**GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)**

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

**Course Title: Working Drawings**
(Course Code: 4355001)

| Diploma Programme in which this course is offered | Semester in which offered |
|---|---|
| Diploma in Architectural Assistantship | 5th Semester |

## 1. RATIONALE

The knowledge and skill of preparing working drawings is essential for an architect. Over and above necessary designing skills, comprehensive knowledge of execution of actual construction work on site is of paramount importance for an architect. Working drawings are essentially prepared for actual construction of a designed building. Working drawings consist of basic drawings and detailed drawings. The basic set includes all plans, sections & elevation with accurate dimensions while the detail drawings include enlarged details of kitchen, toilets, doors & windows, staircase etc. also with accurate dimensions. A foundation plan and line out drawing with centre-line dimensions which is part of the basic set of drawings is essential for the line-out of the building on site. Most importantly, the architect gets an opportunity to apply all his knowledge and creative skills for designing architectural details as a part of detail drawings. All finishes are also specified in these details drawings. These drawings include all dimensions including wall thickness, heights, levels, etc. All these put together facilitate in constructing the building on site exactly according to its design. Working Drawings help site engineers to understand how a building is actually constructed on site and hence it is important for students to learn to prepare the working drawings as it is the core ability required for architecture. This course is accordingly designed for developing all the required competency as follows.

## 2. COMPETENCY

The course content should be taught and curriculum should be implemented with the aim to develop required skills in students so that they are able to acquire following competencies:

- **Prepare all required basic working drawings including site layout and all plans, elevations and sections of a given building.**
- **Prepare all required detailed working drawings with necessary specifications and finishes for the given building.**

## 3. COURSE OUTCOMES (COs)

The applied theory for this course should be taught and practical should be carried out in such a manner that students are able to acquire required learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes. Students will be able to

a. Prepare basic working drawings for a given building.
b. Prepare site layout with necessary details based on basic drawings.
c. Prepare detailed working drawings based on basic drawings.

d. Incorporate the knowledge of construction, finishes and services for designing details and for preparing working drawings.
e. Use CAD software for preparation of all working drawings.

## 4. TEACHING AND EXAMINATION SCHEME

| Teaching Scheme (In Hours) | | | Total Credits (L+T+P/2) | Examination Scheme | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory Marks | | Practical/Studio Marks | | Total Marks |
| L | T | S | C | CA | ESE | CA | ESE | |
| 0 | 0 | 12 | 6 | 00 | 00 | 50* | 50 | 100 |

*(*): For this practical/studio only course, 50 marks under the practical CA should be done by assessment of process of working drawings with all parameters. This is designed to facilitate attainment of COs holistically. Thus, this course should be considered as an **Applied 'Theory' Course** where the theory portion has to be taught during the practical/studio hours.*
***Legends: L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **S**–Studio; **C** – Credit, **CA** -Continuous Assessment; **ESE** -End Semester Examination.*

## 5. SUGGESTED PRACTICAL/STUDIO EXERCISES

The following practical outcomes (PrOs) are the sub-components of the COs. T*hey 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 | **Design development and its finalization for working drawings:** Design and develop plan for a given building and its finalization for working drawings | I | 12 |
| 2 | **Preparation of site layout with necessary details:** Prepare site layout with necessary details for a given building | II | 24 |
| 3 | **Preparation of Preparation of all Basic Drawings:** Prepare all Basic Drawings for a given building | III | 60 |
| 4 | **Preparation of all Detail Drawings:** Prepare all Detail Drawings for a given building | IV | 48 |
| 5 | **Preparation of all working drawings with CAD software:** Drawing all working drawings on computer for a given building | V | 24 |
| | **Total Hrs.** | | **168** |

***Note***

*Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of Course Outcomes related to affective domain. Thus, over all development of Programme Outcomes would be assured. Faculty should refer to that common list and should ensure that students*

