
5. Processes and Materials of Manufacture; Lindberg Roy A.; Prentice-Hall India.
6. Principles of Manufacturing Materials and Process, J S Campbell.

Course Outcomes:

Students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Understand the basic concept of machining operations	20
CO-2	Analyze conventional machining processes.	30
CO-3	Study, understand and generate the sequence of machining operation to produce the end product.	30

CO-4	Judge the limitations and scope of machines to perform variety of operations.	20

Term Work:

Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.

List of Experiments:

1. Study of Machine Tools (Lathe, Shaper, Slotter, Planner) – study the types of cutting tools available and relative motions between cutting tool and work piece on each machine tool. Also derive capacity and capability of respective machine tools from machine specifications and number of available attachments to perform variety of operations.
2. Study of Machine Tools (Grinding, Milling, Drilling) – study the types of cutting tools available and relative motions between cutting tool and work piece on each machine tool. Also derive capacity and capability of respective machine tools from machine specifications and number of available attachments to perform variety of operations.
3. Job making on lathe machine
4. Job making on shaper / slotter machine
5. Job making on milling machine
6. Job making on Drilling machine
7. Job making on Grinding machine
8. Alignment test on lathe machine / any other machine

Major Equipment:

All conventional machine tools such lathe, milling, shaper, slotter, drilling machine, grinder, etc.

List of Open Source Software/learning website:

https://nptel.ac.in/courses/112107145/14

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3141909
Semester – IV
Subject Name: Organisational Behaviour

Type of course:

Prerequisite: Nil

Rationale:
Organizational Behavior deals with the application of management skills applied to individual as well as group of persons. It also helps in team work and understanding group dynamics and leads to leadership and motivation.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	**Focus and Purpose:** Definition, need and importance of organizational behavior, Nature and scope, Frame work, OB model	03
2	**Individual Behaviour:** Attitudes: Characteristics, Components, Formation, Measurement, barriers to change attitude. Perception: Meaning and concept of perception, factors influencing perception, Motivation: Importance, Types, Theories of Motivation, Effects on work behaviour. Personality and value: Types, Factors influencing personality, Theories, Learning, Types of learners, The learning process, Learning theories, Organizational behaviour modification. Misbehaviour: Types, Management Intervention. Emotions: Emotional Labour, Emotional Intelligence, Theories. Impression management, Individual decision making techniques	14
3	**Group Behaviour:** Organization structure, Formation, Groups in organizations, Influence, Group dynamics, Group decision making techniques, Team building, Communication, Control, Johari Window	08
4	**Leadership and Power:** Meaning, Importance, Leadership styles, Behavioural Theories, Fiedler model, LMX theory and Path Goal theory, Leaders vs Managers, Sources of power, Power centers, Power and Politics.	07
5	**Dynamics of Organizational Behaviour:** Organizational culture and climate, Factors affecting organizational climate, Importance, Job satisfaction, Determinants, Measurements, Influence on behaviour, Stress, Work Stressors, Prevention and Management of stress, Balancing work and Life, Kurt Lewin's–three step model, methods for implementing organizational change.	10

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	25	25	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:
1. Stephen P. Robins, Organizational Behavior, / Pearson Education
2. Udai Pareek, Understanding Organizational Behaviour, Oxford Higher Education
3. Margi Parikh and Rajan Gupta, Organizational Behaviour, McGraw Hill Education
4. Fred Luthans, Organizational Behavior, McGraw Hill
5. Schermerhorn, Hunt and Osborn, Organizational behavior, John Wiley
6. Mc Shane & Von Glinov, Organizational Behaviour, McGraw Hill
7. Hellrigal, Slocum and Woodman, Organizational Behavior, Cengage Learning
8. Ivancevich, Konopaske & Maheson, Organizational Behaviour & Management, McGraw Hill

Course Outcomes:
After learning the course

Sr. No.	CO statement	Marks % weightage
CO-1	Students will be able to understand various methods and terms used different organizational behaviour model	15
CO-2	Students will be able to understand Individual Behaviour like attitude, perception, motivation, personality, misbehaviour and emotions.	30
CO-3	Students will be able to understand group behaviour, leadership and power	35
CO-4	Students will be able to understand dynamics of organizational behaviour and managing change.	20

List of Open Source Software/learning website:
Industry visit, Management games to understand Individual behaviour and group behaviour, also games for leadership development.