Gyanmanjari Innovative University

Syllabus
Gyanmanjari Diploma Engineering College
Semester-1 (Diploma)

Subject: Civil Engineering Concepts and Applications– DET2CV11203
Type of Course: Engineering Science Courses
Prerequisite: Basic knowledge of mathematics, measurement, and general science

Rationale: This course introduces students to the fundamental concepts and practical aspects of civil engineering through a structured and application-oriented approach, helping them understand basic civil engineering systems and their real-world relevance. By the end of the course, students will be able to interpret basic building systems, perform simple measurements and calculations, read and develop basic drawings, identify and select construction materials, and carry out basic surveying and estimation tasks. The course emphasizes practical learning and problem-solving, enabling students to connect theoretical knowledge with real-life engineering applications.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
CI	T	P	C	SEE	CCE	
4	0	2	5	100	50	150

Legends: CI-Classroom Instructions; T-Tutorial; P -Practical; C –Credit; SEE -Semester End Evaluation; CCE-Continuous and Comprehensive Evaluation

Course Content:

Sr. No.	Course Content	Hrs.	% Weightage
1	**Introduction to Civil Engineering and Measurements** ***Theory Topics:*** Introduction to Civil Engineering, branches of Civil Engineering, scope and role of civil engineer, types of structures (buildings, roads, bridges, dams), units and measurements (SI system), basic quantities (length, area, volume), importance of infrastructure ***Practical:*** 1. Measure classroom dimensions and calculate area & volume	18	20 %

2. Prepare a sketch of classroom with actual dimensions
3. Identify and label structural components in campus.
4. Unit conversion problem-solving tasks.
5. Prepare a simple layout sketch of classroom showing dimensions and components.
6. Observe and document civil structures in surroundings.
7. Group comparison of two structures (function & design)

Evaluation Method:

Sr. No.	Evaluation Methods	SEE	CCE
1	**Field and Measurement Task** Students will be assessed through analytical and application-based tasks related to basic concepts of civil engineering, units and measurements, structural components, and infrastructure systems. The evaluation will include calculation of length, area, and volume, unit conversion exercises, identification of structural elements, and preparation of simple sketches with dimensions. The assessment will focus on conceptual understanding, measurement accuracy, calculation skills, and practical application of civil engineering fundamentals.	20	
2	**Active Learning Assignments: layout sketches Application Activity** Students will perform practical activities involving measurement of classroom dimensions, preparation of layout sketches, unit conversion exercises, observation of civil engineering structures, and comparison of structural functions and designs. Students will identify structural components within the campus and document observations related to buildings, roads, bridges, or other infrastructure elements. The activities will emphasize practical measurement skills, dimensional accuracy, graphical representation, analytical observation, and application-oriented learning.		10
	Total	**20**	**10**

Examination Style:

	Field and Measurement Task (20 Marks) Students will be provided with two to four questions based on measurement and basic civil engineering concepts. The questions may include: • Calculation of area and volume from measured dimensions. • Unit conversion problems using SI and other unit systems. • Identification and labeling of structural components. • Preparation of simple dimensional sketches and layouts. The questions may include numerical, descriptive, and practical application-based problems prepared by the faculty. This task is designed to assess students' understanding of civil engineering fundamentals, accuracy in calculations, and ability to apply measurement concepts in practical situations. **Layout sketches Application Activity (10 Marks)** Students will perform practical activities involving measurement, observation, sketch preparation, and structural analysis related to civil engineering applications. Students may measure classroom dimensions, calculate area and volume, prepare layout sketches, identify structural components, and compare functions and designs of different structures. Students will also perform unit conversion exercises using measured values and document surrounding civil engineering structures. Evaluation shall be based on measurement accuracy, correctness of calculations, quality of sketches, analytical observation, application of concepts, and technical presentation of submitted work.		
2	**Building Planning and Drawing** ***Theory Topics:*** Components of building, principles of building planning (orientation, ventilation, lighting), zoning and FSI concept, types of areas (carpet area, built-up area), basic building drawings, symbols and abbreviations, line types and scales. ***Practical:*** 8. Identification of Building Components from a Residential Building Plan. 9. Calculation of Carpet Area, Built-up Area, and Plinth Area from a Given Drawing. 10. Preparation of Scaled Building Drawings Using Given Dimensions. 11. Identification and Correction of Building Planning Defects in a Layout. 12. Preparation of Door and Window Schedule from a Building Plan. 13. Orientation Analysis of a Building for Ventilation and Natural Lighting. 14. Preparation of Schedule of Openings for a Residential Building. 15. Practice of Standard Building Material Symbols and	20	20 %

Abbreviations.

16. Preparation and Interpretation of Basic Building Drawings (Plan, Elevation, and Section).
17. Study and Application of Line Types, Scales, and Dimensioning in Building Drawings.