*also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.*

*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/Studio Exercises** of this course required which are embedded in the COs and ultimately the competency.*

| Sr. No. | Sample Performance Indicators for the PrOs | Weightage in % |
|---|---|---|
| Assessment should be done on the basis of demonstration of, | | |
| 1 | Skills | 40 |
| 2 | Learning Process | 20 |
| 3 | Communication | 20 |
| 4 | Learning Attitude | 20 |
| **Total** | | **100** |

## 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 | Measuring Tape, Laser measure tape, Drawing Sheets, Tracing papers | 1-5 |
| 2 | Drawing Board (A1 size @ 23"X32") with other essential instruments like Parallel scale, Set squares (45˚ and 30˚-60˚), Adjustable set square, Triangular scales, Tracing papers, Drawing Sheets. | 1-5 |
| 3 | Interactive board with LCD overhead projector. | 1-5 |
| 4 | Desktop PCs with latest configuration | 1-5 |

## 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 fulfil the development of this competency.

a) Work as a leader/a team member.
b) Follow ethical practices.
c) Social and Functional Competence of design.
d) Participate in class discussions, present the design effectively and generate new ideas.
e) Practice environmentally friendly methods and design processes.

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) | Topics and Sub-topics |
|---|---|---|
| **Unit – I Design development and its finalization for working drawings** | **1a.** Select a building unit/s from previous semester's housing design project or select any given building unit for preparing a complete set of working drawings.<br>**1b.** Develop the design of the selected/given building unit with respect to materials of construction and finishes.<br>**1c.** Finalize the structure of the building (With the help of a structural consultant or applied mechanics faculty of your institute), e.g. wall thicknesses in case of load bearing structure and approximate column locations and their sizes in case of frame structure.<br>**1d.** Draw all the drawings to a scale of 1:50 or any convenient scale. | **1.1** Introduction and study of working drawings of housing projects as follows,<br>• Study of a set working drawings prepared by a practicing architect.<br>• Study of 'Working Drawings' prepared by students of Architecture degree & diploma colleges through students visits and/or presentations by experts from both industry and other institutes.<br>• Site visits to on-going housing construction sites<br>• The basic building unit drawings should be drawn to appropriate scales e.g. 1:50 or 1:100 (not odd scales like 1:40 or 1:75). However, such decisions are best left at the discretion of concerned faculty members. |
| **Unit – II Preparation of site layout with necessary details** | **2a.** Draw the site layout to a scale of 1:200 or any appropriate scale.<br>**2b.** Prepare a detailed layout plan showing all housing units and mark out the housing unit selected for working drawings separately (should be removed – great degree of details will be required, distances amongst all units, compound walls, common plot, etc. this will make it more complex)<br>**2c.** Prepare a site drainage and water supply plan. | **2.1** Site layout including building units, roads and landscaped areas drawn clearly without rendering.<br>**2.2** The drawing format for preparing working drawings, standardized, complete with borderline, notes, revision table and nameplate.<br>**2.3** Draw essential site details like compound wall section, UGWT, landscape, hard paving detail etc. |

| Unit | Unit Outcomes (UOs) | Topics and Sub-topics |
|---|---|---|
| **Unit – III Preparation of all Basic Drawings** | **3a.** Draw plans at all levels.<br>**3b.** Draw all elevations.<br>**3c.** Draw all sections.<br>**3d.** Develop all the basic drawings with all necessary dimensions, levels, material finishes, specifications and notes.<br>**3e.** Cross-check all plans, elevations and sections for any missing architectural element or detail and rectify the same if necessary.<br>**3f.** Draw all the above drawings in a standard drawing format. | **3.1** All plans (as applicable),<br>• Foundation Plan<br>• Grid Plan<br>• All Floor Plans<br>• Terrace Plan<br>**3.2** All elevations (as applicable),<br>• North elevation<br>• South elevation<br>• West elevation<br>• East elevation<br>• Any other<br>**3.3** All sections include (as applicable),<br>• Minimum one section through toilets<br>• Minimum one section through staircase<br>• Minimum two other sections<br>(Note: Sections should be drawn with the aim to show all the details of the designed building and hence should be cut accordingly) |
| **Unit – IV Preparation of all Detailed Drawings** | **4a.** Draw all the detail drawings in a standard drawing format.<br>**4b.**Write specifications, notes and instructions wherever necessary.<br>**4c.**Specify the make, sizes and specifications of all materials, fixtures and finishes on the drawing. | **4.1** All detailed drawings including at least the following,<br>• Toilet details<br>• Kitchen details<br>• Door/Window details<br>• Staircase details<br>• Railing details<br>• Flooring details<br>• Electrical layout<br>• House Drainage Layout<br>• Any other<br>**4.2** All detailed drawings should be drawn to a scale of 1:20 or 1:25. However some of the more intricate details should be drawn to an appropriate enlarged scale.<br>**4.3** All details designed and worked out individually by the students under the guidance of faculty. Detail drawings should be co-related with the basic drawings before finalization. |

