RAJIV GANDHI PROUDYOGIKI VISHVAVIDYALAYA (DIPLOMA WING)

BHOPAL P05 DIPLOMA IN PRODUCTION ENGINEERING

PART A:- PROCESS OF CURRICULUM DEVELOPMENT

LIST OF IDENTIFIED PROFESSIONAL ROLES

1. To apply knowledge of mathematics, science, and engineering.
2. To design and conduct experiments, as well as to analyze and interpret data.
3. To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. To function on multidisciplinary teams.
5. To identify, formulate, and solve engineering problems.
6. To understand professional and ethical responsibility.
7. To communicate effectively.
8. To understand the impact of engineering solutions in a global, economic, environmental, and societal context.
9. To engage in lifelong learning.
10. To use the techniques, skills, and modern engineering tools necessary for engineering practice.

LIST OF SELECTED TERMINAL BEHAVIORS
COURSE NAME: - ENGINEERING METROLOGY (401)

1. To apply knowledge of mathematics, science, and engineering.
   TB-1 To understand linear measurement and angular measurement. (401)
   TB-2 To understand the concept and principles of comparators. (401)
2. To design and conduct experiments, as well as to analyze and interpret data.
   TB-1To practice different types of measuring instruments. (401)
3. To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
   TB-1 To select appropriate method of inspection. (401)
4. To function on multidisciplinary teams. NIL
5. To identify, formulate, and solve engineering problems
   TB-1 To identify the appropriate instrument for linear and angular measurement. (401)
6. To understand professional and ethical responsibility NIL
7. To communicate effectively NIL
8. To understand the impact of engineering solutions in a global, economic, environmental, and societal context.
   NIL
9. To engage in lifelong learning
   TB-1 To operate different types of measuring instruments. (401)
10. To use the techniques, skills, and modern engineering tools necessary for engineering practice.
    NIL

FRAMED COs FOR SELECTED TERMINAL BEHAVIORS
COURSE NAME: - ENGINEERING METROLOGY (401)

1. To apply knowledge of mathematics, science, and engineering.

   TB-1 To understand linear measurement and angular measurement. (401)
   CO2: Understand concept of linear and angular measurement.
   TB-2 To understand the concept and principles of comparators. (401)
   CO2: Understand concept of linear and angular measurement.

2. To design and conduct experiments, as well as to analyze and interpret data.
   NIL
3. To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

   TB-1 To select appropriate method of inspection.
   CO1: Understand concept of metrology & limit fit and tolerance system.

4. To function on multidisciplinary teams. NIL
5. To identify, formulate, and solve engineering problems

   TB-1 To identify the appropriate instrument for linear and angular measurement. (401)
   CO2: Understand concept of linear and angular measurement.
6. To understand professional and ethical responsibility NIL
7. To communicate effectively NIL
8. To understand the impact of engineering solutions in a global, economic, environmental, and societal context.
   NIL
9. To engage in lifelong learning

   TB-1 To operate different types of measuring instruments. (401)
   CO2: Understand concept of linear and angular measurement.

10. To use the techniques, skills, and modern engineering tools necessary for engineering practice.

    NIL

CO GROUPING AND COURSE FORMATION

COURSE NAME: - ENGINEERING METROLOGY (401)

(Total 100 Hrs., Total 100 Marks)

LIST OF COs:-

CO1: Understand concept of metrology & limit fit and tolerance system. (10 Hrs, 10 marks)

CO2: Understand concept of linear and angular measurement. (40 Hrs, 40 marks)

CO3: Understand geometrical irregularities and surface roughness. (20 Hrs, 20 marks)

C04: understand screw threads and gear measurement. (20 Hrs, 20 marks)

C05: Understand measuring machine and calibration of measuring instruments. (10 Hrs, 10 marks)

LOs FORMATION

COURSE NAME: - ENGINEERING METROLOGY (401)
(Total 100 Hrs., Total 100 Marks)

List of COs and LOs

CO1: Understand concept of metrology & limit fit and tolerance system. (10 Hrs, 10 marks)

LO1: To know about engineering metrology (4 Hrs, 4 Marks)
LO2: To know about limit fits and tolerances (6 Hrs, 6 Marks)

CO2: Understand concept of linear and angular measurement. (40Hrs, 40 marks)

LO1: To know about concept of linear measurement (15 Hrs., 15 Marks)

LO2: To know about concept of angular measurement (10 Hrs., 10 Marks)

LO3: To understand principle of comparators (15 Hrs., 15 Marks)

CO3: Understand geometrical irregularities and surface roughness. (20 Hrs, 20 marks)

LO1: To understand importance of geometrical accuracy (10 Hrs., 10 Marks)

LO2: To understand method for assessment of surface roughness (10 Hrs., 10 Marks)

C04: Understand screw threads and gear measurement. (20Hrs, 20 marks)

LO1: To know about terms related with screw thread (10 Hrs., 10 Marks)

LO2: To understand how to measure screw threads (5 Hrs., 5 Marks)

LO3: To understand gear measurement (5 Hrs., 5Marks)

C05: Understand measuring machine and calibration of measuring instruments. (10 Hrs, 10 marks)

LO1: To know about construction and working principle of measuring machine (5 Hrs., 5 Marks)

LO2: To understand the importance of calibration (5 Hrs., 5 Marks)

PART B:- CURRICULUM OF PRODUCTION ENGINEERING

RGPV (Diploma Wing) Bhopal	COURSE PLAN	Format -2	Sheet No. 1/1

Course Name	**ENGINEERING METROLOGY**	Semester	FOURTH

Branch	PRODUCTION ENGINEERING	Course Code	401	No. of COs	05	No. of LOs	12

Total Hrs. of Teaching Learning	100	Total Marks	100	Total no. of Assessments		Types of Assessments		No. of External Assessments	

DESCRIPTION OF OUTCOMES			T-L Hrs.	Max. Marks
CO 01	P054011	**Understand concept of metrology & limit fit and tolerance system.**	**10**	**10**
Los	PO540111	To know about engineering metrology.	04	04
	PO540112	To know about limit, fits and tolerances.	06	06
CO 02	P054012	**Understand concept of linear and angular measurement**.	**40**	**40**
Los	PO540121	To know about concept of linear measurement	15	15
	PO540122	To know about concept of angular measurement	10	10
	PO540123	To understand principle of comparators	15	15
CO 03	P054013	**Understand geometrical irregularities and surface roughness.**	**20**	**20**
Los	PO540131	To understand importance of geometrical accuracy	10	10
	PO540132	To understand method for assessment of surface roughness	10	10
CO 04	P054014	**Understand screw threads and gear measurement.**	**20**	**20**
Los	PO540141	To know about terms related with screw thread	10	10
	PO540142	To understand how to measure screw threads	05	05
	PO540143	To understand gear measurement	05	05
CO 05	P054015	**Understand measuring machine and calibration of measuring instruments.**	**10**	**10**
Los	PO540151	To know about construction and working principle of measuring machine	05	05
	PO540152	To understand the importance of calibration	05	05

RGPV (DIPLOMA WING) BHOPAL	OCB CURRICULUM FOR THE COURSE	FORMAT- 3	Sheet No. 1/3

Branch	PRODUCTION ENGINEERING	Semester	FOURTH
Course Code	401	Course Name	**ENGINEERING METROLOGY**