Evaluation Method:

Sr. No.	Evaluation Methods	SEE	CCE
1	**Drawing and Planning Task** Students will be assessed through analytical and application-based tasks related to building planning principles, orientation, ventilation, lighting, zoning, FSI concepts, area calculations, and building drawing interpretation. The evaluation will include preparation and interpretation of scaled drawings, identification of building components, calculation of carpet and built-up areas, and application of symbols, abbreviations, line types, and scales used in building drawings. The assessment will focus on planning accuracy, drawing presentation, calculation skills, and application of building planning principles.	20	
2	**Active Learning Activity:** **Layout Analysis and Development Activity** Students will perform practical activities involving interpretation and development of building layouts, zoning of spaces, preparation of scaled drawings, analysis of orientation and ventilation, and preparation of door-window schedules. Students will identify planning mistakes in layouts and suggest suitable improvements for functional planning, lighting, and ventilation. The activities will emphasize logical space planning and upload on GMIU portal. Students will perform practical activities involving interpretation and development of building layouts, zoning of spaces, preparation of scaled drawings, analysis of orientation and		10

		ventilation, and preparation of door-window schedules. Students will identify planning mistakes in layouts and suggest suitable improvements for functional planning, lighting, and ventilation. The activities will emphasize logical space planning and upload on GMIU portal.				
		Total	**20**	**10**		

Examination Style:

Drawing and Planning Task (20 Marks)

Students will be provided with a building plan, partial layout, or a set of dimensions based on which they are required to prepare a neat and scaled drawing. The task may include:

- Interpretation of building components such as rooms, doors, and windows.
- Calculation of carpet area and built-up area.
- Preparation of scaled drawings using proper symbols, abbreviations, and line types.
- Application of building planning principles related to orientation, ventilation, and lighting.

The questions may include drawing-based, calculation-based, and planning-oriented problems prepared by the faculty. This task is designed to assess students' understanding of building planning concepts, drawing accuracy, area calculation skills, and presentation quality.

Layout Analysis and Development Activity (10 Marks)

Students will perform practical activities involving development and analysis of building layouts based on given residential planning requirements. Students will prepare layouts through zoning of spaces, addition of dimensions, circulation planning, and placement of doors and windows, followed by preparation of neat and labeled building plans. Students may also analyze orientation, ventilation, and lighting conditions and suggest suitable improvements. Evaluation shall be based on zoning clarity, logical planning, dimensional accuracy, graphical presentation, application of planning principles, and overall quality of the developed layout.

3	**Construction Materials and Testing** ***Theory Topics:*** Properties of construction materials, properties of aggregates (size, shape, specific gravity, water absorption), flakiness and elongation index, aggregate impact value, sieve analysis and gradation, properties of cement (consistency and setting time), workability of concrete and slump test, properties and compressive strength of bricks, basic concrete mix proportioning	18	20 %

Practical:

18. Determination of Aggregate Impact Value of Coarse Aggregates.
19. Determination of Flakiness Index and Elongation Index of Aggregates.
20. Sieve Analysis and Gradation Curve Preparation for Aggregates.
21. Determination of Specific Gravity and Water Absorption of Aggregates.
22. Determination of Standard Consistency of Cement Using Vicat Apparatus.
23. Determination of Initial and Final Setting Time of Cement.
24. Workability Test of Concrete by Slump Cone Method.
25. Determination of Compressive Strength of Bricks.
26. Study and Comparison of Physical Properties of Fine and Coarse Aggregates.
27. Preparation of Basic Concrete Mix Proportions and Material Quantity Calculation.

Examination Style:

Sr. No.	Evaluation Methods	SEE	CCE
1	**Material Testing and Analysis Task** Students will be assessed through analytical and application-based tasks related to properties and testing of construction materials. The evaluation will include aggregate properties such as size, shape, specific gravity, water absorption, flakiness index, elongation index, aggregate impact value, sieve analysis and gradation, cement properties including consistency and setting time, workability of concrete through slump test, properties and compressive strength of bricks, and basic concrete mix proportioning. The assessment will focus on understanding of material properties, interpretation of test results, calculation accuracy, and application of material selection principles in construction practice.	20	

	2	**Active Learning Activity:** **Material Test Data Interpretation Activity** Students will perform practical activities involving interpretation of material testing data, comparison of construction materials, and selection of suitable materials for given construction situations such as walls, floors, or concrete works. Students will analyze test observations, prepare gradation curves, study workability and setting characteristics, and justify material suitability based on engineering requirements. The activities will emphasize analytical thinking, interpretation skills, application of testing concepts, and technical presentation of observations and results.		10		
		Total	**20**	**10**		

Material Testing and Analysis Task (20 Marks)

Students will be provided with test data, observations, or practical situations related to construction material properties and testing. The task may include:

- Aggregate Impact Value calculations and interpretation.
- Determination and analysis of Flakiness Index and Elongation Index.
- Sieve analysis and preparation of gradation curves.
- Interpretation of cement consistency, setting time, and concrete slump test observations.

