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|--|--|-------------|-----|
| Course Title:  | <b>Computer Aided Engineering Drawing (Common to All )</b> |             |     |
| Course Code  | <b>BCEDK203/203</b>  | CIE Marks   | 50  |
| Teaching Hour/Week (L:T:P:S)   | 2:0:2:0  | SEE Marks   | 50  |
| Total Hours of Teaching - Learning   | 40   | Total Marks | 100 |
| Credits  | 03   | Exam Hours  | 03  |
| <b>Course Learning Objectives:</b><br><b>CLO1:</b> To understand the basic principles and conventions of engineering drawing<br><b>CLO2:</b> To use drawing as a communication mode<br><b>CLO3:</b> To generate pictorial views using CAD software<br><b>CLO4:</b> To understand the development of surfaces<br><b>CLO5:</b> To visualize engineering components   |  |             |     |
| <b>Teaching-Learning (General Instructions):</b> <ul style="list-style-type: none"> <li>Students should be made aware of powerful engineering communication tool –Drawing.</li> <li>Simple Case studies can be suitably selected by the teacher for hands on practice to induce the feel of fruitfulness of learning.</li> <li>Appropriate Models, Power Point presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.</li> <li>For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc can be used. Similarly for other shapes)</li> <li>Use any CAD software for generating orthographic and pictorial views.</li> <li>Make use of sketch book with graph sheets for manual / preparatory sketching</li> </ul>  |  |             |     |
| <b>Module-1</b>  |  |             |     |
| <b>Introduction: for CIE only</b><br>Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.<br><b>Orthographic Projections of Points, Lines and Planes:</b><br>Introduction to Orthographic projections: Orthographic projections of points in 1 <sup>st</sup> and 3 <sup>rd</sup> quadrants.<br>Orthographic projections of lines (Placed in First quadrant only).<br>Orthographic projections of planes viz triangle, square, rectangle, pentagon, hexagon, and circular laminae (Placed in First quadrant only using change of position method).<br><b>Application on projections of Lines &amp; Planes (For CIE only)</b> |  |             |     |
| <b>Module-2</b>  |  |             |     |
| <b>Orthographic Projection of Solids:</b><br>Orthographic projection of right regular solids ( <b>Solids Resting on HP only</b> ): Prisms & Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes & Tetrahedron.<br><b>Projections of Frustum of cone and pyramids (For practice only, not for CIE and SEE).</b>  |  |             |     |

| Module-3   |
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| <p><b>Isometric Projections:</b><br/>Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids.</p> <p><b>Conversion of simple isometric drawings into orthographic views.</b><br/>Problems on applications of Isometric projections of simple objects / engineering components.</p> <p><i>Introduction to drawing views using 3D environment (For CIE only).</i></p>   |
| Module-4   |
| <p><b>Development of Lateral Surfaces of Solids:</b><br/>Development of lateral surfaces of right regular prisms, cylinders, pyramids and cones resting with base on HP only. Development of lateral surfaces of their frustums and truncations.<br/>Problems on applications of development of lateral surfaces like funnels and trays.</p> <p><i>Problems on applications of development of lateral surfaces of transition pieces connecting circular duct and rectangular duct (For CIE Only)</i></p>   |
| Module-5   |
| <p><b>Multidisciplinary Applications &amp; Practice (For CIE Only):</b><br/> <b>Free hand Sketching;</b> True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools &amp; Furniture's etc<br/> <b>Drawing Simple Mechanisms;</b> Bicycles, Tricycles, Gear trains, Ratchets, two-wheeler cart &amp; Four-wheeler carts to dimensions etc<br/> <b>Electric Wiring and lighting diagrams;</b> Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software<br/> <b>Basic Building Drawing;</b> Like, Architectural floor plan, basic foundation drawing, steel structures- Frames, bridges, trusses using Auto CAD or suitable software,<br/> <b>Electronics Engineering Drawings-</b> Like, Simple Electronics Circuit Drawings, practice on layers concept.<br/> <b>Graphs &amp; Charts:</b> Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.</p> |
| <p><b>Course Outcomes</b><br/>At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> <li><b>CO 1.</b> Draw and communicate the objects with definite shape and dimensions</li> <li><b>CO 2.</b> Recognize and Draw the shape and size of objects through different views</li> <li><b>CO 3.</b> Develop the lateral surfaces of the object</li> <li><b>CO 4.</b> Create a Drawing views using CAD software.</li> <li><b>CO 5.</b> Identify the interdisciplinary engineering components or systems through its graphical representation.</li> </ul>   |

**Assessment Details (both CIE and SEE):**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks) and that for SEE minimum passing marks is 35% of the maximum marks (18 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE)**

