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

RGP	V (Diplo	ma V	Ving) Bhopal		COURSE	E PLAN	1	j	Format	t -2		et No.
Co	urse Nan	ne	ENGINEERI	NG N	METROLOGY			Sem	ester		FOU	RTH
Branc	ch		ODUCTION GINEERING		Course Code	401	No. of	COs	05	No.	of LOs	s 12
Tea	Hrs. of aching arning	100	Total Marks	100	Total no. of Assessments		Type: Assessi			Ex	o. of ternal ssments	S
			DESCR	IPTI(ON OF OUTC	OMES					T-L Hrs.	Max. Marks
CO 01	P05401	1	Understand cond	cept o	f metrology & lin	mit fit ar	nd toleran	ce syste	m.		10	10
	PO5401	111	To know about er	nginee	ring metrology.						04	04
Los	PO5401	112	To know about lin	mit, fi	ts and tolerances.						06	06
CO 02	P05401	2	Understand of	conce	ept of linear a	nd ang	ular mea	suren	nent.		40	40
	PO5401	121	To know about o	oncep	ot of linear measur	rement					15	15
Los	PO5401	122	To know about o	oncep	ot of angular meas	surement					10	10
200	PO5401	123	To understand pr	rincipl	e of comparators						15	15
CO 03	P05401	3	Understand a	geom	etrical irregu	larities	and sur	face r	oughn	ess.	20	20
	PO5401	131	To understand in	nporta	nce of geometric	al accura	су				10	10
Los	PO5401	132	To understand m	ethod	for assessment o	f surface	roughness				10	10
CO 04	P05401	4	Understand s	crew	threads and	gear m	easurem	ent.			20	20
	PO540	141	To know about t	erms 1	elated with screw	thread					10	10
Los	PO5402	142	To understand h	ow to	measure screw tl	nreads					05	05
	PO5402	143	To understand go	ear me	easurement						05	05
CO 05	P05401	5	Understand instruments.	neas	uring machin	e and c	alibratio	on of n	neasuı	ring	10	10
Lo	PO5402	151	To know about machine	ıt cor	nstruction and	working	g princip	le of m	neasuri	ing	05	05
S	PO5402	152	To understand	l the	importance of	calibrat	tion				05	05

,	PLOMA WING) HOPAL	OCB CURRICULU	JM FOR THE COURSE	FORM	IAT- 3	Sheet No. 1/3
Branch	PRODUCTIO	N ENGINEERING	Semester	FOURT	Н	
Course Code	401	Course Name	ENGINEERING MET	ROLOG	Y	
					Teach Hrs	Mark s
Course Outcome 1	Understand co	oncept of metrology &	limit, fit and tolerance	system.	10	10
Learning Outcome 1	To know about en	gineering metrology.			04	04
CONTENT	_	Metrology & Inspection: In minology used in Metrology	ntroduction, Definition, Type .	s of inspec	tion, meth	ods
Method of Assessment		I	Paper pen test			
Learning Outcome 2	To know about lin	nit, fits and tolerances.			06	06
CONTENT		1 & bilateral system, selection	Terms related to limits, fits & on of fit, selection of tolerance			
Method of Assessment	,	I	Paper pen test			
Course Outcome 2	Understand c	oncept of linear and a	ngular measurement.		40	40
Learning Outcome 1	To know about co	oncept of linear measuremen	nt		15	15
CONTENT		-	surement, types of linear mea e, Vernier depth gauge, outsi	_		
Method of Assessment		Paper pen to	est/ Practical assessment			
Learning Outcome 2	To know about co	oncept of angular measurem	ent		10	10
CONTENT	working: Protracto	ž –	neasurement, Types of angle ination sets, sine bar & acces	_		
Method of Assessment	,	Paper pen to	est/ 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 indicator, sigma comparator, optical comparator, Pneumatic comparator	comparators:	Dial
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 straightness, methods of testing straightness: edge method, wedge method, sprit level method, flatness, methods of testing flatness: high spot method, dial indicator method, liquid level method, squareness, methods of testing squareness: Try square method, dial indicator method circularity & concentricity, methods of testing roundness & concentricity, Radius measurement methods.	Autocollimate nethod, Auto l, concept of a	or method, collimator roundness,
Method of Assessment	Paper pen test/ Practical assessment		
Learning Outcome 2	To understand method for assessment of surface roughness	10	10
CONTENT Method of Assessment	Assessment of surface roughness: Importance of surface roughness, surface to texture, secondary texture, 1 st , 2 nd , 3 rd , 4 th order of irregularities, Methods for as roughness: touch method, Instrumental method e.g. profilograph, Tomlinson profi surface finish recorder, concept of CLA & RMS value & its importance. Paper pen test	ssessment o	f surface
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 w	vith screw thr	ead
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 and measurement of major diameter & Minor diameter of screw threads by micrometer, concep Methods of measurement of effective diameter by three wire method & Thread micrometer methods, Pitch measurement, methods of pitch measurement, limitations of each measurement, methods of thread angle measurement by tool room microscope, profile peach methods	t of effective er, Limitation ethods, Thre	diameter, as of each and angle
	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 Concept of gear testing, Techniques of gear inspection: functional testing, analytical testing applications of gear inspection techniques, Parkinson gear roller testing method, tooth the methods of tooth thickness measurement by constant chord method, chordal thickness measurement of Circular pitch, Base pitch, Blank diameter, Backlash, Concentricity.	, principles d	& specific surement,

