

# GOVERNMENT POLYTECHNIC, NAGPUR

(An Autonomous Institute of Govt. of Maharashtra)

## COURSE CURRICULUM

<b>PROGRAMME</b>	<b>: DIPLOMA IN EE/EC/CM/IT/MT/TX</b>
<b>LEVEL NAME</b>	<b>: ENGINEERING SCIENCES AND TECHNICAL ARTS COURSES</b>
<b>COURSE CODE</b>	<b>: ME302E</b>
<b>COURSE TITLE</b>	<b>: ENGINEERING GRAPHICS</b>
<b>PREREQUISITE</b>	<b>: NIL</b>
<b>TEACHING SCHEME</b>	<b>: TH: 02; TU: 00; PR: 04 (CLOCK HRs.)</b>
<b>TOTAL CREDITS</b>	<b>: 04 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)</b>
<b>TH. TEE</b>	<b>: NIL</b>
<b>PR. TEE</b>	<b>: 02 HRs (Internal)</b>
<b>PT. EXAM</b>	<b>: NIL</b>

### ❖ **RATIONALE:**

Engineering graphics is the language of engineers. It describes the fundamentals, facts, concepts, principles and techniques of Engineering Graphics. The course illustrates techniques of drawing in an engineering field. The concepts of graphical language are used in expressing the ideas, conveying the instructions, which are used in carrying out the jobs on the sites, shop floor etc. It helps to develop the idea of visualizing the actual object or part on the basis of drawings and blue prints. This course is useful in developing drafting and sketching skills of the student. This preliminary course aims at building a foundation for the further course in drawing and other allied courses.

### **COURSE OUTCOMES:**

**After completing this course students will be able to–**

1. Draw geometrical figures, curves, sketches etc.
2. Construct the views of an object by using principles of orthographic projection.
3. Visualize three dimensional objects and draw isometric projections.
4. Apply various drawing codes, conventions and symbols as per IS SP-46
5. Interpret various engineering curves
6. Draw free hand sketches of mechanical elements

❖ **COURSE DETAILS:****A. THEORY :**

<b>Units</b>	<b>Specific Learning Outcomes (Cognitive Domain)</b>	<b>Topics and subtopics</b>	<b>Hrs.</b>
1. Principles of drawing	1. Use of instruments for drawing, scales, lines and their applications. 2. Use of IS SP-46. 3. Loci of points from given data.	1.1 Use of different drawing instruments and equipment 1.2 Types of letters and numbers (single stroke vertical and numbers only) 1.3 Conventions of lines, 1.4 Dimensioning technique as per IS: SP -46 1.5 Scales (reduced, enlarged and full size)- Plain scale, diagonal scale. 1.6 Redrawing 1.7 Loci of points	<b>05</b>
2. Engineering curves.	1. Draw conic sections. 2. Draw involute, cycloid and state their applications 3. Draw helix, spiral from given data.	2.1 To draw an ellipse by- i) Arcs of circles method ii) Concentric circles method 2.2 To draw parabola- I ) Rectangle method 2.3 To draw hyperbola by- I ) Passing through a given point with reference to given asymptotes 2.4 To draw involutes of circle and polygon of maximum six sides 2.5 To draw cycloid, epi-cycloid and hypo-cycloid	<b>08</b>
3. Orthographic projections.	1. Visualize, interpret and draw orthographic views from given pictorial views. 2. Use of IS SP-46 for dimensioning technique.	<b>3.1</b> Introduction to orthographic projections <b>3.2</b> First angle and Third angle method of projections <b>3.3</b> Conversion of simple pictorial views into orthographic views and dimensioning techniques as per IS SP-46	<b>07</b>
4. Isometric projections	1. Visualize, interpret and draw Isometric views from given orthographic views	4.1 Isometric scales 4.2 Isometric views of simple object (plane surfaces, slanting surfaces, and Rectangular, V, Trapezoidal slots)	<b>07</b>

5. Free hand sketches	1. Prepare proportionate freehand sketches of given machine elements 2. Describe functions and use of machine element.	5.1 Types of threads profile – Vee and square, acme, buttress, seller, BA threads, knuckle threads. Types of screws 5.2 Bolts – square and hexagonal bolts, eye bolt 5.3 Types of nuts : square, hexagonal, wing 5.4 Foundation bolts: Eye foundation bolt, Rag foundation bolt, Lewis foundation bolt 5.5 Single and double Riveted Lap and Butt joints	05
Total Hrs.			32