		Teach Hrs	Mark s
Course Outcome 1	**Understand concept of metrology & limit, fit and tolerance system.**	**10**	**10**
Learning Outcome 1	To know about engineering metrology.	04	04
CONTENT	**Basic Concept of Metrology & Inspection**: Introduction, Definition, Types of inspection, methods of inspection, Terminology used in Metrology.		
Method of Assessment	Paper pen test		
Learning Outcome 2	To know about limit, fits and tolerances.	06	06
CONTENT	**Study of Limits, fits & tolerances system:** Terms related to limits, fits & tolerance, Hole & shaft basis system, unilateral & bilateral system, selection of fit, selection of tolerance grade, Indian standards for limits, fit, tolerance		
Method of Assessment	Paper pen test		
Course Outcome 2	**Understand concept of linear and angular measurement**.	**40**	**40**
Learning Outcome 1	To know about concept of linear measurement	15	15
CONTENT	**Linear measurement:** Concept of linear measurement, types of linear measuring instruments & their working: Vernier calipers, Vernier height gauge, Vernier depth gauge, outside micrometer, inside micrometer.		
Method of Assessment	Paper pen test/ Practical assessment		
Learning Outcome 2	To know about concept of angular measurement	10	10
CONTENT	**Angular measurement:** Concept of Angular measurement, Types of angle measuring instruments & their working: Protractors, Bevel protractors, Combination sets, sine bar & accessories, indirect method for angular measurement & their importance.		
Method of Assessment	Paper pen test/ Practical assessment		

Learning Outcome 3	To understand principle of comparators	15	15
CONTENT	Dial calipers, depth micrometer, dial indicator thickness gauge, slip gauge blocks, Types of comparators: Dial indicator, sigma comparator, optical comparator, Pneumatic comparator		
Method of Assessment	Paper pen test/ Practical assessment		
Course Outcome 3	**Understand geometrical irregularities and surface roughness.**	**20**	**20**
Learning Outcome 1	To understand importance of geometrical accuracy	10	10
CONTENT	**Testing of geometrical irregularities:** Concept of geometrical irregularities, Importance of geometrical accuracy, straightness, methods of testing straightness: edge method, wedge method, sprit level method, Autocollimator method, flatness, methods of testing flatness: high spot method, dial indicator method, liquid level method, Autocollimator method, squareness, methods of testing squareness: Try square method, dial indicator method, concept of roundness, circularity & concentricity, methods of testing roundness & concentricity, Radius measurement, Radius measurement methods.		
Method of Assessment	Paper pen test/ Practical assessment		
Learning Outcome 2	To understand method for assessment of surface roughness	10	10
CONTENT	**Assessment of surface roughness:** Importance of surface roughness, surface terminology: Primary texture, secondary texture, 1^{st}, 2^{nd}, 3^{rd} , 4^{th} order of irregularities, Methods for assessment of surface roughness: touch method, Instrumental method e.g. profilograph, Tomlinson profile recorder, Tolysurf surface finish recorder, concept of CLA & RMS value & its importance.		
Method of Assessment	Paper pen test		
Course Outcome 4	Understand screw threads and gear measurement**.**	**20**	**20**
Learning Outcome 1	To know about terms related with screw thread	10	10
CONTENT	**Screw thread measurement:** Types of screw threads, elements of V-threads, Terms related with screw thread		
Method of Assessment	Paper pen test /Practical assessment		
Learning Outcome 2	To understand how to measure screw threads	05	05
CONTENT	Methods for measurement of Major diameter & Minor diameter e.g. Micrometer with V anvils, Bench micrometer, measurement of major diameter & Minor diameter of screw threads by micrometer, concept of effective diameter, Methods of measurement of effective diameter by three wire method & Thread micrometer, Limitations of each methods, Pitch measurement, methods of pitch measurement, limitations of each methods, Thread angle measurement, methods of thread angle measurement by tool room microscope, profile projector, limitations of each methods		
	Paper pen test		
Learning Outcome 3	To understand gear measurement	05	05
CONTENT	**Gear measurement:** Elements of spur gear, concept of spur gear, terms associated with the gear measurement, Concept of gear testing, Techniques of gear inspection: functional testing , analytical testing, principles & specific applications of gear inspection techniques, Parkinson gear roller testing method, tooth thickness measurement, methods of tooth thickness measurement by constant chord method, chordal thickness method, methods of measurement of Circular pitch, Base pitch, Blank diameter, Backlash, Concentricity.		