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 measuring machine): Construction & working principle, Methods of measurement, a 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 correction: effect of temperature, deformation, parallax error, Reference Condition, I Calibration of gauge blocks, calibration of micrometer: deviation of reading, flatness faces, parallelism of measuring faces; Calibration of vernier calipers: deviation of remeasuring faces, parallelism of measuring faces, squareness of the fixed faces; calibration of readings. Deviation of reading, Repeatability of reading, discrimination, calibration of gauge length interferometer.	Reference s of measur ading, flatn ration of di	itandard, ing less of al
Method of Assessment	Paper pen test		

CO1:LO1

COI:		71.) CC	THE TOD	I E A DAUDIC	D 1	C	CO	1.0	. -	1
RC	SPV (Diploma V Bhopal	wing) SC	OUTC	LEARNING OME	Branch Code P05	Course Code 401	CO Code 01	Cod 01	le	ormat No. 4
COL	JRSE NAME	ENGINEE	RING METI	ROLOGY			1			
CO I	Description	Understai	nd concept o	f metrology &	k limit, f	it and to	lerance	syste	m.	
LO I	Description		out engineering							
			SCH	HEME OF STU	JDY					
S. No.	Learning C	Content	Teaching– Learning Method	Description Proces		Teach Hrs.	Pract. /Tut Hrs.	Li Requ	Rs aired	Rema rks
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. Teach will conduct Progressive test/ gir Assignment.		04	0	Handout, Book		
			SCHEM	IE OF ASSES	SMENT					
S. N	o Method of Assessment		escription of	Assessment		Iaximum Marks	Resou Requi			ernal / ernal
1	Paper pen tes	`	given learnin swer of quest	g content, Studions.	lents	04	Progre test/ semest exam	End	Interr /Exte	
	ADDI	TIONAL I	NSTRUCTIO	ONS FOR THI	E HOD/	FACUL	ΓΥ (IF A	ANY)		

