SHORT TERM VOCATIONAL CERTIFICATE COURSE

AUTOCAD [2D & 3D]
(6 Months Duration)

Prepared by

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AUTOCAD [2D & 3D]

Name of the course : **AUTOCAD [2D & 3D]**
Sector : **Engineering Sector**

Course Code : **ACAD**

Entry Qualification : **SSC or Above**

Duration : 6 Months - (40 Hours: English + Course content: 200 Hours)

Terminal competence :

By the end of the course the trainees will be able to work as surveyors and also, they can independently carry out/levelling work needed for the different types of construction sites

Introduction of the course:

AutoCAD is a powerful computer-aided design (CAD) software developed by Autodesk. It is widely used by architects, engineers, and professionals in various fields to create precise 2D and 3D drawings and models. This course will introduce you to the basics of AutoCAD, including its interface, fundamental commands, and essential tools.

Objectives:

By the end of the course, the students should learn

- Basic Principles of surveying
- Handling surveying equipment like chain, compass, Dumpy Level, Theodolite, total Station
- Measuring the size and shape of an area of land

Skills:

By the end of the course, the students should learn

- Measuring distances, calculating the areas, preparing the maps and reports.
- Measurement of horizontal and vertical angles with theodolite.
- Mapping the position of boundaries of land/site.
- Recording the features like agriculture fields, ponds & lakes.
- Recording the levels of land and earth work calculations.
- Setting out footings, columns, plan of a building on the ground.

SYLLABUS (THEORY)

S.No	Major Topics	No of Hours	Weightage
1	Introduction to Lettering and Dimensioning	35	1
2	Geometric Construction	35	17
3	Orthographic Projections	30	16
4	Levelling	35	17
5	Introduction to Theodolite Surveying	30	17
6	Total Station Survey & DGPS	35	17
	Total		

I. Introduction to Lettering and Dimensioning:

a) Scope and objective of the subject
b) Importance of engineering drawing as a communication medium
c) Drawing instruments and their uses
d) Scales: Recommended scales, reduced & enlarged.
e) Sheet sizes: A0, A1, A2, A3, A4, A5. Layout of drawing sheet sizes of title block and its contents
f) Simple exercises on the use of drawing instruments.
g) Types of Lettering
h) Singel Stroke Letters
i) Dimensioning - rules and systems of dimensioning – dimensioning a given drawing

II. Geometric Construction:

a) Bisecting a line - perpendiculars - parallel lines - division of a line
b) Angles - bisection, trisection
c) Tangent lines touching circles internally and externally
d) Polygons - Regular polygons - circumscribed and inscribed in circles.
e) Conic sections - Definitions of focus, directrix, eccentricity
f) Construction of Ellipse by Concentric circles method.
g) Construction of parabola by rectangular method.
h) Construction of Hyperbola when given the position of point from X-axis and Y-axis.
i) Neat Sketches of only 3 views for describing object
j) Concept of Front view, Top view, and Side view, sketching of these views for a number of engineering objects.

III. Orthographic Projections:

a) Definition - Planes of Projection- Four quadrants - Reference line.
b) Projections of straight lines
c) Projections of planes
d) Projections of solids
e) Single bed roomed residential building
f) Two bed roomed residential building
g) Single storey one bed room residential building (Framed structure)
h) Single storey two bed room residential building (Framed Structure)
i) Multi storey residential building
j) Hospital building
k) Office building

IV. Modeling:

a) Modeling fundamentals for engineering Design
b) Shape modeling and its applications
c) Drawing Elementary CADD Command-Line, Polyline, Polygon, Circle, Ellipse: Text-Single, Multi-text.
d) Modifying Elementary Commands – Erase, Move, Copy, Mirror, Offset, trim, Extend, Scale, Strech, Chamfer, Fillet & Explode.

V. CADD:

a) Definition of CAD, Applications and Advantages of CAD
b) Methods to access AutoCAD commands
c) Geometrical figures, using draw commands
d) Practice on different commands
e) Conventional signs used in civil engineering drawing
f) Line sketch of building, Cross section of wall
g) Introduction to CADD – Function Keys, Shortcut Keys
h) Application of CADD – Automatic Drafting, Geometric Modeling
i) Geometric Modeling – Wire frame modeling, surface modeling and solid modeling
j) CADD Application and its features
k) Introduction to Standard based 2D drafting [Based on International Standard for representation & confirmation]

PRACTICAL:

l) Making Layers, Line type & Line weight

m) Different menus of AutoCAD, function keys, shortcut Kets, paper size.
n) Making title block, writing it & inserting it any drawing file with scale, angle & explode options.
o) Creating a new template file (.Dwt file) & applying it to every drawing file.
p) Drafting of building plan, elevation, section views.
q) Applying dimensions to various views by using dimensions

VI. 3D Design:

a) Concept of 3D Design
b) X, Y, Z Coordination System
c) Creating Revolved, ruled and Tabulated & Edge surfaces
d) Creating Isometric drawing with the Iso plane shaded it from visual style
e) Making solid model box, poly solid, cylinder, cone, pyramid, wedge, torus
f) Project – Site visit.
g) Building Drawing Plam
h) Building Detailing, Building Model

SCHEME OF INSTRUCTION/MODULE:

1. **Communicative English: 40 hours**
2. **Course : 200 hours**

Duration of Course	**Theory**		**On the Job Training**		**Total**	
	Hours	**weightage**	**Hours**	**weightage**	**Hours**	**weightage**
1 Module (06 months)	60	30%	140	70%	200	100%

SYLLABUS (THEORY)