Method of Assessment	Paper pen test		
Course Outcome 5	**Understand measuring machine and calibration of measuring instruments.**	**10**	**10**
Learning Outcome 1	To know about construction and working principle of measuring machine	05	05
CONTENT	**Measuring Machine:** Length bar measuring machine, universal measuring machine, CMM (coordinate measuring machine): Construction & working principle, Methods of measurement, applications; Laser measuring system: Construction & working principle.		
Method of Assessment	Paper pen test		
Learning Outcome 2	To understand the importance of calibration	05	05
CONTENT	**Calibration of dimensional Standards & Measuring Instruments:** Measurement error and their correction: effect of temperature, deformation, parallax error, Reference Condition, Reference standard, Calibration of gauge blocks, calibration of micrometer: deviation of reading, flatness of measuring faces, parallelism of measuring faces; Calibration of vernier calipers: deviation of reading, flatness of measuring faces, parallelism of measuring faces, squareness of the fixed faces; calibration of dial gauges: Deviation of reading, Repeatability of reading, discrimination, calibration of slip gauge by NPL gauge length interferometer.		
Method of Assessment	Paper pen test		

CO1:LO1

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 401	CO Code 01	LO Code 01	Format No. 4

COURSE NAME	**ENGINEERING METROLOGY**
CO Description	**Understand concept of metrology & limit, fit and tolerance system.**
LO Description	To know about engineering metrology

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	**Basic Concept of Metrology & Inspection**: Introduction, Definition, Types of inspection, methods of inspection, Terminology used in Metrology.	Traditional Lecture method	Teacher will explain the contents. Teacher will conduct Progressive test/ give Assignment.	04	0	Handout, Book	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	For the given learning content, Students write answer of questions.	04	Progressive test/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

CO1:LO2

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 401	CO Code 01	LO Code 02	Format No. 4

COURSE NAME	**ENGINEERING METROLOGY**
CO Description	**Understand concept of metrology & limit, fits and tolerance system.**
LO Description	To know about limit fits and tolerances

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	**Study of Limits, fits & tolerances system:** Terms related to limits, fits & tolerance, Hole & shaft basis system, unilateral & bilateral system, selection of fit, selection of tolerance grade, Indian standards for limits, fit, tolerance	Traditional Lecture method + assignment	Teacher will explain the content. Teacher will conduct Progressive test/quiz/ Assignment	06		Handout, Book/ Video	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	For the given learning content, Students write answer of questions	06	Progressive test/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

CO2:LO1

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 401	CO Code 02	LO Code 01	Format No. 4

COURSE NAME	**ENGINEERING METROLOGY**
CO Description	Understand concept of linear and angular measurement.
LO Description	To know about concept of linear measurement

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	**Linear measurement:** Concept of linear measurement, types of linear measuring instruments & their working: Vernier calipers, vernier height gauge, vernier depth gauge, outside micrometer, inside micrometer.	Traditional Lecture method + Practical	Teacher will explain the contents and provide handout to students. Teacher will conduct Progressive test/practical	05	10	Handout, Book/ Metrology Lab Visit/ Video	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test/ Practical assessment	For the given learning content, Students write answer of questions and face Practical Viva	15	Progressive Test paper/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

List of Practical

- About the Metrology Laboratory.
- Handling of instruments & their care.
- Measurement of Length & Diameter by Vernier Callipers.
- Measurement of Length & Diameter by Micrometer.

CO2:LO2

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 401	CO Code 02	LO Code 02	Format No. 4

COURSE NAME	ENGINEERING METROLOGY
CO Description	**Understand concept of linear and angular measurement**.
LO Description	To know about concept of angular measurement

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	**Angular measurement:** Concept of Angular measurement, Types of angle measuring instruments & their working: Protractors, Bevel protractors, Combination sets, sine bar & accessories, indirect method for angular measurement & their importance.	Traditional Lecture method + Practical	Teacher will explain the contents to students. Teacher will conduct Progressive / Practical/ assignment	04	06	Handout, Book/ Metrology Lab Visit/ Video	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test/ Practical assessment	For the given learning content, Students write answer of questions and face Practical Viva.	10	Progressive Test paper/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

List of Practical

- To determine the external Taper of a given job by means of Sine bar method.