CO1:LO2

CO1.1	102					•				
RGI	PV (Diploma V Bhopal	Ving) SC	CHEME FOR OUTC	LEARNING OME	Branch Code P05	Course Code 401	CO Code 01	Coc 02	le	ormat No. 4
COU	RSE NAME	ENGINEE	RING METI	ROLOGY	i.			1		
CO I	Description	Understai	nd concept o	f metrology &	k limit,	fits and t	toleranc	e syst	em.	
LO D	escription	To know abo	out limit fits and	d tolerances						
	<u>'</u>		SCH	HEME OF STU	UDY					
S. No.	Learning C	ontent	Teaching— Learning Method	Description Proces		Teach Hrs.	Pract. /Tut Hrs.		Rs uired	Rema rks
1	Study of Limitolerances system tolerance, Hole & system, unilateral system, selection of toler Indian standards fit, tolerance	ts, fits & shaft basis & bilateral on of fit, rance grade,	Traditional Lecture method + assignment	Teacher will the content. will Progressive Assignment	Teacher	r t		Hand Book Vide		
			SCHEM	IE OF ASSES	SMENT	-				
S. No	Method of Assessment	Г	Description of	Assessment	N	Aaximum Marks	Resou Requi			ernal / ernal
1	Paper pen tes	`	given learnin swer of quest	g content, Stud tions	dents	06	Progre test/ semest exam	End	Intern /Exter	
	ADDI	TIONAL I	NSTRUCTIO	ONS FOR TH	E HOD/	FACUL	TY (IF A	ANY)		

CO2:	LO1									
RC	SPV (Diploma V Bhopal	Wing) SC	HEME FOR OUTC	LEARNING OME	Branch Code P05	Course Code 401	CO Code 02	LO Cod 01	le	ormat No. 4
COL	JRSE NAME	ENGINEE	RING METI	ROLOGY					I	
CO	Description	Understar	nd concept of	f linear and ang	gular me	asuremei	nt.			
LO I	Description		-	linear measureme						
				HEME OF STU						
S. No.	Learning (Content	Teaching– Learning Method	Description Proces		Teach Hrs.	Pract. /Tut Hrs.	Ll Requ	Rs uired	Rema rks
1	Concept o measurement, ty	rpes of linear truments & g: Vernier hier height depth gauge,	method + Practical	Teacher will exthe contents provide hand students. Teach conduct Progretest/practical	and dout to her will	05	10	Hand Book Metro y Lab Visit/ Video	olog	
			SCHEN	ME OF ASSES	SMENT					
S. N	Method of Assessment		escription of	Assessment		Iaximum Marks	Resou Requi			ernal / ernal
1	Paper pen te Practical assessment		swer of ques	g content, Studitions and face	lents	15	Progre Test pa End semest exam	aper/	Interr /Exte	
	ADD	ITIONAL I	NSTRUCTIO	ONS FOR TH	E HOD/	FACUL'	TY (IF	ANY)		
]	List of Practica	ા <u></u>					
	•	Handling		Laboratory. ts & their care th & Diameter		ier Callij	pers.			
	•	Measurem	nent of Lengt	th & Diameter	by Micr	ometer.				

CO2:LO2

R	GPV (Diploma V Bhopal	Wing) S	SCHEME FOR OUTC		Branch Code P05	Course Code 401	CO Code 02	LO Code 02	_	ormat No. 4
CO	URSE NAME	ENGINE	ERING METRO	DLOGY						
СО	Description	Unders	tand concept	of linear and	angular	measure	ement.			
LO	Description		about concept of							
			SCH	HEME OF STU	UDY					
S. No.	Learning (Content	Teaching— Learning Method	Description Proces		Teach Hrs.	Pract. /Tut Hrs.	LF Requ		Rema rks
1	Concept of Angula measurement, Typ measuring instrum working: Protracto protractors, Combi	asurement, Types of angle asuring instruments & their reking: Protractors, Bevel tractors, Combination sets, a bar & accessories, indirect chod for angular asurement & their		Teacher will exthe contents students. Teach conduct Progre Practical/ assignments	to her will essive /	04	06	Hando Book/ Metro y Lab Visit/ Video	olog	
			SCHEM	ME OF ASSES	SMENT	7				
S. N	No Method of Assessment		Description of	Assessment	N	Aaximum Marks	Resou Requi			ernal / ernal
1	Paper pen te Practical assessment	write a	e given learning answer of quest cal Viva.		dents	10	Progre Test pa End semest exam	aper/	Intern /Exte	
	ADD	ITIONAL	INSTRUCTIO	ONS FOR TH	E HOD/	FACUL	ΓΥ (IF A	ANY)		
			1	List of Practica	al					