Identification and suitability assessment of materials based on given properties and applications.

The questions may include numerical problems, analytical exercises, interpretation-based questions, and application-oriented scenarios prepared by the faculty. This task is designed to assess students' understanding of material properties, testing procedures, analytical ability, and interpretation of results for construction applications.

Material Test Data Interpretation Activity (10 Marks)

Students will perform practical activities involving interpretation of construction material test data and selection of suitable materials for specific construction requirements. Students may analyze aggregates, cement, concrete, and brick properties, compare material performance, and justify material selection for practical applications such as walls, floors, and concrete works. Students will prepare structured observations, gradation representations, or material selection reports with suitable reasoning and conclusions. Evaluation

<table>
<tr><td></td><td>shall be based on appropriateness of material selection, analytical interpretation, relevance to the given scenario, understanding of material behavior, and clarity of technical presentation.</td><td></td><td></td></tr>
<tr><td>4</td><td>Surveying Fundamentals
<u>Theory Topics:</u>
Introduction to surveying, purpose and types of surveying, basic principles of surveying, chain surveying (equipment, ranging, chaining, field book recording), compass surveying (types of compasses, bearing, whole circle bearing and quadrantal bearing, local attraction), plane table surveying (equipment, methods such as radiation), simple leveling concept and terminology (level, reduced level), common errors in surveying and basic precautions
<u>Practical:</u>
28. Perform simple chain surveying to measure distance between two points.
29. Determine direction of a line using compass and Take bearing of given lines using compass and represent it diagrammatically.
30. Prepare a basic layout of a small area using plane table.
31. Students measure bearings of given survey lines and convert them between WCB and QB systems. Evaluation is based on accuracy of observations and calculations.
32. Students observe compass readings, identify local attraction, and apply necessary corrections. Evaluation is based on correct detection and correction of bearings.
33. perform ranging of a survey line using direct and indirect ranging methods and record observations.
34. Measure offsets to locate details along a chain line and prepare a neat field sketch.
35. Conduct chain and tape measurements on sloping ground and determine the horizontal distance.
36. Record chain surveying observations in a field book and prepare a chain survey plot of a given area.
37. Identify and use different surveying instruments such as chain, tape, ranging rod, arrows, cross-staff, optical square, compass, and plane table accessories.
Examination Style:
<table><tr><th>Sr. No.</th><th>Evaluation Methods</th><th>SEE</th><th>CCE</th></tr><tr><td>1</td><td>Surveying Task
Students will be assessed through analytical and application-based tasks related to basic surveying methods and principles. The evaluation will include chain surveying, compass surveying, plane table surveying, simple leveling</td><td>20</td><td></td></tr></table></td><td>20</td><td>20%</td></tr>
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		concepts, field book recording, bearing calculations, local attraction, and common surveying errors and precautions. Students may also be required to measure distances, determine directions, calculate and represent bearings, and interpret field observations through sketches or diagrams. The assessment will focus on conceptual understanding, accuracy in measurements and calculations, application of surveying methods, and clarity of technical presentation.				
	2	**Survey Layout Activity** Students will perform practical activities involving preparation of simple survey layouts using chain, compass, and plane table surveying methods. Students will measure distances, determine bearings, prepare basic area layouts, and represent survey data graphically with proper labeling and conventions. The activity will emphasize field observation, graphical representation, instrument handling, measurement accuracy, and conversion of survey data into practical layouts.		10		
		Total	**20**	**10**		

Surveying Task (20 Marks)

In this task, students will be given practical and application-based problems related to basic surveying methods such as chain surveying, compass surveying, and simple leveling. The task may include:

- Measurement of distance using chain surveying methods.
- Determination and representation of bearings using compass surveying.
- Interpretation of local attraction and basic surveying errors.
- Preparation of sketches, diagrams, and field observations.

Students are required to perform necessary surveying steps, record observations systematically, and present results clearly using suitable diagrams and calculations. Evaluation shall focus on correct use of surveying methods, accuracy of measurements and calculations, proper representation of results, and clarity of presentation.