| Unit | Unit Outcomes (UOs) | Topics and Sub-topics |
|---|---|---|
| **Unit – V Working drawings with CAD software** | **5a.** Draw all the basic drawings on computer with the help of CAD software. However, preparing all detail drawings with CAD is best left at the discretion of concerned faculty member and should be considered optional.<br>**5b.** Document the entire set of working drawings. | **5.1** Use the latest version of CAD software to prepare working drawings.<br>**5.2** Documentation of the entire set of working drawings should be done with the aim of preparing an excellent quality work portfolio, required for Office Training Placement in 6th Semester as well as for future academic purpose |

## 9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Unit No. | Unit Title | Teaching Hours | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|---|
| | | | R Level | U Level | A Level | Total Marks |
| I | Design development and its finalization for working drawings | **Not Applicable** | | | | |
| II | Preparation of site layout with Necessary details | | | | | |
| III | Preparation of all Basic Drawings | | | | | |
| IV | Preparation of all Detailed Drawings | | | | | |
| V | Working drawings with CAD software | | | | | |
| **Total** | | | | | | |

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

***Note****: This specification table provides general guidelines to assist learners 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 LEARNER ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested learner-centric **co-curricular** activities which can be undertaken to accelerate the attainment of the various outcomes in this course. Learners should perform following activities in group and prepare reports of about 5 to 7 pages for each activity. They should also collect/record physical evidences for their (learner's) portfolio which may be useful for their placement interviews.

Students should survey the market for building materials, collect data of different finishes and fixtures used for residential bungalow design, understand their applications and analyze them by making a presentation and/or an interactive group discussion. These can be done either individually or in a group. For such data collection and other study, students need to go out of the institute to markets or residential sites. Students should go for site visits and prepare a report on it. Such visits should be organized by concerned faculty member/s who should compulsorily accompany the students for this purpose. Required permissions should be given by institute/department heads

The practical/exercises should be properly designed and implemented with an attempt to develop different types of practical skills (Course Outcomes in psychomotor and affective domain) so that learners are able to acquire the competencies (Programme Outcomes).

## 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 learner(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 learners 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***.
f) Guide learners on how to address issues on measurements, material selection etc.
g) Use relevant video/animation films to explain various concepts and processes related to building detailing and construction techniques for Residential Bungalow.
h) Use different instructional strategies in classroom teaching.
i) Use the relevant architectural assignments in the given situation.
j) Guide learners on form, functions utility, method of construction, etc. to facilitate them to prepare actual measured drawings.
k) Use the technique of table top discussions along with jury sessions to teach the relevant content to the learners.
l) Adopt various strategies to enhance each learner's individual creative ability especially with reference to concept and form.

## 12. SUGGESTED MICRO-PROJECTS

**Only one micro-project** is planned to be undertaken by a learner that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based (group of 3 to 5). However, **in the fifth and sixth semesters**, the number of learners 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 learner 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 microproject should be about **14-16 (fourteen to sixteen) learner engagement hours** during the course. The learners 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 CO. Similar micro-projects could be added by the concerned course teacher:

a. Undertake an **Architectural Apprenticeship** to gain practical exposure of the actual on-going projects.
b. Undertake a design project in consultation with the teacher.

