

**ENGINEERING GRAPHICS (Electronics, Computer and allied branches)****Course Code : 311008**

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Programme Name/s</b> | : Artificial Intelligence/ Artificial Intelligence and Machine Learning/ Automation and Robotics/ Cloud Computing and Big Data/ Computer Technology/ Computer Engineering/ Computer Software Technology/ Computer Science & Engineering/ Digital Electronics/ Data Sciences/ Electronics & Tele-communication Engg./ Electrical and Electronics Engineering/ Electronics & Communication Engg./ Electronics Engineering/ Computer Hardware & Maintenance/ Instrumentation & Control/ Industrial Electronics/ Information Technology/ Computer Science & Information Technology/ Instrumentation/ Medical Electronics/ Computer Science/ Electronics & Computer Engg. |
| <b>Programme Code</b>   | : AI/ AN/ AO/ BD/ CM/ CO/ CST/ CW/ DE/ DS/ EJ/ EK/ ET/ EX/ HA/ IC/ IE/ IF/ IH/ IS/ MU/ SE/ TE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Semester</b>         | : First                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Course Title</b>     | : ENGINEERING GRAPHICS (Electronics, Computer and allied branches)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Course Code</b>      | : 311008                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

**I. RATIONALE**

Engineering graphics is the language of engineers. 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. This course is useful in developing drafting and sketching skills in the student. It covers the knowledge & use of drawing instruments & also familiarizes the learner about Bureau of Indian standards related to engineering drawing. The curriculum aims at developing the ability to draw and read various engineering curves, projections and dimensioning styles. The subject mainly focuses on use of drawing instruments, developing imagination and translating ideas into sketches. This course also helps to develop the idea of visualizing the actual object or part on the basis of drawings and blue prints. This preliminary course aims at building a foundation for the further courses related to engineering drawing and other allied courses in coming semesters

**II. INDUSTRY / EMPLOYER EXPECTED OUTCOME**

Prepare engineering drawing using prevailing drawing instruments.

**III. COURSE LEVEL LEARNING OUTCOMES (COS)**

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Draw geometrical figures and engineering curves.
- CO2 - Apply principles of orthographic projections for drawing given pictorial views.
- CO3 - Apply basic CAD commands for drawing different entities.
- CO4 - Use various drawing codes, conventions and symbols as per IS SP-46 in engineering drawing.
- CO5 - Draw free hand sketches of given engineering elements.

**IV. TEACHING-LEARNING & ASSESSMENT SCHEME**

| Course Code | Course Title                                                     | Abbr | Course Category/s | Learning Scheme          |    |    |     |     |                | Credits | Assessment Scheme |       |       |                  |       |     |       |             |     |     |     |  | Total Marks |
|-------------|------------------------------------------------------------------|------|-------------------|--------------------------|----|----|-----|-----|----------------|---------|-------------------|-------|-------|------------------|-------|-----|-------|-------------|-----|-----|-----|--|-------------|
|             |                                                                  |      |                   | Actual Contact Hrs./Week |    |    | SLH | NLH | Paper Duration |         | Theory            |       |       | Based on LL & TL |       |     |       | Based on SL |     |     |     |  |             |
|             |                                                                  |      |                   | CL                       | TL | LL |     |     |                |         | Practical         |       |       |                  |       |     |       |             |     |     |     |  |             |
|             |                                                                  |      |                   |                          |    |    |     |     |                |         | FA-TH             | SA-TH | Total |                  | FA-PR |     | SA-PR |             | SLA |     |     |  |             |
|             |                                                                  |      |                   |                          |    |    |     |     |                |         | Max               | Max   | Max   | Min              | Max   | Min | Max   | Min         | Max | Min |     |  |             |
| 311008      | ENGINEERING GRAPHICS (Electronics, Computer and allied branches) | EGP  | DSC               | 2                        | -  | 4  | -   | 6   | 3              | -       | -                 | -     | -     | -                | 50    | 20  | 50@   | 20          | -   | -   | 100 |  |             |

**ENGINEERING GRAPHICS (Electronics, Computer and allied branches)****Course Code : 311008****Total IKS Hrs for Sem. : 2 Hrs**

Abbreviations: CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, \*# On Line Examination , @\$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.\* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. \* Self learning hours shall not be reflected in the Time Table.
7. \* Self learning includes micro project / assignment / other activities.