#### B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1.	Draw types of lines, lettering, numbers are to be drawn on sketch book only and one problem from each subtopics 1.5 ,1.6 and 1.7 of chapter 1 <b>(01 Sheet)</b>	1.Principles of drawing	12
2	Draw Engineering Curves, one problem from each subtopic of chapter 2. <b>(01 Sheet)</b>	2. Engineering Curves	12
3	Draw two problem using first angle method of projection <b>(01 Sheet)</b>	3 Orthographic Projections	14
4	Draw one problem with plane surfaces & other with slot, slanting surfaces (using natural scale and isometric scale) <b>(01 Sheet)</b>	4. Isometric Projections	14
5	Draw Free Hand Sketches – any ten sketches covering all the topics under chapter 6 <b>(01 Sheet)</b>	5. Free Hand Sketches	12
Total Hrs.			64

#### ❖ SPECIFICATION TABLE FOR THEORY PAPER:

Nil

#### ❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Nil

## ❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	--	--	--	--
		Assignments		Continuous	--	--	--	--
	TEE (Term End Examination)	End Exam	Students	End Of the Course	--	--	--	--
				Total	--	--	--	--
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics, Assessment Sheets &b Drawing Sheets	4,5,6
		Drawing Portfolio		Continuous	05	--	Drawing Portfolio	4,5,6
				TOTAL	25	10		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	50	20	Rubrics & Drawing Answer Sheets	1, 2, 3, 4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Drawing of scale, redrawing, and loci of point, line work, neatness ,cleanliness and accuracy	10
2	Drawing two Engineering Curves, line work, neatness ,cleanliness and accuracy	10
3	Drawing of orthographic projections , line work neatness ,cleanliness and accuracy	10
4	Drawing of isometric projections, line work neatness ,cleanliness and accuracy	10
5	Drawing of Free Hand Sketches , line work neatness ,cleanliness and accuracy	10
	<b>TOTAL</b>	<b>50</b>

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

Course Outcomes (Cos)	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
<b>1</b>	3	–	–	–	–	–	3	3	–	3	–	–
<b>2</b>	3	–	3	3	–	–	3	3	3	3	–	–
<b>3</b>	3	–	3	3	–	–	3	3	3	3	–	–
<b>4</b>	3	–	3	3	–	–	–	3	–	3	–	–
<b>5</b>	3	–	3	3	–	–	–	3	3	3	–	–
<b>6</b>	3	–	3	3	–	–	–	3	3	3	–	–

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
<b>1.</b>	Engineering Drawing Practice for Schools and Colleges IS: SP-46	Bureau of Indian Standards, Third Reprint, October 1998	81-7061-091-2
<b>2.</b>	Engineering Drawing	N.D. Bhatt Charotar Publishing house 2010	978-93-80358-17-8
<b>3.</b>	Machine Drawing	N.D. Bhatt &V. M Panchal, Charotar Publishing house, 2010	978-93-80358-11-6
<b>4</b>	Engineering Drawing	D.A. Jolhe Tata McGrawHill Edu.2010	978-0-07-064837-1

5.	Engineering Drawing	R. K. Dhawan , S..Chand & co. 2001	81-219-1431-0
6	Engineering Drawing	P. J Shah. S.Chand&co.2008	81-219-2964-4

❖ **E-REFERENCES:**

- <https://www.youtube.com/watch?v=TJ4jGyD-WCw>, assessed on 25<sup>th</sup> March 2016
- [https://www.youtube.com/watch?v=dmt6\\_n7Sgcg](https://www.youtube.com/watch?v=dmt6_n7Sgcg), assessed on 25<sup>th</sup> March 2016
- [https://www.youtube.com/watch?v=\\_MQScnLXL0M](https://www.youtube.com/watch?v=_MQScnLXL0M), assessed on 26<sup>th</sup> March 2016
- <https://www.youtube.com/watch?v=3WXPanCq9LI>, assessed on 26<sup>th</sup> March 2016
- <https://www.youtube.com/watch?v=fvjk7PlxAuo>, assessed on 27<sup>th</sup> March 2016
- <http://www.me.umn.edu/courses/me2011/handouts/engg%20graphics.pdf> , assessed on 27<sup>th</sup> March 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

- 1) Drawing Board with drawing instruments
- 2) Mini-drafter

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. O. V. Sarode	I/C, Head of Mechanical Engineering	Government Polytechnic, Nagpur.
2.	Mr. M.G. Thote	Lecturer in Mechanical Engineering	Government Polytechnic, Nagpur.
3.	Mr. G.H. Dahole	Lecturer in Mechanical Engineering	Government Polytechnic, Nagpur.
4	Er. Ritesh Jain	Deputy Manager	Mahindra and Mahindra Ltd. Nagpur
5	Er. A.M.Onkar	Chief Executive Officer	Onkar Furnitures, MIDC, Nagpur
6	Mr. G.F.Potbhare	Principal	NIT, Polytechnic, Nagpur
7	Dr. S.S.Baraskar	Lecturer in Mechanical Engineering	Govt. Polytechnic, Arvi

(Member Secretary PBOS)

(Chairman PBOS)