GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)
Semester - II

CourseTitle: Architectural Drawing
(Course Code: 4325002)

Diploma programme in which this course is offered	Semester in which offered
Architectural Assistantship	Second

1. RATIONALE

Architectural Drawing is a course which develops one's power of visualization of an object in third dimension by studying it's given plan, elevation and side elevation and thus will enable the learner to generate architectural drawings. It also develops the learner's perspective drawing skills. Further, this course also develops one's ability to compute the dimensions so as to be able to represent them in correct manner. This course enables the learner to develop necessary skills for preparing technically correct Architectural Presentation Drawings.

2. COMPETENCY

The purpose of this course is to help the student to attain the following industry identified competency through various teaching-learning experiences:

- **Draw perspective drawing of any given building/ object**
- **Prepare technical drawings of solid objects based on given specific conditions**

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge and the relevant soft skills associated with the identified competency are to be developed in the student for the achievement of the following COs:

a) Draw sections, projections and develop surfaces of solids for a given situation
b) Prepare perspective drawing of a given object or building
c) Prepare presentation drawings both manually as well as with CAD software

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
3	0	2	4	30*	70	25	25	150

(*):Out of 30 marks under the theory CA, 10 marks are for assessment of the micro-project to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken

during the semester for the assessing the attainment of the cognitive domain UOs required for the attainment of the COs.

***Legends: L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit, **CA** - Continuous Assessment; **ESE** -End Semester Examination.*

5. SUGGESTED PRACTICAL EXERCISES

The following practical outcomes (PrOs) are the sub-components of the COs. *Some of the **PrOs** marked **'*'** are compulsory, as they are crucial for that particular CO at the 'Precision Level' of Dave's Taxonomy related to 'Psychomotor Domain'.*

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Draw projections of different types of solids for vertical/horizontal position.	1	3
2	Draw projections of different types of solids inclined to one plane only.	1	3
3	Draw projections of different types of sections of solids for different positions of the cutting plane.	2	6
4	Draw the development of surface of different types of simple solids.	3	2
5	Draw the development of surface of different types of truncated solids.	3	2
6	Draw perspective drawings of given problems with respect to, 1. Object touching the picture plane. 2. Object in front of picture plane 3. Object behind picture plane.	4	4
7	Draw perspective drawings of given problems with different eye levels.	4	4
8	Prepare given presentation drawings with the help of CAD software	5	4
	Total		**28**

Note

i. *More **Practical Exercises** can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. The above table is only a suggestive list.*

ii. *The following are some **sample** 'Process' and 'Product' related skills (more may be added/deleted depending on the course) that occur in the above listed **Practical Exercises** of this course required which are embedded in the COs and ultimately the competency.*

S. No.	Sample Performance Indicators for the PrOs	Weightage in %
1	Drawing planning and layout – overall composition (for optimum use of drawing sheet)	10
2	Use of appropriate instruments, lines, dimensioning & annotations.	20

S. No.	Sample Performance Indicators for the PrOs	Weightage in %
3	Completing given practice problems	30
4	Accuracy of drawing	10
5	Neatness of drawing	10
6	Timely submission of completed drawing sheet	10
7	Answering viva voce questions	10
Total		**100**

Note: *Use above sample assessment scheme for practical exercises 1 to 7*

S. No.	Sample Performance Indicators for the PrOs	Weightage in %
1	Selecting relevant set up parameters	10
2	Creating given drawing using relevant Commands	40
3	Dimensioning the given drawing and writing text using blocks and layers effectively.	40
4	Submission of digital drawing file/plot in time	10
Total		**100**

Note: *Use above sample assessment scheme for practical exercises 8*

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

These major equipment with broad specifications for the PrOs is a guide to procure them by the administrators to usher in uniformity of practicals in all institutions across the state.