CO2:LO3

CO2:	LO3										
RC	PV (Diploma V Bhopal	Ving) SC	CHEME FOR OUTC	LEARNING OME	Branch Code P05	Course Code 401	CO Code 02	LO Cod 03	e	ormat No. 4	
COU	JRSE NAME	ENGINEEI	RING METRO	DLOGY		1			<u>'</u>		
CO I	Description	Understa	nd concept	of linear and	angular	measure	ement.				
LO I	Description	To understa	and principle of	comparators							
			SCF	HEME OF STU	JDY						
S. No.	Learning C	ontent	Teaching– Learning Method	Description Proces		Teach Hrs.	Pract. /Tut Hrs.	LI Requ		Rema rks	
Method Dial calipers, depth micrometer, dial indicator thickness gauge, slip gauge blocks, Types of comparators: Dial indicator, sigma comparator, optical comparator, Pneumatic comparator Method Traditional Lecture method + Practical (Metrology Lab) Teacher will explain the contentsto students. Teacher will conduct Progressive / Practical Wideo/ Lab Visit											
			SCHEN	ME OF ASSES	SMENT	1					
S. N	o Method of Assessment		escription of	Assessment		Iaximum Marks	Resou Requi			ernal / ernal	
1	Paper pen tes /Practical assessment		nswer of q	ng content, Stu uestions and		15	Practic file/ semest exam	End	Intern /Exte		
	ADDI	TIONAL I	NSTRUCTIO	ONS FOR TH	E HOD/	FACUL	ΓΥ (IF A	ANY)			
]	List of Practica	a <mark>l</mark>						
	•	Measuren	nent of gap b	y means of slip	p gauges						

• Measurement of diameter of spigot by using slip gauge blocks.

CO3:LO1

RGI	PV (Diploma V Bhopal	Wing) SC	HEME FOR OUTC	LEARNING OME	Branch Code P05	Course Code 401	CO Code 03	Cod 01	_	ormat No. 4
COU	RSE NAME	ENGINEER	RING METRO	OLOGY				•	·	
CO3	Description	Understan	d geometrica	al irregularitie	s and sur	face roug	ghness			
LO1 l	Description	To understa	nd importance	of geometrical ac	curacy					
			SCF	HEME OF STU	JDY					
S. No.	Learning C	Content	Teaching– Learning Method	Description Proces		Teach Hrs.	Pract. /Tut Hrs.	Ll Requ	Rs iired	Rema
1	concentricity,	chtness: edge method, sprit Autocollimator methods of high spot cator method, method, ds of testing quare method, od, concept of cularity & methods of dness & Radius Radius	method + Practical (Metrology Lab)	the contents	s to cher will essive	04	06	Hand Book Video	/	
			SCHEM	ME OF ASSES	SMENT	•				
S. No	Method of Assessment		escription of	Assessment		Iaximum Marks	Resou Requi			ernal / ernal
1	Paper pen tes Practical assessment	,	given learnir swer of quest	ng content, Stu tions	idents	10	Practic file/En semest exam	d	Intern /Exte	
	ADDI	TIONAL I	NSTRUCTIO	ONS FOR TH	E HOD/	FACUL	ΓY (IF	ANY)		
			1	List of Practica	-1 -1			·	·	_

• To check the straightness of straightedge by wedge method.

