GOVERNMENT POLYTECHNIC GARIYABAND

GARIYABAND (C.G.)

LESSON PLAN

SESSION – JAN-JUNE 2025

NAME OF FACULTY : Prakash Vibhor Baghel
COURSE :- Diploma in Engineering
SUBJECT:- Engineering Metrology

DESIGNATION : Lecturer (Mechanical)
DEPARTMENT : Mechanical Engineering
COURSE CODE : 2037475(037) **SEMESTER :** IV

SESSION STARTS FROM : 01/02/2025 **TOTAL CLASS PER WEEK:-** 03

Unit No.	Lecture No.	Topics to be covered	Planned Date	Execution Date	Remark
1	1	**Unit-1.0 Introduction** 1.1 Inspection, its objective and purpose, types of inspection – raw material inspection, in process inspection, final inspection, Methods of Inspection - centralized and decentralized inspection, their advantages, disadvantages and applications, Inspection report.	04/02/2025	04/02/25	
	2	1.2 Metrology: Correlation of inspection and metrology, definition of metrology and its importance in industrial inspection, meaning of specification, Interchangeability and selective assembly,	06/02/2025	06/02/25	
	3	Tutorial class	07/02/2025	07/02/25	
	4	1.3 Accuracy and Precision, their need in industrial measurement, relationship between cost and accuracy, Errors – systematic and random	11/02/2025	13/02/25	
	5	1.4 Elements of measuring systems – standard, work piece, instruments, person and environment, Standard, its importance material standard and wavelength standard, classification of standards – primary, secondary, tertiary and working standards.	13/02/2025	14/02/25	
	6	Tutorial class	14/02/2025	18/02/25	
2	7	**Unit-2.0 Linear Measurement** 2.1 Standards of length – Line and End standards, their characteristics and applications, Datum planes in dimension measurement – Surface plate, V-block.	18/02/2025	20/02/25	
	8	2.2 Classification of linear measurement instruments – direct and indirect with examples, Direct measuring instruments: i Vernier caliper, ii Micrometer – outside, inside and depth construction working, handling, specifications, applications, precautions and errors of each	20/02/2025	21/02/25	
	9	iii Vernier height gauge iv Depth gauge construction working, handling, specifications, applications, precautions and errors of each 2.3 Indirect measuring instruments: Telescopic gauges, small hole gauges –their construction, working, specifications, applications, precautions and errors.	21/02/2025	25/02/25	
	10	Tutorial cass	25/02/2025	28/02/25	
	11	2.4 Dial Gauge: classification as per IS: 2092-1962, schematic diagram, function of parts, working principle, accuracy, applications and precautions. 2.5 Slip gauge – Classification as per IS: 2984-1966, their accuracy, applications,	27/02/2025	04/03/25	
	12	selection of gauge blocks, wringing, handling and precautions.	28/02/2025	06/03/25	
	13	Tutorial cass	04/03/2025	07/03/25	

HOD
Department of Mechanical Engg.
Govt. Polytechnic Gariyaband (C.G.)

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3	14	**Unit-3.0 Angular measurements**3.1 Need for angle measurement, Direct angle measurement: i Optical Bevel Protractor (construction, working, handling, specifications, applications, precautions.)	06/03/2025	11/03/25	
	15	ii Universal Bevel protractor (construction, working, handling, specifications, applications, precautions.)	07/03/2025	13/03/25	
	16	Tutorial cass	11/03/2025	18/03/25	
	17	3.2 Indirect angle measurement: i Angle gauges – sets , handling, method of combining, selection of angle gauge blocks for a given angle.	13/03/2025	21/03/25	
	18	ii Sine bar – working principle, types as per IS:5979-1970, specifications, handling, measuring known and unknown angles. iii Spirit level – working principle, sensitivity and factors affecting it, handling, applications .	18/03/2025	27/03/25	
	19	Tutorial cass	20/03/2025	28/03/25	
	20	iv Autocollimator – working principle, construction, handling, applications.	21/03/2025		
	21	v Angle Dekkor – working principle, construction, handling, applications.	27/03/2025		
	22	Tutorial cass	28/03/2025		
4	23	**Unit 4.0 Measurement of Geometric Tolerances and Surface Roughness** 4.1 Concept of straightness, flatness, squareness and roundness, importance of their measurement. 4.2 Measurement of Straightness: Straight edge method (Light gap and feeler gauge method), Wedge method, Precision level method and Autocollimator method Their principle, instruments required for each method, precautions, limitations, applicability i.e., type of job/situation where each of methods is suitable and accuracy of each method.	03/04/2025		
	24	4.3 Measurement of flatness: High spot method, Precision level method, Autocollimator method Their principle, instruments required for each method, precautions, limitations, applicability i.e., type of job/situation where each of methods is suitable and accuracy of each method. 4.4 Measurement of Squareness: Indicator method, Engineer's square tester, Autocollimator method Their principle, instruments required for each, method, precautions, limitations, applicability i.e., type of job/situation where each of methods is suitable and accuracy of each method.	04/04/2025		
	25	Tutorial cass	08/04/2025		

HOD
Department of Mechanical Engg.
Govt. Polytechnic Gariyaband (C.G.)