S. No.	Equipment Name with Broad Specifications	PrO.No.
1	Drawing instruments for class room teaching (Large Size).	1-7
2	Drawing Board (A1 : 23”x32” Size)	1-7
3	Other Instruments: Parallel, Set squares (45˚ and 30˚-60˚), Adjustable Set Squares, Protractor, Drawing Compass, Dividers, Drawing Pencils, Circle Master, French Curves, Stencils (8-6-4 mm, All in One), Eraser, Drawing sheets, Drawing Pins/Clips, Sheet Container and Drawing instrument box. ***(Note : Roller Scale to be used only for Sketch book practice work)***	1-7
4	Interactive board with LCD overhead projector	1-8
5	CAD Workstation: i7, 2 GB RAM, 320 GB HDD, 17” Screen, 1 GHz. (Minimum requirement)	8
6	Plotter: Print resolution Up to 1200 x 600 dpi, 16 MB Memory	8
7	Licensed latest network version of AutoCAD software	8

7. AFFECTIVE DOMAIN OUTCOMES

The following ***sample*** Affective Domain Outcomes (ADOs) are embedded in many of the above-mentioned COs and PrOs. More could be added to fulfill the development of this course competency.

a) Work as a leader/a team member.
b) Follow ethical practices.
c) Shutdown the CAD workstation when not in use.
d) Also turn off all electrical devices when not in use.

The ADOs are best developed through the laboratory/field based exercises. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

i. 'Valuing Level' in 1st year
ii. 'Organization Level' in 2nd year.
iii. 'Characterization Level' in 3rd year.

8. UNDERPINNING THEORY

The major underpinning theory is given below based on the higher level UOs of Revised Bloom's taxonomy that are formulated for development of the COs and competency. If required, more such UOs could be included by the course teacher to focus on attainment of COs and competency.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
Unit – I **Projections of Solids**	1a. Draw projections of different types of solids in vertical/horizontal position. 1b. Draw projections of different types of solids inclined to one plane only.	1.1 Different types of solids like cube, prism, pyramids, cone and cylinder. 1.2 Different terms like apex, axis, slant edge, meaning and identification of the true length of the base side, true length of the slant edge, and true shape of triangular face of pyramids, etc. 1.3 Procedure for drawing various positions of solids relative to the reference planes, projections of solids: • Vertical/horizontal Position • Inclined to one plane only
Unit: II **Sections of Solids**	2a. Draw projections of different types of sections of solids for different positions of the cutting plane.	2.1 Introduction of cutting planes, auxiliary planes, true shape, full section, half section. 2.2 Procedure for drawing the projections of solid sections such as cube, prism, pyramid,

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
		cone and cylinder for the given position of the cutting plane
Unit: III **Development of Surfaces**	3a. Draw the development of surface of different types of simple solids. 3b. Draw the development of surface of different types of truncated solids.	3.1 Development of simple and truncated geometrical solids such as cube, prisms, pyramids, cylinder and cone
Unit: IV **Perspective Views**	4a. Draw perspective drawings of given problems with respect to:- 1) Simple objects placed in relation with picture plane and station point like: i) Object touching the picture plane ii) Object in front of picture plane iii) Object behind picture plane 2) Simple object keeping eye level at different levels: i) Eye level above object. ii) Eye Level below than the given object.	4.1 Important Terms - Picture Plane, Station point, Vanishing point, Eye level, Ground level, Central visual ray, etc. 4.2 Perspective drawings, • One Point Perspective • Two Point Perspective
Unit–V **Architectural Rendering Techniques**	5a. Prepare architectural presentation drawings with rendering, both manually as well as with CAD software	5.1 Different Rendering Techniques: Different types of rendering techniques showing various rendering patterns, human figures, vehicles, furniture, trees etc.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTIONPAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A	Total Marks
I	Projections of Solids	9	2	2	10	14
II	Sections of Solids	9	2	2	10	14
III	Development of Surfaces	7	2	2	10	14
IV	Perspective Views	10	4	5	12	21
V	Architectural Rendering Techniques	7	2	1	4	07
Total		**42**	**12**	**12**	**46**	**70**

Legends: *R=Remember, U=Understand, A=Apply and above (Revised Bloom's taxonomy)*

Note*: This specification table provides general guidelines to assist students for their learning and to teachers to teach and question paper designers/setters to formulate test items/questions to assess the attainment of the UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may slightly vary from above table.*

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related **co-curricular** activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should perform following activities in group and prepare reports of about 5 pages for each activity. They should also collect/record physical evidences for their (student's) portfolio which may be useful for their placement interviews:

a) Solve all problems for all sheets number 1 to 8 in A2 size cartridge sheets (with complete data and dimensions) after practicing in sketch book.
b) Take two simple objects in your vicinity and sketch its perspective.
c) Download the soft copy of plan, section and elevation of any building. Read and interpret this drawing.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a) Massive open online courses (***MOOCs***) may be used to teach various topics/sub topics.
b) Guide student(s) in undertaking micro-projects.
c) ***'L' in section No. 4***means different types of teaching methods that are to be employed by teachers to develop the outcomes.
d) About ***20% of the topics/sub-topics*** which are relatively simpler or descriptive in nature is to be given to the students for ***self-learning***, but to be assessed using different assessment methods.
e) With respect to ***section No.10***, teachers need to ensure to create opportunities and provisions for ***co-curricular activities***.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project is group-based (group of 3 to 5). However, **in the fifth and sixth semesters**, the number of students in the group should **not exceed three**.