CO3·LO2

No. Learning Method Process Hrs. Tut Hrs. 1 Assessment of surface roughness: Importance of 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, Concept of CLA & RMS value & its importance. SCHEME OF ASSESSMENT S. No Method of Assessment Description of Assessment Maximum Marks Required rks Hrs. Tut Hrs. Required rks Hrs. Tut Hrs. Traditional Lecture method + Hrs. Handout, Book /You-tube Video Video SCHEME OF ASSESSMENT S. No Method of Assessment Maximum Marks Required Internal Maximum Resources External / Internal Internal Internal No Maximum Marks Required Internal No Maximum Resources Internal Internal Internal Internal	CO3:	LO2									
CO Description Understand geometrical irregularities and surface roughness SCHEME OF STUDY S. Learning Content No. I Assessment of surface roughness	RC	•	Wing) SC			Code	Code	Code	Cod	le	No.
To understand method for assessment of surface roughness	COU	JRSE NAME	ENGINEE	RING METRO	DLOGY		-1	П	1	<u> </u>	
SCHEME OF STUDY S. Learning Content No. Learning Content No. Learning Content No. Learning Content No. Teaching— Learning Method Teaching— Process No. 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. SCHEME OF STUDY Description of T-L Prach Hrs. Traditional Teacher will explain the contents to students. Teacher will conduct Progressive test/Quiz SCHEME OF ASSESSMENT 1 Paper pen test For the given learning content, Students write answer of questions, Internal /End semester exam	CO	Description	Understa	nd geometri	ical irregulari	ties and	surface	roughn	ess		
S. Learning Content No. Learning Content Teaching—Learning Method Traditional Lecture 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, concept of CLA & RMS value & its importance. SCHEME OF ASSESSMENT S. No Method of Assessment Process Traditional Lecture method + Assignment the contents to students. Teacher will conduct Progressive test/Quiz	LO l	Description	To understa	and method for	assessment of sur	face rougl	nness				
No. Learning Method Process Hrs. /Tut Hrs. Required rks 1 Assessment of surface roughness: Importance of surface roughness, surface terminology: Primary texture, secondary texture, 1st, 2nd, 3nd, 4th order of irregularities, Methods for assessment of surface roughness: touch method, Instrumental method e.g. profilograph, Tomlinson profile recorder, concept of CLA & RMS value & its importance. SCHEME OF ASSESSMENT Scheme Process Hrs. /Tut Hrs. Required rks				SCH	HEME OF STU	JDY					
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 surface roughness: touch method, Instrumental method e.g. profilograph, Tomlinson profile recorder, concept of CLA & RMS value & its importance. SCHEME OF ASSESSMENT S. No Method of Assessment Paper pen test For the given learning content, Students write answer of questions, Students. Teacher will conduct Progressive test/Quiz Wideo Video Video SCHEME OF ASSESSMENT S. No Method of Assessment Paper pen test For the given learning content, Students write answer of questions, Internal /External /External /External	S. No.	Learning C	Content	Learning	_			/Tut			Rema rks
S. No Method of Assessment Description of Assessment Maximum Marks Required Internal Paper pen test For the given learning content, Students write answer of questions, 1 Paper pen test Write answer of questions, S. No Method of Assessment Maximum Marks Resources Required Internal / Internal / External /	1	roughness: Im surface roughn terminology: Pri secondary textur , 4 th order of Methods for as surface rough method, Instrum e.g. profilograph profile recorde surface finish concept of CL	portance of ess, surface mary texture, e., 1 st , 2 nd , 3 rd irregularities, essessment of ness: touch ental method n, Tomlinson er, Tolysurfa recorder, A & RMS	Lecture method + Assignmen t + Quiz	the contents students. Teac conduct Progre	to ther will	10	-	Book /You-	-tube	
Assessment Marks Required Internal Paper pen test For the given learning content, Students write answer of questions, 1 Assignment /End /External semester exam				SCHEM	ME OF ASSES	SMENT	1				
write answer of questions, /End semester exam /External	S. N			Description of	Assessment						
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)	1	Paper pen te		_	-	idents	10	/End semest			
		ADD	TIONAL I	NSTRUCTIO	ONS FOR TH	E HOD/	FACULT	ΓΥ (IF A	ANY)		