1. Introduction to lettering and Dimensioning - 05
2. Geometric Construction - 10

3. Orthographic Projections - 15
4. Modeling - 10
5. CADD - 10
6. 3D Design - 10

ON THE JOB TRAINING/PRACTICAL

1. Introduction to lettering and Dimensioning - 20
2. Geometric Construction - 25
3. Orthographic Projections - 25
4. Modeling - 25
5. CADD - 25
6. 3D Design - 20

LIST OF EQUIPMENT

1. Work Station
2. High Performance Computers
3. AutoCAD software [2D & 3D Design]
4. Plotters & Printers
5. Flatbed Scanners & 3D Scanners

Qualifications of Teaching Faculty:

1. Graduation from any recognized university with an aggregate of 55% marks in a relevant field such as Civil Engineering/ Bachelor of Architecture or a related discipline.
2. 3+ Years of Experience working in office environments, preferably in roles that involve utilizing AutoCAD tools and technologies.

Reference books/ Internet links:

1. AutoCAD 2024: A Problem-Solving Approach, Basic and Intermediate" by Sham Tickoo
2. AutoCAD 2024 For Dummies" by Bill Fane and David Byrnes
3. Mastering AutoCAD 2024 and AutoCAD LT 2024" by Brian C. Benton

DIVISION OF MARKS:

Theory: 100 Max. Marks

1. Communicative English : 20 marks
2. Short Questions : 6 x5m =30 marks
3. Long Questions : 4x10m = 40 marks
4. Multiple Choice Questions : 10x1=10 marks

Practical: 100 Max. Marks

1. External : 40 marks
2. Record/ Mini Project : 10 marks
3. Internship (OJT) : 50 marks

STATE INSTITUTE OF VOCATIONAL EDUCATION
O/o DIRECTOR OF INTERMEDIATE EDUCATION, TELANGANA, HYDERABAD
SHORT TERM VOCATIONAL CERTIFICATE COURSE

REGD. NO.

TIME: 3 HRS **MAX MARKS: 100**

AUTOCAD [2D & 3D]
MODEL QUESTION PAPER (THEORY)

SECTION- A

COMMUNICATIVE ENGLISH 20 MARKS

SECTION- B

Note: a) Answer ALL questions.
b) Each question carries **5 Marks**. **6X5M=30 MARKS**

1. What is the importance of engineering drawing as a communication medium?
2. List the recommended scales used in engineering drawings. Define meridian and write the types of meridians.
3. What are the different types of lettering used in technical drawings?
4. Explain the difference between parallel and perpendicular lines.
5. What is the function of a title block on a drawing sheet?
6. Define the term 'orthographic projection'?

SECTION- C

Note: a) Answer any **FOUR** questions.
b) Each question carries **10 Marks**. **4X10M=40 MARKS**

1. Discuss various drawing instruments used in technical drawing and mention their specific uses.
2. Explain the process of constructing an ellipse using the concentric circles method. Provide a step-by-step guide.
3. Describe the rules and systems of dimensioning in technical drawings. How is dimensioning applied to a given drawing?
4. Outline the steps involved in projecting a solid in orthographic projection. Include an example of projecting a simple geometric solid.
5. Discuss the advantages and applications of CAD in modern engineering design. How does CAD improve the design process?

6. Explain the process of creating a 3D model in AutoCAD. What are the key commands and steps involved in modelling a simple object like a box or cylinder?

SECTION-D **10X1=10 Marks**

1. What is the primary purpose of engineering drawings?
   a. Decoration
   b. Communication
   c. Entertainment
   d. Data Storage

2. Which of the following is NOT a recommended scale for technical drawings?
   a) 1:1
   b) 1:5
   c) 2:1
   d) 3:2

3. What type of lettering is typically used in technical drawings?
   a) Calligraphy
   b) Single-Stroke Gothic
   c) Cursive
   d) Script

4. Which drawing instrument is used to draw circles and arcs?
   a. Ruler
   b. Protractor
   c. Compass
   d. Set square

5. What is an orthographic projection?
   a. A perspective drawing technique
   b. A method of representing three-dimensional objects in two dimensions
   c. A type of isometric drawing
   d. A shading technique for 3D models

6. In AutoCAD, which command is used to create a copy of an object?
   a. Mirror
   b. Offset
   c. Copy
   d. Scale

7. Which method is used to construct an ellipse in geometric drawing?
    a. Trisection method
    b. Concentric circles method
    c. Tangent method
    d. Division method

8. What information is typically found in the title block of a drawing sheet?
    a. Drawing number, author, date
    b. Drawing number, scale, paper type
    c. Author, paper size, printer settings
    d. Date, paper type, drawing medium

9. What is the use of layers in AutoCAD?
    a. To create 3D models
    b. To organize and manage different elements of a drawing
    c. To apply textures
    d. To print drawings

10. Which AutoCAD command is used to draw a polygon?
    a) Polyline
    b) Circle
    c) Polygon
    d) Ellipse

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MODEL QUESTION PAPER (PRACTICAL)

Note: a) Answer ALL questions.
b) Each question carries **10 Marks**. **4X10=40MARKS**

1. Draw and Dimension a Simple Mechanical Part Using AutoCAD, create a detailed 2D drawing of a simple mechanical part such as a flange or bracket. Include all necessary dimensions, annotations, and labels.

2. Construct an ellipse using the concentric circles method. Start with the given major and minor axes and accurately plot the ellipse.

3. Create an orthographic projection of a given 3D object, such as a simple geometric shape or an engineering component.

4. Create a 3D model of a simple object like a box, cylinder, or cone using AutoCAD.

Record/Mini Project & Viva **10 Marks**

Internship **50 Marks**