**V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT**

| Sr.No | Theory Learning Outcomes (TLO's) aligned to CO's.                                                                                                                                                                                                                                | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Suggested Learning Pedagogies. |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| 1     | TLO 1.1 Prepare drawing using drawing instruments.<br>TLO 1.2 Use IS SP-46 for dimensioning.<br>TLO 1.3 Use different types of lines.<br>TLO 1.4 Draw regular geometrical figures.<br>TLO 1.5 Draw figures having tangency constructions.                                        | <b>Unit - I Basic Elements of Drawing</b><br>1.1 Drawing Instruments and supporting material: method to use them with applications.<br>1.2 Standard sizes of drawing sheets (ISO-A series)<br>1.3 I.S. codes for planning and layout.<br>1.4 Letters and numbers (single stroke vertical)<br>1.5 Convention of lines and their applications.<br>1.6 Scale - reduced, enlarged & full size<br>1.7 Dimensioning techniques as per SP-46 (Latest edition) – types and applications of chain, parallel and coordinate dimensioning<br>1.8 Geometrical constructions.                                                                                                   | Model Demonstration            |
| 2     | TLO 2.1 Explain different engineering curves with areas of application.<br>TLO 2.2 Draw different conic sections.<br>TLO 2.3 Draw involute and cycloidal curves.<br>TLO 2.4 Draw helix and spiral curves from the given data<br>TLO 2.5 Plot Loci of points from the given data. | <b>Unit - II Engineering curves &amp; Loci of Points.</b><br>2.1 Concept and understanding of focus, directrix, vertex and eccentricity. Conic sections.<br>2.2 Methods to draw an ellipse by Arcs of circle method & Concentric circles method.<br>2.3 Methods to draw a parabola by Directrix-Focus method & Rectangle method<br>2.4 Methods to draw a hyperbola by Directrix-Focus method.<br>2.5 Methods to draw involutes: circle & pentagon,<br>2.6 Methods to draw Cycloidal curve: cycloid, epicycloid and hypocycloid<br>2.7 Methods to draw Helix & Archimedean spiral.<br>2.8 Loci of points on Single slider crank mechanism with given specifications | Demonstration                  |

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| Sr.No | Theory Learning Outcomes (TLO's) aligned to CO's.                                                                                                                                                                                                                                         | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Suggested Learning Pedagogies.                    |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| 3     | TLO 3.1 Explain methods of the given types of Projections.<br>TLO 3.2 Draw orthographic views of simple 2D entities containing lines, circles and arcs only<br>TLO 3.3 Draw orthographic views from the given pictorial views.<br>TLO 3.4 Use IS code IS SP-46 for dimensioning technique | <b>Unit - III Orthographic projections</b><br>3.1 Introduction of projections-orthographic, perspective, isometric and oblique: concept and applications.<br>3.2 Orthographic projection: First angle and Third angle method, their symbols. Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces.                                                                                                                                                                  | Model<br>Demonstration<br>Video<br>Demonstrations |
| 4     | TLO 4.1 Draw basic 2D entities in Auto CAD software<br>TLO 4.2 Modify and edit the given commands.<br>TLO 4.3 Prepare 2D drawing of the given simple engineering components using Auto CAD software.<br>TLO 4.4 Print given drawing using printer/ plotter                                | <b>Unit - IV Computer Aided Drafting</b><br>4.1 Basic entities: line, circle, arc, polygon, ellipse, rectangle, multiline, polyline.<br>4.2 Commands: trim, delete, copy, offset, array, block, layers.<br>4.3 Dimensioning: linear, horizontal, vertical, aligned, rotated, baseline, continuous, diameter, radius, angular dimensions.<br>4.4 Text: Single line, multiline.<br>4.5 Standard sizes of sheet, selecting various plotting parameters such as paper size, paper units, drawing orientation, plot scale, plot offset, plot area, print preview. | Presentations<br>Video<br>Demonstrations          |
| 5     | TLO 5.1 Sketch proportionate freehand sketches of the given machine elements.<br>TLO 5.2 Select proper fasteners and locking arrangement.                                                                                                                                                 | <b>Unit - V Free Hand Sketches of Engineering Elements</b><br>5.1 Free hand sketches of machine elements: Thread profiles, nuts, bolts, studs, set screws, washers, Locking arrangements. (For branches other than mechanical Engineering, the teacher should select branch specific elements for free hand sketching)                                                                                                                                                                                                                                       | Model<br>Demonstration                            |

**VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.**

| Practical / Tutorial / Laboratory Learning Outcome (LLO)                                      | Sr No | Laboratory Experiment / Practical Titles / Tutorial Titles                                                                                                      | Number of hrs. | Relevant COs |
|-----------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------|
| LLO 1.1 Use drawing instruments                                                               | 1     | * Draw horizontal, vertical, 30 degree, 45 degree, 60 & 75 degrees lines using Tee and Set squares/ drafter. (Sketch Book).                                     | 2              | CO1          |
| LLO 2.1 Use IS code related to dimensioning standard<br>LLO 2.2 Draw the given types of lines | 2     | * Draw different types of lines, dimensioning styles (Sketch Book)                                                                                              | 2              | CO1          |
| LLO 3.1 Draw figure as per the given sketch                                                   | 3     | * Draw one figure showing dimensioning techniques, two problems on redraw the figures and one problem on loci of points - slider crank mechanism. (Sketch Book) | 2              | CO1          |
| LLO 4.1 Draw figures using IS Standard for drawing                                            | 4     | * Draw one figure showing dimensioning techniques, two problems on redraw the figures and one problem on loci of points - slider crank mechanism. (01 Sheet)    | 4              | CO1          |

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| <b>Practical / Tutorial / Laboratory Learning Outcome (LLO)</b>                           | <b>Sr No</b> | <b>Laboratory Experiment / Practical Titles / Tutorial Titles</b>                                                                                                                                                        | <b>Number of hrs.</b> | <b>Relevant COs</b>             |
|-------------------------------------------------------------------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------------|
| LLO 5.1 Identify different Engineering curves<br>LLO 5.2 Draw different types of curves   | 5            | * Draw any four Engineering Curves (Sketchbook)                                                                                                                                                                          | 2                     | CO1                             |
| LLO 6.1 Identify different Engineering curves<br>LLO 6.2 Draw different types of curves   | 6            | * Draw any four Engineering Curves – (01 Sheet)                                                                                                                                                                          | 4                     | CO1                             |
| LLO 7.1 Apply method of projection for drawing simple orthographic views                  | 7            | * Draw two problems on orthographic projections using first angle method of projection having plain surfaces, slanting surfaces and slots etc.- ( Sketchbook)                                                            | 2                     | CO2<br>CO4                      |
| LLO 8.1 Apply method of projection for drawing simple orthographic views                  | 8            | Draw two problems on orthographic projections using first angle method of projection having plain surfaces, slanting surfaces and slots etc.- (01 Sheet)                                                                 | 4                     | CO2<br>CO4                      |
| LLO 9.1 Apply method of projection for drawing complex orthographic views                 | 9            | Draw two problems on orthographic projections using first angle method of projection having cylindrical surfaces, ribs etc. (Sketchbook)                                                                                 | 2                     | CO2<br>CO4                      |
| LLO 10.1 Apply method of projection for drawing complex orthographic views                | 10           | * Draw two problems on orthographic projections using first angle method of projection having cylindrical surfaces, ribs etc.- (01 Sheet)                                                                                | 4                     | CO2<br>CO4                      |
| LLO 11.1 Apply CAD commands for drawing different entities.                               | 11           | * Draw basic 2D entities like rectangle, rhombus, polygon, arcs, circles using CAD. Commands.                                                                                                                            | 4                     | CO3                             |
| LLO 12.1 Apply CAD commands for drawing different entities.                               | 12           | * Draw basic 2D entities using rectangular and circular arrays.                                                                                                                                                          | 2                     | CO3                             |
| LLO 13.1 Apply CAD commands for drawing different entities.                               | 13           | Draw basic branch specific components using CAD commands                                                                                                                                                                 | 2                     | CO3<br>CO4                      |
| LLO 14.1 Apply CAD commands for drawing different entities.                               | 14           | Draw complex branch specific components using CAD commands.                                                                                                                                                              | 4                     | CO3<br>CO4                      |
| LLO 15.1 Draw Orthographic views of a given object.                                       | 15           | Problem Based Learning: Given the orthographic views of at least three objects with few missing lines, the student will try to imagine the corresponding objects, complete the views and draw these views (sketch book). | 2                     | CO2<br>CO4                      |
| LLO 16.1 Draw standard discipline oriented components using free hand .                   | 16           | * Draw freehand Sketches of 12 different standard components (Sketch book)                                                                                                                                               | 2                     | CO5                             |
| LLO 17.1 Draw standard discipline oriented components using free hand .                   | 17           | Draw freehand Sketches of 12 different standard components (1 Sheet)                                                                                                                                                     | 2                     | CO5                             |
| LLO 18.1 Collect information of an ancient Indian culture related to engineering graphics | 18           | * Correlate ancient Indian sculptures, Indian temples, Monuments, etc. with Engineering Graphics                                                                                                                         | 2                     | CO1<br>CO2<br>CO3<br>CO4<br>CO5 |