CO4:LO1

RC	GPV (Diploma V Bhopal	Wing) SC	HEME FOR OUTC	LEARNING OME	Branc Code P05		CO Code 04	Coc 01	le	ormat No. 4
COU	JRSE NAME	ENGINEER	RING METRO	DLOGY	L				l .	
CO4	Description	Understand	l screw threa	ds and gear m	easurei	nent.				
LO1	Description			ed with screw thre						
			SCH	HEME OF STU	JDY					
S. No.	Learning C	Content	Teaching– Learning Method	-	Description of T-L Process		Pract. /Tut Hrs.		LRs Required	
1	Screw thread Types of screw thread of V-threads, Terrescrew thread			Teacher will the contents. will Progressive test/Quiz/Pract	expla Teach condu	er	06	Hand Book Vide		
			SCHEM	IE OF ASSES	SMEN	T				
S. N	Method of Assessment		escription of	Assessment		Maximun Marks	n Resou Requi			ernal / ernal
1	Paper pen tes Practical assessment		given learnir swer of quest	ng content, Stutions.	idents	10	Progre Test pa End semest exam	aper/	Intern /Exter	
	ADDI	TIONAL II	NSTRUCTIO	ONS FOR TH	E HOD	/ FACUL	TY (IF A	ANY)		
]	List of Practica	al					
	•	Measurem microscop	U	and length i.e.	. pitch	of screen	thread by	y tool	room	

CO4:LO2

JO4:1	LO2				1	1		T			
RG:	PV (Diploma V Bhopal	Wing) SC			Code	Course Code 401	CO Code 04	Coc 02	le	F <mark>ormat</mark> No. 4	
COURSE NAME ENGINEERING METROLOGY											
CO D	Description	Understand	l screw threa	ds and gear m	easurem	ent.					
LO D	Description	To understa	nd how to mea	sure screw threa	ds						
			SCH	HEME OF STU	JDY						
S. No.	U		Teaching– Learning Method	Description of T-Process		Teach Hrs.	Pract. /Tut Hrs.	ut Required		Rema rks	
1	Methods for me Major diameter diameter e.g. Micranvils, Bench measurement of measurement of effective diamethreads by micror of effective diamethreads by three and Limitations of e Pitch measurement diameter by three each methods, measurement, metangle measurement microscope, profilimitations of each	& Minor ometer with V micrometer, najor diameter ter of screw meter, concept eter, Methods of effective wire method micrometer, ach methods of t, limitations Thread angle hods of thread t by tool room file projector,	method + Practical	Teacher will the contents. will Progressive tes	Teacher conduct		-	Handout, Book			
			SCHEM	ME OF ASSES	SMENT	•					
S. No Method of Assessment			Description of Assessment			Maximum Reso Marks Requ				kternal / nternal	
1	Paper pen tes		given learnir swer of quest	ng content, Students tions.		5	Progressive Test paper/ End semester exam		Internal /External		
	ADDI	TIONAL II	NSTRUCTIO	ONS FOR TH	E HOD/	FACULT	ΓY (IF A	ANY)			