Survey Layout Activity (10 Marks)

In this activity, students will prepare a simple layout of a small area using basic surveying concepts such as chain surveying, compass surveying, or plane table surveying methods. Students will present

<table>
<tr><td></td><td>the layout with proper labeling, dimensions, bearings, and graphical representation based on given or observed field data. The activity focuses on understanding conversion of survey observations into visual layouts and practical mapping applications. Evaluation shall be based on correctness of layout, logical representation, measurement accuracy, proper labeling, and overall quality of presentation.</td><td></td><td></td></tr>
<tr><td>5</td><td>Quantity Estimation and Costing
<u>Theory Topics:</u>
Introduction to estimation, units of measurement, principles of quantity calculation, area and volume concepts, material estimation basics, basic cost concept, wastage and optimization
<u>Practical:</u>
38. Estimate bricks required for wall.
39. Calculate flooring quantity.
40. Prepare simple quantity table.
41. Estimate paint requirement.
42. Cost comparison of materials.
Evaluation Method:
<table>
<tr><th>Sr. No.</th><th>Evaluation Methods</th><th>SEE</th><th>CCE</th></tr>
<tr><td>1</td><td>Quantity Estimation Task
Students will be assessed through analytical and application-based tasks related to basic estimation and costing concepts. The evaluation will include quantity estimation for brickwork, flooring, painting work, and material requirements using appropriate units, formulas, and area-volume concepts. Students may also perform simple cost comparisons and apply principles of wastage and optimization in estimation work. The assessment will focus on conceptual understanding, accuracy of calculations, proper use of units, systematic estimation methods, and clarity of presentation.</td><td>20</td><td></td></tr>
<tr><td>2</td><td>Estimation Sheet Preparation Activity
Students will perform practical activities involving preparation of estimation sheets for construction works such as walls, flooring, or painting. Students will organize quantity calculations in tabular form, prepare structured estimation data, compare material costs, and present final</td><td></td><td>10</td></tr>
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</td><td>14</td><td>20 %</td></tr>
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		results through charts, reports, or PowerPoint presentations. The activity will emphasize quantity calculation skills, data organization, technical presentation, and practical application of estimation concepts in civil engineering work.				
		Total	**20**	**10**		

Examination Style:

Quantity Estimation Task (20 Marks)

In this task, students will be given analytical and numerical problems related to basic quantity estimation and costing. The task may include:

- Estimation of brick quantity for masonry work.
- Calculation of flooring quantities and area measurements.
- Estimation of paint requirements for surfaces.
- Simple cost comparison and material optimization problems.

Students are required to apply appropriate formulas, maintain unit consistency, and present solutions in a systematic manner with proper calculation steps. Evaluation shall focus on correctness of estimation methods, accuracy of calculations, proper use of units, logical problem-solving approach, and clarity of presentation.

Estimation Sheet Preparation Activity (10 Marks)

In this activity, students will prepare a structured estimation sheet for construction works such as brickwork, flooring, or painting based on given dimensions or practical situations. Students will organize quantities in tabular format, include calculations and material details, compare material costs where required, and present final results through reports or PowerPoint presentations. The activity focuses on systematic preparation, organization of estimation data, and practical application of quantity estimation concepts. Evaluation shall be based on correctness of quantity calculations, logical arrangement of data, proper table formatting, technical presentation, and overall clarity of submitted work.

Suggested Specification table with Marks (Theory): 100

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage %	10%	20%	30%	15%	10%	00%

Course Outcome:

After learning the course, the students should be able to:	
CO1	Understand basic civil engineering concepts including branches, types of structures, and apply units, measurements, and calculations of length, area, and volume.
CO2	Interpret building drawings, calculate areas, and apply principles of building planning to develop simple layouts with proper labeling and dimensions.
CO3	Identify and evaluate properties of construction materials such as aggregates, cement, and concrete, and apply basic concepts for material selection and usage.
CO4	Apply basic surveying techniques including chain, compass, and plane table surveying to measure distances, determine directions, and prepare simple layouts.
CO5	Perform basic estimation and quantity calculations for construction works, prepare structured estimation sheets, and analyze cost-related aspects.

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students.

A minimum of 20–30% of the course content shall be suggested to deliver through Flipped Learning, where students study digital learning resources before the classroom session. Classroom time shall be utilized for discussion, problem-solving, practical applications, and higher-order learning activities.

Students shall be encouraged to use AI-powered learning platforms, simulation software, virtual laboratories, digital libraries, research databases, online certification courses, NPTEL, SWAYAM, MOOCs, and other technology-enabled learning resources to strengthen conceptual understanding and practical competence.

Continuous assessment shall be conducted through Active Learning Assignments (ALAs), quizzes, skill demonstrations, presentations, practical exercises, projects, case studies, innovation activities, peer assessment, reflective learning, and industry-oriented tasks instead of relying primarily on conventional written assignments.

Reference Books:

[1] Basic Civil Engineering, by S.S. Bhavi katti, New Age International Publishers.
[2] Basic Civil Engineering, by Satheesh Gopi, Pearson Education.
[3] Building Construction, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications.
[4] Surveying and Levelling, by N.N. Basak, McGraw-Hill Education.
[5] Estimating and Costing in Civil Engineering, by B.N. Dutta, UBS Publishers.