**Note : Out of above suggestive LLOs -**

- '\* Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

**VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)****Micro project**

- List the applications of engineering curves in different fields of engineering and submit a report on it.
- Prepare a list of industrial and household components in which conic curves are used and justify the utility of these curves.

**Note :**

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicious mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and may be considered for FA-PR evaluations.

**VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED**

| Sr.No | Equipment Name with Broad Specifications                                                                                                                                                                                                                                                            | Relevant LLO Number |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1     | CAD Workstation: 2GB RAM, 320 GB HDD, 17" screen, 1GHz (Minimum Requirement)                                                                                                                                                                                                                        | 11,12,13,14         |
| 2     | Plotter: Print Resolution upto 1200X600 Dpi, 16 MB Memory                                                                                                                                                                                                                                           | 11,12,13,14         |
| 3     | Licensed Latest Network of AutoCAD Software                                                                                                                                                                                                                                                         | 11,12,13,14         |
| 4     | Models/ Charts of objects mentioned in unit no. 5                                                                                                                                                                                                                                                   | 16,17               |
| 5     | Models of objects for orthographic projections                                                                                                                                                                                                                                                      | 7,8,9,10            |
| 6     | Drawing Table with Drawing Board of Full Imperial/ A1 size.                                                                                                                                                                                                                                         | All                 |
| 7     | Set of various industrial drawings being used by industries.                                                                                                                                                                                                                                        | All                 |
| 8     | Set of drawings sheets mentioned in section 6.0 could be developed by experienced teachers and made used available on the MSBTE portal to be used as reference/standards.                                                                                                                           | All                 |
| 9     | Drawing equipment and instruments for class room teaching-large size: a. T-square or drafter (Drafting Machine). b. Set squares (450 and 300-600) c. Protector. d. Drawing instrument box (containing set of compasses and dividers). Drawing sheets, Drawing pencils, Eraser, Drawing pins / clips | All                 |

**IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)**

| Sr.No              | Unit | Unit Title                                 | Aligned COs | Learning Hours | R-Level  | U-Level  | A-Level   | Total Marks |
|--------------------|------|--------------------------------------------|-------------|----------------|----------|----------|-----------|-------------|
| 1                  | I    | Basic Elements of Drawing                  | CO1         | 6              | 0        | 0        | 8         | 8           |
| 2                  | II   | Engineering curves & Loci of Points.       | CO1         | 6              | 0        | 0        | 8         | 8           |
| 3                  | III  | Orthographic projections                   | CO2,CO4     | 8              | 0        | 0        | 16        | 16          |
| 4                  | IV   | Computer Aided Drafting                    | CO3,CO4     | 4              | 0        | 0        | 8         | 8           |
| 5                  | V    | Free Hand Sketches of Engineering Elements | CO4,CO5     | 6              | 0        | 0        | 10        | 10          |
| <b>Grand Total</b> |      |                                            |             | <b>30</b>      | <b>0</b> | <b>0</b> | <b>50</b> | <b>50</b>   |

**X. ASSESSMENT METHODOLOGIES/TOOLS**

**ENGINEERING GRAPHICS (Electronics, Computer and allied branches)****Course Code : 311008****Formative assessment (Assessment for Learning)**