CO4:LO3

Method Hrs. 1	CO4:	LO3									
Understand screw threads and gear measurement.	RG	` -	Ving) SC	OUTCOME Code		Code	Code	Code	Code No.		
To understand gear measurement SCHEME OF STUDY	COU	RSE NAME	ENGINEEL	RING METRO	DLOGY	1		-	ı		
S. Learning Content No. Learning Content No. Gear measurement: Elements of spur gear, concept of spur gear, terms associated with the gear measurement. Concept of gear inspection: functional testing, analytical testing, principles & specific applications of gear inspection techniques, Parkinson gear roller testing method, thord thickness measurement by constant chord method, chordal thickness measurement by Concentricity. SCHEME OF ASSESSMENT For the given learning content, Students write answer of questions. For the given learning content, Students write answer of questions.	COI	Description	Understar	nd screw thre	ads and gear n	neasurei	ment.				
SCHEME OF STUDY S. Learning Content No. Process Teaching	LOI	Description									
S. Learning Content No. Concept		1	10 direction			JDY					
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 by constant chord method, chordal thickness measurement of Circular pitch, Base pitch, Blank diameter, Backlash, Concentricity. SCHEME OF ASSESSMENT S. No Method of Assessment Paper pen test For the given learning content, Students write answer of questions. Lecture method the contents. Teacher will conduct Progressive test/quiz. Book Book Book Book Book Required Book Book Required Progressive test/quiz. Book Book Progressive test/quiz.	S. No.	Learning C	Content	Teaching— Learning	Description of T-L			/Tut Required			
S. No Method of Assessment Description of Assessment Maximum Marks Required Internal Paper pen test For the given learning content, Students write answer of questions. 5 Progressive Test paper/End semester exam	1	of spur gear, cor gear, terms associ gear measurement gear testing, Tech- inspection: functi- analytical testing, specific applicati- inspection techniq gear roller testing thickness measure of tooth thickness by constant ch- chordal thickness methods of me- Circular pitch, Bas- diameter,	ncept of spur lated with the , Concept of miques of gear onal testing , principles & ons of gear ues, Parkinson method, tooth ment, methods measurement ord method, assurement of se pitch, Blank	Lecture method + Practical	the contents. T will conduct	eacher 'eacher	05			,	
Assessment Marks Required Internal Paper pen test For the given learning content, Students write answer of questions. 5 Progressive Test paper/ External End semester exam				SCHEN	ME OF ASSES	SMENT	Γ	T-			
write answer of questions. Test paper/ /External End semester exam	S. No			escription of	ng content, Students						
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)	1	Paper pen tes		_			5	Test pa End semest	Test paper/ /Ex End semester		
		ADDI	TIONAL I	NSTRUCTIO	ONS FOR TH	E HOD/	FACUL	ΓY (IF A	ANY)		