## 13. SUGGESTED LEARNING RESOURCES

| S. No. | Title of Book | Author | Publication with place, year and ISBN |
|---|---|---|---|
| 1 | Time-Saver Standards for Architectural Design | Donald Watson , Michael Crosbie | McGraw-Hill Professional; 2nd edition (16 January 2005);<br>ISBN-10 : 0071432051<br>ISBN-13 : 978- 0071432054 |
| 2 | Neufert,Architects' Data | Ernst Neufert | Wiley-Blackwell, United Kingdom<br>ISBN-10 : 111928435X<br>ISBN-13 : 978-1119284352, 5th edition (12 July 2019) |
| 3 | Architectural Detailing: Function, Constructibility, Aesthetics | Edward Allen | Publisher Wiley 3rd edition<br>ISBN-10 1118881990<br>ISBN-13 978-1118881996 |
| 4 | Best of Architects Working Details: External: 1 | Colin Boyne, Lance Wright | Nichols Pub Co Publication date 1 November 1982<br>ISBN-10: 0893971421<br>ISBN-13: 978-0893971427 |
| 5 | Working Drawings Handbook | Keith Styles and Andrew Bechard | Architectural Press<br>An imprint of Elsevier<br>Fourth edition 2004<br>ISBN 0 7506 6372 3 |

## 14. SOFTWARE/LEARNING WEBSITES

- www.houzz.com
- www.archdaily.com/category/
- websites of architectural product manufacturers e.g. sanitary-ware manufacturers, door window manufacturers, flooring material manufacturers and traders, etc
- www.greatbuildings.com
- www.architecturalrecord.com
- www.archdaily.com
- www.dezeen.com
- www.archpaper.com
- www.architectmagazine.com
- www.archello.com

## 15. PO-COMPETENCY-CO MAPPING

| Semester V | Working Drawings (Course Code:4355001) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | POs and PSOs | | | | | | | | |
| Competency & Course Outcomes | PO 1 Basic & Discipline | PO 2 Problem Analysis | PO 3 Design/ develop-ment of | PO 4 Engineer-ing Tools, Experime | PO 5 Engineer-ing practices for society, sustain- | PO 6 Project Manage-ment | PO 7 Life-long learning | * PSO 1 Planning & Design | #PSO 2 Execu-tion |

| | specific knowledge | | solutions | ntation &Testing | ability & environment | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Competency** | • **Prepare all basic working drawings including site layout and all plans, elevations and sections of a given building.** • **Prepare all detailed working drawings with all specifications and finishes for the given building.** | | | | | | | | |
| a) Prepare basic working drawings for a given building | 3 | 2 | 3 | 1 | 2 | 1 | 3 | 3 | 2 |
| b) Prepare site layout with necessary details based on basic drawings. | 3 | 2 | 3 | 1 | 2 | 1 | 3 | 3 | 2 |
| c) Prepare detailed working drawings based on basic drawings. | 2 | 2 | 3 | 1 | 2 | 1 | 3 | 2 | 2 |
| d) Incorporate the knowledge of construction, finishes and services for designing details and preparing working drawings. | 3 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 2 |
| e) Use CAD software for preparation of working drawings. | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 1 |

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

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

**#PSO 2: Execution:** Suggest appropriate building materials as per the requirement.

## 16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

**GTU Resource Persons**

| S. No | Name and Designation | Institute | Contact No. | Email |
|---|---|---|---|---|
| 1 | Shri Bhaskar J. Iyer, HOD (Arch), Coordinator& Associate Dean | Government Polytechnic for Girls, Ahmedabad. | 9879474833 | bhaskariyer2004 @gmail.com |
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| 3 | Shri Bhavesh M Patel, Lecturer | Government Polytechnic for Girls, Ahmedabad. | 9427462830 | bhavesh0arch222 @gmail.com |