- Term work

**Summative Assessment (Assessment of Learning)**

- Practical

**XI. SUGGESTED COS - POS MATRIX FORM**

| Course Outcomes (COs) | Programme Outcomes (POs)                     |                       |                                       |                        |                                                                        |                         |                         | Programme Specific Outcomes* (PSOs) |       |       |
|-----------------------|----------------------------------------------|-----------------------|---------------------------------------|------------------------|------------------------------------------------------------------------|-------------------------|-------------------------|-------------------------------------|-------|-------|
|                       | PO-1 Basic and Discipline Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/ Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO-1                               | PSO-2 | PSO-3 |
| CO1                   | 3                                            | -                     | -                                     | 2                      | -                                                                      | 2                       | -                       |                                     |       |       |
| CO2                   | 3                                            | -                     | -                                     | 2                      | -                                                                      | 2                       | -                       |                                     |       |       |
| CO3                   | 3                                            | -                     | -                                     | 2                      | -                                                                      | 2                       | -                       |                                     |       |       |
| CO4                   | 3                                            | -                     | -                                     | 2                      | -                                                                      | 2                       | 2                       |                                     |       |       |
| CO5                   | 3                                            | -                     | -                                     | 2                      | -                                                                      | 2                       | -                       |                                     |       |       |

Legends :- High:03, Medium:02,Low:01, No Mapping: -  
 \*PSOs are to be formulated at institute level

**XII. SUGGESTED LEARNING MATERIALS / BOOKS**

| Sr.No | Author                      | Title                                                           | Publisher with ISBN Number                                                     |
|-------|-----------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------------------|
| 1     | Bureau of Indian Standards. | Engineering Drawing Practice for Schools and Colleges IS: SP-46 | Third Reprint, October 1998 ISBN No. 81-7061-091-2                             |
| 2     | Bhatt, N.D.                 | Engineering Drawing                                             | Charotar Publishing House, 2010 ISBN No. 978-93-80358-17-8                     |
| 3     | Bhatt, N.D.; Panchal, V. M  | Machine Drawing                                                 | Charotar Publishing House, 2010 ISBN No. 978-93-80358-11-6                     |
| 4     | Jolhe, D.A.                 | Engineering Drawing                                             | Tata McGraw Hill Edu. New Delhi, 2010, ISBN No. 978-0-07-064837-1              |
| 5     | Dhawan, R. K.               | Engineering Drawing                                             | S. Chand and Company New Delhi, ISBN No. 81-219-1431-0                         |
| 6     | Pradhan, S.K Jain, K.K      | Engineering Graphics                                            | Khanna Book Publishing CO(P) LTD, New Delhi, ISBN No. 978-93-91505-50-9        |
| 7     | Jeyapoovan T                | Engineering Drawing and Graphics using AutoCAD                  | Vikas Publishing House Pvt. Ltd., First Reprint 2013, ISBN NO.978-81259-4000-5 |
| 8     | Salunkhe R                  | AutoCAD 2013 2D & 3D for Civil and Mechanical Engineering       | Aruta Publishers Chiplun, 2013, ISBN No. 978-81-902648-1-5                     |

**XIII. LEARNING WEBSITES & PORTALS**

| Sr.No | Link / Portal                                                                                         | Description                          |
|-------|-------------------------------------------------------------------------------------------------------|--------------------------------------|
| 1     | <a href="https://www.youtube.com/watch?v=dmt6_n7Sgcg">https://www.youtube.com/watch?v=dmt6_n7Sgcg</a> | Free Hand Sketches                   |
| 2     | <a href="https://www.youtube.com/watch?v=dmt6_n7Sgcg">https://www.youtube.com/watch?v=dmt6_n7Sgcg</a> | Orthographic Projection              |
| 3     | <a href="https://www.youtube.com/watch?v=3WXPanCq9LI">https://www.youtube.com/watch?v=3WXPanCq9LI</a> | Basics of Projection                 |
| 4     | <a href="https://www.youtube.com/watch?v=fvjk7PlxAuo">https://www.youtube.com/watch?v=fvjk7PlxAuo</a> | Introduction to Engineering Graphics |

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| Sr.No                                                                                                                                                                                                                            | Link / Portal                                                                                         | Description       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------|
| 5                                                                                                                                                                                                                                | <a href="https://www.youtube.com/watch?v=cmR9cfWJRUU">https://www.youtube.com/watch?v=cmR9cfWJRUU</a> | Basics of AutoCAD |
| <b>Note :</b> <ul style="list-style-type: none"><li>Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students</li></ul> |                                                                                                       |                   |

**MSBTE Approval Dt. 01/10/2024****Semester - 1, K Scheme**