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The duration of the micro-project should be about **14-**

16 (fourteen to sixteen) student engagement hours during the course. The students ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. This has to match the competency and the COs. Similar micro-projects could be added by the concerned course teacher:

a) Prepare perspective drawings of existing or planned buildings
b) Prepare existing building architectural drawings in CAD with rendering
c) Sketch free-hand perspective views of existing buildings in the sketch book
d) List the impact of ability of manual drafting on computer aided drafting.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Engineering Drawing	N.D.Bhatt	Charotar Publishing House;Anand, 2014. ISBN : 9789380358963
2	Textbook of Engineering Drawing	P.J. Shah	S.Chand, New Delhi. 2013 ISBN : 9788121941822
3	Engineering Drawing	M.B. Shah, B.C. Rana	Pearsons. 2009 ISBN: 9788131759714
4	Engineering Drawing	BasantAgrawal, C. M. Agrawal	McGraw-Hill, 2019 ISBN : 9789353167448
5	AutoCAD 2020: A ProblemSolving Approach, Basic and Intermediate	Sham Tickoo	26th Edition, CADCIM Technologies, 2019
6	AutoCAD 2013, Command Reference Guide	Autodesk Inc.	Autodesk Inc.

14. SOFTWARE/LEARNING WEBSITES

- https://www.youtube.com/results?search_query=engineering+drawing
- https://youtu.be/MT1T31GtGpg
- https://youtu.be/WEwkepkv6mg
- https://youtu.be/trJQIvatIpI
- https://nptel.ac.in/courses/112/103/112103019
- https://nptel.ac.in/courses/112/105/112105294
- https://en.wikipedia.org/wiki/Engineering_drawing i)
- https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing
- https://www.scribd.com/search?content_type=tops&pa

15. PO-COMPETENCY-CO MAPPING

Semester I	Architectural Drawing (Course Code: 4315002)								
	POs and PSOs								
Competency & Course Outcomes	**PO 1** Basic & Discipline specific knowledge	**PO 2** Problem Analysis	**PO 3** Design/ development of solutions	**PO 4** Engineering Tools, Experimentation &Testing	**PO 5** Engineering practices for society, sustainability & environment	**PO 6** Project Management	**PO 7** Life-long learning	*** PSO 1** Planning & Design	**#PSO 2** Execution
Competency	• Draw perspective drawing of any given building/ object • Prepare technical drawings of solid objects based on given specific conditions								
Course Outcomes CO a) Draw section, projections and development of surfaces of solids for a given situation.	2	1	-	-	-	-	2	1	1
CO b) Construct perspective drawing of a given object or building.	2	-	-	1	-	1	2	1	1
CO c) Prepare presentation drawings both manually as well as with CAD software	3	-	1	-	1	-	2	2	2

*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

***PSO 1: Planning and Design:** Prepare architectural designs and all types of drawings with appropriate material specifications and application techniques as per specific requirements of the project.

#PSO 2: Execution: Work competently as assistants in architectural firms so as to contribute and coordinate both office work and execution on site

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

S. No	Name and Designation	Institute	Contact No.	Email
1	Shri Bhaskar J. Iyer, HOD, Coordinator & Associate Dean	Government Polytechnic for Girls, Ahmedabad	9879474833	bhaskariyer2004@gmail.com
2	Smt. Swati K. Shah, I/c HOD	Government Polytechnic for Girls, Ahmedabad	9427624105	skshah27@gmail.com

S. No	Name and Designation	Institute	Contact No.	Email
3	Smt. Arpita M. Mistry, Lecturer	Government Polytechnic for Girls, Surat	9712938971	arpitamistry89@gmail.com
4	Shri Pratik M. Bagul, Lecturer	Government Polytechnic for Girls, Surat	9687879139	pratikbagul1375@gmail.com
5	Shri Rakesh T. Dabhi	Government Polytechnic, Vadnagar	6351386245	rtdabhi@gmail.com