CO2:LO3

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 401	CO Code 02	LO Code 03	Format No. 4

COURSE NAME	ENGINEERING METROLOGY
CO Description	**Understand concept of linear and angular measurement**.
LO Description	To understand principle of comparators

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Dial calipers, depth micrometer, dial indicator thickness gauge, slip gauge blocks, Types of comparators: Dial indicator, sigma comparator, optical comparator, Pneumatic comparator	Traditional Lecture method + Practical (Metrology Lab)	Teacher will explain the contentsto students. Teacher will conduct Progressive / Practical	06	09	Handout, Book/ Video/ Lab Visit	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test /Practical assessment	For the given learning content, Students write answer of questions and face Practical Viva	15	Practical file/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

List of Practical

- Measurement of gap by means of slip gauges.
- Measurement of diameter of spigot by using slip gauge blocks.

CO3:LO1

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 401	CO Code 03	LO Code 01	Format No. 4

COURSE NAME	ENGINEERING METROLOGY
CO3 Description	Understand geometrical irregularities and surface roughness
LO1 Description	To understand importance of geometrical accuracy

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	**Testing of geometrical irregularities:** Concept of geometrical irregularities, Importance of geometrical accuracy, straightness, methods of testing straightness: edge method, wedge method, sprit level method, Autocollimator method, flatness, methods of testing flatness: high spot method, dial indicator method, liquid level method, Autocollimator method, squareness, methods of testing squareness: Try square method, dial indicator method, concept of roundness, circularity & concentricity, methods of testing roundness & concentricity, Radius measurement, Radius measurement methods.	Traditional Lecture method + Practical (Metrology Lab)	Teacher will explain the contents to students. Teacher will conduct Progressive test/Quiz/ Practical	04	06	Handout, Book/ Video	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test/ Practical assessment	For the given learning content, Students write answer of questions	10	Practical file/End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

List of Practical

- To check the straightness of straightedge by wedge method.

CO3:LO2

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 401	CO Code 03	LO Code 02	Format No. 4

COURSE NAME	ENGINEERING METROLOGY
CO Description	**Understand geometrical irregularities and surface roughness**
LO Description	To understand method for assessment of surface roughness

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	**Assessment of surface roughness:** Importance of surface roughness, surface terminology: Primary texture, secondary texture, 1st, 2nd, 3rd , 4th order of irregularities, Methods for assessment of surface roughness: touch method, Instrumental method e.g. profilograph, Tomlinson profile recorder, Tolysurf surface finish recorder, concept of CLA & RMS value & its importance.	Traditional Lecture method + Assignment + Quiz	Teacher will explain the contents to students. Teacher will conduct Progressive test/Quiz	10	-	Handout, Book /You-tube Video	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	For the given learning content, Students write answer of questions,	10	Assignment /End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

CO4:LO1

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 401	CO Code 04	LO Code 01	Format No. 4

COURSE NAME	ENGINEERING METROLOGY
CO4 Description	Understand screw threads and gear measurement.
LO1 Description	To know about terms related with screw thread

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	**Screw thread measuremen** Types of screw threads, element of V-threads, Terms related wit screw thread	Traditional Lecture method + Practical	Teacher will explain the contents. Teacher will conduct Progressive test/Quiz/Practical	04	06	Handout, Book/ Video	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test/ Practical assessment	For the given learning content, Students write answer of questions.	10	Progressive Test paper/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

List of Practical

- Measurement of angle and length i.e. pitch of screen thread by tool room microscope.

CO4:LO2

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 401	CO Code 04	LO Code 02	Format No. 4

COURSE NAME	ENGINEERING METROLOGY
CO Description	Understand screw threads and gear measurement.
LO Description	To understand how to measure screw threads

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Methods for measurement of Major diameter & Minor diameter e.g. Micrometer with V anvils, Bench micrometer, measurement of major diameter & Minor diameter of screw threads by micrometer, concept of effective diameter, Methods of measurement of effective diameter by three wire method & Thread micrometer, Limitations of each methods, Pitch measurement, methods of pitch measurement, limitations of each methods, Thread angle measurement, methods of thread angle measurement by tool room microscope, profile projector, limitations of each methods	Traditional Lecture method + Practical	Teacher will explain the contents. Teacher will conduct Progressive test/Quiz	05	-	Handout, Book	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	For the given learning content, Students write answer of questions.	5	Progressive Test paper/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

CO4:LO3

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 401	CO Code 04	LO Code 03	Format No. 4

COURSE NAME	ENGINEERING METROLOGY
CO Description	Understand screw threads and gear measurement**.**
LO Description	To understand gear measurement

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	**Gear measurement:** Elements of spur gear, concept of spur gear, terms associated with the gear measurement, Concept of gear testing, Techniques of gear inspection: functional testing , analytical testing, principles & specific applications of gear inspection techniques, Parkinson gear roller testing method, tooth thickness measurement, methods of tooth thickness measurement by constant chord method, chordal thickness method, methods of measurement of Circular pitch, Base pitch, Blank diameter, Backlash, Concentricity.	Traditional Lecture method + Practical	Teacher will explain the contents. Teacher will conduct Progressive test/quiz.	05	-	Handout, Book	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	For the given learning content, Students write answer of questions.	5	Progressive Test paper/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

CO5:LO1

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 401	CO Code 05	LO Code 01	Format No. 4

COURSE NAME	ENGINEERING METROLOGY
CO Description	Understand measuring machine and calibration of measuring instruments**.**
LO Description	To know about construction and working principle of measuring machine

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	**Measuring Machine:** Length bar measuring machine, universal measuring machine, CMM (coordinate measuring machine): Construction & working principle, Methods of measurement, applications; Laser measuring system: Construction & working principle.	Traditional Lecture method + Practical	Teacher will explain the contents. Teacher will conduct Progressive test/Quiz.	05	-	Handout, Book/ Video	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	For the given learning content, Students write answer of questions.	05	Progressive Test paper/ End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

CO5:LO2

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Branch Code P05	Course Code 401	CO Code 05	LO Code 02	Format No. 4

COURSE NAME	ENGINEERING METROLOGY
CO Description	Understand measuring machine and calibration of measuring instruments.
LO Description	To understand the importance of calibration

SCHEME OF STUDY

S. No.	Learning Content	Teaching–Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	**Calibration of dimensional Standards & Measuring Instruments:** Measurement error and their correction: effect of temperature, deformation, parallax error, Reference Condition, Reference standard, Calibration of gauge blocks, calibration of micrometer: deviation of reading, flatness of measuring faces, parallelism of measuring faces; Calibration of vernier calipers: deviation of reading, flatness of measuring faces, parallelism of measuring faces, squareness of the fixed faces; calibration of dial gauges: Deviation of reading, Repeatability of reading, discrimination, calibration of slip gauge by NPL gauge length interferometer.	Traditional Lecture method	Teacher will explain the contents. Teacher will conduct Progressive test/Quiz.	05	-	Handout, Book, Video	

SCHEME OF ASSESSMENT

S. No	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
1	Paper pen test	For the given learning content, Students write answer of questions.	05	Progressive Test paper/End semester exam	Internal /External

ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)

Reference Books:

1. Engineering Metrology & Quality Control By R.K. Jain
2. Engineering. Metrology By H.K. Pareek
3. Engineering Metrology By I.C. Patel
4. Practical Metrology By Hume & Sharp
5. Engineering Metrology By R.K. Rajput