CO5:LO1

Understand measuring machine and calibration of measuring instruments.	<u>CO5:</u>	LOI											
CO Description Understand measuring machine and calibration of measuring instruments. CO Description To know about construction and working principle of measuring machine SCHEME OF STUDY S. Learning Content No. Teaching—Learning Method Machine: measuring machine, CMM (coordinate measuring machine): Construction & working principle, Methods of measurement, applications; Laser measuring system: Construction & working principle. SCHEME OF ASSESSMENT Paper pen test For the given learning content, Students write answer of questions. For the given learning content, Students write answer of questions. SCHEME OF ASSESSIVE Test paper/ End semester exam	RG		Ving) SC	OUTCOME Code		Code	Code	Code	Cod	Code No.			
To know about construction and working principle of measuring machine	COURSE NAME ENGINEERING METROLOGY												
SCHEME OF STUDY S. Learning Content No. Learning Method Teaching—Learning Method Measuring Machine: Inditional Lecture method measuring machine, Combusting principle, Methods of measurement, applications; Laser measuring principle. SCHEME OF STUDY Teaching—Process Process Process Teacher will explain the contents. Teacher will conduct Progressive test/Quiz. Traditional Lecture method practical Process Process Teach Pract. LRs Rema rks Total throad process Process Teacher will explain the contents. Teacher will conduct Progressive test/Quiz. SCHEME OF ASSESSMENT S. No Method of Assessment Maximum Resources Required Internal Paper pen test For the given learning content, Students write answer of questions. SCHEME OF ASSESSMENT S. No Method of Assessment Maximum Resources Required Internal Paper pen test For the given learning content, Students write answer of questions.	CO Description Understand measuring machine and calibration of measuring instruments							nents.	•				
S. Learning Content No. Learning Content No. Learning Method Teaching—Learning Method Teaching—Learning Method Traditional Lecture method—Practical Measuring machine, CMM (coordinate measuring machine): Construction & working principle. SCHEME OF ASSESSMENT S. No Method of Assessment Paper pen test For the given learning content, Students write answer of questions. Teacher will explain the contents. Teacher will conduct Progressive test/Quiz. Teacher will explain the contents. Teacher will conduct Progressive test/Quiz. SCHEME OF ASSESSMENT S. No Method of Assessment Paper pen test For the given learning content, Students write answer of questions. Teacher will explain the contents. Teacher will conduct Progressive test/Quiz. SCHEME OF ASSESSMENT S. No Method of Assessment Paper pen test For the given learning content, Students write answer of questions. S. Progressive Internal External / External / External / End semester exam Sementary Test paper/ End semester exam	LOI	Description	To know ab										
No. Learning Method Process Hrs. /Tut Hrs. Required rks				SCH	HEME OF STU	JDY							
Lecture method practical measuring machine, universal measuring machine, CMM (coordinate measuring machine): Construction & working principle, Methods of measurement, applications; Laser measuring system: Construction & working principle. SCHEME OF ASSESSMENT S. No Method of Assessment Paper pen test For the given learning content, Students write answer of questions. Lecture method + Practical the contents. Teacher will conduct Progressive test/Quiz. Book/Video Will conduct Progressive test/Quiz. Book/Video Will conduct Progressive test/Quiz. Book/Video Waximum Resources Marks Required Internal Paper pen test For the given learning content, Students write answer of questions. Progressive test/Quiz.	No. Learning Process							/Tut					
S. No Method of Assessment Description of Assessment Maximum Resources Required Internal Paper pen test For the given learning content, Students write answer of questions. For the given learning content, Students write answer of questions. O5 Progressive Test paper/ End semester exam	Length bar machine, measuring mac (coordinate machine): Conworking princip of rapplications; measuring Construction		measuring universal hine, CMM measuring struction & le, Methods neasurement, Laser system:	Lecture method + Practical	the contents. T will conduct	eacher	Book/ Video		/				
Assessment Marks Required Internal Paper pen test For the given learning content, Students write answer of questions. Paper pen test For the given learning content, Students write answer of questions. Progressive Test paper/ External Find semester exam				SCHEM	IE OF ASSES	SMENT							
write answer of questions. Test paper/ /External End semester exam	S. N	1											
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)	1			idents	Test paper/ /I End semester								
		ADDI	TIONAL I	NSTRUCTIO	ONS FOR THI	E HOD/	FACULT	ΓΥ (IF A	ANY)				

CO5:LO2

CO5:L	.O2									
RGF	PV (Diploma V Bhopal	Ving) SC	SCHEME FOR LEARNING OUTCOME Code P05			Course Code 401	CO Code 05	Coc 02	le	Format No. 4
COUF	RSE NAME	ENGINEER	RING METRO	DLOGY						
CO D	escription	Understan	d measuring	machine and	calibrati	on of me	asuring	instruı	nents.	,
LO Description To understand the importance of calibration										
			SCI	HEME OF STU	JDY					
S. Learning Con No.		Content	Teaching— Learning Method	Description of T-L Process		Teach Pract. Hrs. /Tut Hrs.		LRs Required		Rema rks
	Calibration of Standards & Instruments: error and their coro of temperature, parallax error, Condition, Refere Calibration of gealibration of deviation of reading measuring faces, measuring faces, vernier calipers: reading, flatness faces, parallelism faces, squareness faces; calibration of Repeatability of discrimination, calip gauge by NPI interferometer.	deformation, Reference ence standard, gauge blocks, micrometer: ng, flatness of parallelism of Calibration of deviation of of measuring of measuring of the fixed of dial gauges: reading, of reading, alibration of	method	Teacher will exthe contents. Twill conduct Progressive tes	eacher	05	-	Hand Book Video	•	
			SCHEN	ME OF ASSES	SMENT	Γ				
S. No Method of Assessment			Description of Assessment		N	Maximum Resou Marks Requir				ernal / ernal
1	Paper pen tes		given learnir swer of ques	g content, Students ions.		05 Progressiv Test paper/End semester exam		End	e Internal /External	
	ADDI	TIONAL II	NSTRUCTION	ONS FOR TH	E HOD/	FACUL	ΓY (IF A	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