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4	26	4.5 Measurement of Roundness: V block and Dial indicator method, principle, instruments required, precautions, and limitations. 4.6 Assessment of surface roughness: i Terminology associated with assessment of surface roughness (as per IS: 3073 – 1967) – Surface roughness, primary texture (roughness), secondary texture (waviness), real surface, geometrical surface, effective surface, real profile, geometrical profile, effective profile, reference line, lay, traversing length, sampling length, spacing of irregularities, mean line of profile, centre line of profile. ii 'M' and 'E' system of assessment of surface roughness, their merits and demerits, reasons for adoption of 'M' system,	11/04/2025		
	27	iii Basic units of indicating surface roughness – C.L.A. value, R.M.S. value, ten point height of irregularity, their graphical and mathematical interpretation iv Measurement of surface roughness (a) Comparison method - touch inspection, visual inspection, scratch inspection, microscopic inspection, theirapplications , limitations	15/04/2025		
	28	(b) Direct measurement – Stylus based instrument: Tomlinson surface meter, Taylor- Hobson Talysurf, Profilometer 4.6 Relationship of Machining processes and surface texture and their representation.	17/04/2025		
	29	Tutorial cass	22/04/2025		
5	30	**Unit 5.0 Screw Thread Measurements and Gear Measurements:-** 5.1 Thread nomenclature, Various types of threads, Errors in screw threads: Error in Pitch (Progressive and periodic), effective diameter, major diameter, minor diameter and angle or form.	24/04/2025		
	31	5.2 Methods of measuring external screw thread elements: i Pitch – Thread pitch gauge, microscope method, Pitch measuring machine Procedure of method, precautions to be taken, advantages and limitations. ii Effective diameter – Thread micrometer, two and three wire method	25/04/2025		

HOD
Department of Mechanical Engg.
Govt. Polytechnic Gariyaband (C.G.)

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5	32	iii Minor diameter – Micrometer with two V – shaped hard steel piece iv Major diameter –Micrometer v Angle or Form – Tool room projection Procedure of each method, precautions to be taken, advantages and limitations.	29/04/2025		
	33	Tutorial Class	01/05/2025		
	34	5.3 Methods of internal thread measurement: i Core diameter – Using Wedge parallel and micrometer ii Effective diameter - Using optical comparator iii Thread Form – Using thread cast method, materials used for casting – plaster of Paris, Sulphur, Dental wax Procedure of each method, precautions to be taken, advantages and limitations.	02/05/2025		
	35	5.4 Gear Measurement: Terminology associated with gear measurements, recall types of gears with their sketches, Spur gear nomenclature, need of gear measurement, Gear elements requiring measurement – gear tooth form, gear tooth thickness, pitch, eccentricity.	06/05/2025		
	36	Tutorial Class	08/05/2025		
	37	5.5Measurement of gear elelements: i Gear tooth form – Principle of measurement, Use of Tool room microscope, Use of David Brown gear tooth form testing machine.	09/05/2025		
	38	ii Gear tooth thickness – Principle of measurement – Chordal thickness and Constant Chord, Use of Gear tooth vernier caliper. iii Pitch – Principle of pitch measurement, Use of Parkson gear tester. iv Eccentricity – Purpose and principle of measurement.	13/05/2025		
	39	Tutorial Class	15/05/2025		

HOD
Department of Mechanical Engg.
Govt. Polytechnic Kariyaband (C.G.)

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6	40	**Unit 6.0 Comparators and Limit Gauges** 6.1 Comparators: Definition, working principle, basic requirements of a good comparator, applications.	16/05/2025		
	41	6.2 Types of Comparators – Mechanical, Electrical, Optical and Pneumatic Their working, application, advantages and limitations, selection for given specific work/ component. 6.3 Limit Gauges: Recall the terminology associated with limits, fits and tolerances, Define gauging, its need and difference with measuring,	20/05/2025		
	42	Tutorial Class	22/05/2025		
	43	classification of gauges – according to use, according to form, according to construction, according to specific use.	23/05/2025		
	44	6.4 Fixed size gauges – Plug, ring, snap and thread gauges, their sketches, applications, Go and Not Go ends of a limit gauge, their purpose and identification.	27/05/2025		
	45	Tutorial Class	29/05/2025		
	46	6.5 Taylor's principle, maximum and minimum metal conditions and their correlation with Go and Not Go gauge,	30/05/2025		
	47	working tolerance, gauge tolerance, wear allowance, calculation of gauge dimensions for a given set of data.	03/06/2025		
	48	Tutorial Class	05/06/2025		

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