- CIE shall be evaluated for max. marks of 100 and later the same shall be scaled-down to 50 marks as detailed below:
- CIE component should comprise of Continuous evaluation of Drawing work of students as and when the Modules are covered based on below detailed weightage.

| Module                             | Max. Marks Weightage | Evaluation Weightage in marks                                 |                  |
|------------------------------------|----------------------|---|------------------|
|                                    |                      | Computer display and print out<br>(a)                         | Sketching<br>(b) |
| Module 1                           | 15                   | 10  | 05               |
| Module 2                           | 20                   | 15  | 05               |
| Module 3                           | 20                   | 20  | 00               |
| Module 4                           | 20                   | 20  | 00               |
| Module 5                           | 25                   | 15  | 10               |
| <b>Total</b>                       | <b>100</b>           | <b>80</b>   | <b>20</b>        |
| <b>Consideration of Class work</b> |                      | <b>Total of [(a) + (b)] = 100<br/>Scaled down to 30 Marks</b> |                  |

- At least one **Test** covering all the modules is to be conducted for 100 marks and evaluation to be based SEE pattern, and the same is to be scaled down to **20 Marks**.
- The final CIE = Class work marks + Test marks

**Semester End Examination (SEE)**

- SEE shall be conducted and evaluated for maximum marks 100. Marks obtained shall be accounted for SEE final marks, reducing it by 50%
- Question paper shall be set jointly by both Internal and External Examiner and made available for each batch as per schedule. ***Questions are to be set preferably from TextBooks.***
- **Related to Module-1:** One full question can be set either from “*points & lines*” or “*planes*”.
- Evaluation shall be carried jointly by both the examiners.
- Scheme of Evaluation: *To be defined by the examiners jointly and the same shall be submitted to the university along with question paper.*
- One full question shall be set from each of the Module from Modules 1,2,3 and 4 as per the below table weightage details. **However, the student may be awarded full marks, if he/she completes solution on computer display without sketch.**

| Module                            | Max. Marks Weightage | Evaluation Weightage in marks                   |                           |
|-----------------------------------|----------------------|---|---------------------------|
|                                   |                      | Computer display and print out (a)              | Preparatory sketching (b) |
| Module 1                          | 20                   | 15  | 05                        |
| Module 2                          | 30                   | 25  | 05                        |
| Module 3                          | 25                   | 20  | 05                        |
| Module 4                          | 25                   | 20  | 05                        |
| <b>Total</b>                      | <b>100</b>           | <b>80</b>                                       | <b>20</b>                 |
| <b>Consideration of SEE Marks</b> |                      | <b>Total of (a) + (b) ÷ 2 = Final SEE marks</b> |                           |

### Suggested Learning Resources:

#### Text Books

- *S.N. Lal, & T Madhusudhan*., Engineering Visulisation, 1<sup>st</sup> Edition, Cengage,Publication
- *Parthasarathy N. S., Vela Murali*, Engineering Drawing, Oxford University Press,2015.

#### Reference Books

- *Bhattacharya S. K.*, Electrical Engineering Drawing, New Age International publishers, second edition 1998, reprint2005.
- *Chris Schroder*, Printed Circuit Board Design using AutoCAD, Newnes,1997.
- *K S Sai Ram* Design of steel structures, , Third Edition byPearson
- *Nainan p kurian* Design of foundation systems, Narosapublications
- *A S Pabla*, Electrical power distribution, 6th edition, Tata Mcgrawhill
- *Bhatt, N.D.*, *Engineering Drawing: Plane and Solid Geometry*, 53<sup>rd</sup> edition, Charotar Publishing House Pvt. Limited, 2019.
- *K. R. Gopalakrishna, & Sudhir Gopalakrishna*: Textbook Of Computer Aided Engineering Drawing, 39<sup>th</sup> Edition, Subash Stores, Bangalore,2017

### COs and POs Mapping (CO-PO mappings are only Indicative)

| COs | POs |   |   |   |   |   |   |   |   |    |    |    |
|-----|-----|---|---|---|---|---|---|---|---|----|----|----|
|     | 1   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| CO1 | 3   | 2 |   |   | 3 | 1 |   | 1 | 1 | 3  |    | 2  |
| CO2 | 3   | 2 |   |   | 3 | 1 |   | 1 | 1 | 3  |    | 2  |
| CO3 | 3   | 2 |   |   | 3 | 1 |   | 1 | 1 | 3  |    | 2  |
| CO4 | 3   | 3 |   |   | 3 | 1 | 1 |   | 1 | 3  |    | 1  |
| CO5 | 3   | 2 |   |   | 3 |   |   |   | 1 | 3  |    | 2  |

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped