SYLLABUS FOR THE BATCH FROM YEAR 2025 TO 2026

FOR

Certificate in Sustainable Building Technology

(Credit Based Evaluation and Grading System)

Semester: I

EXAMINATIONS: 2025-2026

The Certificate:

- **Certificate Course in Sustainable Building Technology (6 Months duration)**

Program Outcomes:

- The goal of this course is to provide students with sustainable practices and contemporary building methods. Its target audience includes students, entrepreneurs, architects, technicians, and civil engineers looking to innovate in the building industry. The program guarantees skill development through practical instruction and evaluations, and it is in line with industry norms. Building construction, quality assurance, estimation and costing, smart construction technologies, and sustainable building materials are all covered in key modules, along with hands-on experience with real-world applications. This curriculum equips professionals with state-of-the-art knowledge for the future of building.

Department of Civil Engineering

In collaboration with

DIRECTORATE OF OPEN & DISTANE LEARNING

GURU NANAK DEV UNIVERSITY AMRITSAR

Certificate in SUSTAINABLE BUILDING TECHNOLOGY (SEMESTERSYSTEM) Offered by Department of Civil Engineering in Collaboration with Directorate of Open & Distance Learning and Online Studies, Guru Nanak Dev University Amritsar

Eligibility:

- +2or equivalent Examinations
- Any student pursuing Bachelor Degree, Master Degree, M.Phil., Ph.D. from GNDU campus constituted or affiliated college.

SEMESTER-I

PaperCode	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
ODSBT111T	Sustainable Materials in Construction	30	70	100	4
ODSBT112T	Sustainable Construction Practices	30	70	100	4
ODSBT113T	Construction Planning Management	30	70	100	4
ODSBT114T	Estimation and Costing	30	70	100	4
	TotalMarks&Credits	**120**	**280**	**400**	**16**

Subject Name: Sustainable Materials in Construction

Subject Code: ODSBT111T

(Semester–I)

Time:03Hours **Max.Marks:100Marks**

InternalAssessment:30 Marks

EndTerm:70Marks

Instructions for the Paper-Setter/Examiner:

1. Question paper shall consist of **four sections**.
2. Paper setter shall set **eight questions in all** by selecting **two questions of equal marks from each section**. However, a question may have sub-parts (not exceeding four sub-parts), and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **five questions in all**, by at least selecting **one question from each section** and the **5th question may be attempted from any of the four sections**.
4. The question paper should be strictly according to the instructions mentioned above. **In no case should a question be asked outside the syllabus**.

Section – A

Building Stones & Bricks:

General characteristics of a good building stone, deterioration and preservation of stones, artificial stones, composition of good brick earth, qualities of good bricks, classification of bricks, tests on bricks, varieties of fire bricks.

Cement:

Composition of cement, raw materials, manufacturing process, varieties of cement, hydration of cement, properties, testing of cement.

Concrete:

Introduction, constituents of concrete, batching of materials, manufacturing process of cement concrete, workability, factors affecting it, methods to determine workability, segregation, bleeding of concrete, strength of concrete, factors affecting it.

Section – B

Timber:

Structure of a tree, classification of trees, defects in timber, qualities of good timber, seasoning of timber, decay of timber, preservation of timber.

Miscellaneous Materials:

Paints, distempering, glass, plastics.

Brick & Stone Masonry:
Terms used, types of bonds, their merits and demerits, rubble and ashlar masonry, joints in stone masonry, cement concrete hollow blocks – their advantages and disadvantages.

Damp Proofing:
Sources, causes, bad effects of dampness, preventive measures for dampness in buildings.

Section – C

Roofs:
Terms used, classification of roofs, roof trusses, different roof covering materials.

Plastering & Pointing:
Objects, methods of plastering, materials, types, defects in plastering, special material for plastered surface, distempering, whitewashing, color washing.

Floors:
General, types of floors used in buildings and their suitability, factors for selecting a suitable floor for a building.

Miscellaneous Topics:
Building services – plumbing services, electrical services, air conditioning, acoustics, sound insulation, fire protection measures, lifts.

Section – D

Sustainable Materials:
Benefits of using industrial by-products and agricultural waste, recycling practices in construction. Use of fly ash, limestone powder, metakaolin, silica fume, blast furnace slag, quarry waste, rice husk, etc. in concrete and soil stabilization. Introduction to the use of recycled aggregates in concrete.

Rocks and Minerals:
Role of engineering geology and its applications in civil engineering practices, classification of rocks for engineering purposes, identification of minerals.

Use of Geosynthetics:
Soil stabilization using geotextiles, geogrids, geomembranes, geocells, geonets.

Subject Name: Sustainable Construction Practices

Subject Code: ODSBT112T

(Semester–I)

Time:03Hours **Max.Marks:100Marks**

InternalAssessment:30 Marks

EndTerm:70Marks

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3. Candidates shall attempt **five questions in all**, by at least selecting **one question from each section**, and the **5th question may be attempted from any of the four sections**.
4. The question paper should be strictly according to the instructions mentioned above. **In no case should a question be asked outside the syllabus**.

Section – A

Brick Masonry:
Definitions of various terms used, bond – definition, need, scope, types of bonds – stretcher bond, header bond, English bond, Flemish bond; their merits and demerits.

Stone Masonry:
Rubble and ashlar work.

Hollow Block Masonry:
Hollow cement concrete block masonry, hollow clay block masonry.

Walls:
Types:
(i) Load-bearing
(ii) Non-load-bearing walls, thickness considerations.

Section – B

Damp Proofing:
Causes, ill-effects, preventive measures.

Arches & Lintels:
Definitions of various terms used in arches; types – flat, segmental, semi-circular, horse–shoe, brick and stone arches.
Types of lintels, their merits and demerits.

Floors:
Constituents, various types of floors commonly used, their suitability for different buildings, constructional details of concrete and terrazzo floors.

Foundations:
Types – Shallow foundations and deep foundations; choice of foundations, design criteria, foundations on problematic soils.

Section – C

Doors & Windows:
Location, sizes, types of doors and windows, method of fixing door/window frames in walls, ventilators.

Sloping Roofs:
Definitions of terms used, wooden trusses – king post, queen post truss; steel trusses – fink, fan, north light truss roofs; jack arch roofs.

Stairs & Staircases:
Definition of terms used, essential requirements, proportioning of steps, types – straight flight, quarter turn, half turn, spiral staircases, ramps, escalators, lifts.

Section – D

Miscellaneous Topics (to be covered briefly):
Plastering, pointing, whitewashing, color washing, distempering, painting, scaffolding, underpinning, shoring, building bye-laws.

Green Buildings:
Definition, key features and benefits, use of renewable and recycled materials, energy-efficient design of structures, strategies for waste reduction, certification systems, important green buildings in India.

Retrofitting of Structures:
Importance and necessity, key areas of retrofitting, benefits and associated challenges, column and beam strengthening, use of FRPs, grouting techniques.

Subject Name: Construction Planning Management

Subject Code: ODSBT113T

(Semester–I)

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section – A

Introduction:
Need for project planning and management, value engineering, time value of money, construction schedule, activity and event, bar chart, milestone chart – uses and drawbacks.

PERT (Program Evaluation and Review Technique):
Construction of PERT network, time estimates, network analysis, forward pass, backward pass, event slack, critical path, data reduction.

Section – B

CPM (Critical Path Method):
Definitions, network construction, fundamental rules, determination of project schedule, activity time estimates, float types, their significance in project control, critical path.

Three-Phase Application of CPM:
Planning, scheduling, controlling, updating a narrow diagram, time grid diagram, resource scheduling.

Section – C

Cost Analysis & Contract:
Types of project cost, cost–time relationships, cost slopes, conducting a crash programme, determining the minimum total cost of a project.

Factors Affecting Selection of Equipment:
Types of equipment, depreciation cost, operating cost, economic life of equipment, maintenance and repair cost.

Section – D

Earth-Moving Machinery:
Tractors and related equipment, bulldozers, scrapers, power shovels, draglines, hoes, etc.

Construction Equipment:
Grading/proportioning, batching and mixing, types of mixers, concrete pumps, placing and compacting of concrete.

Hoisting and Transporting Equipment:
Hoists, winches, cranes, belt conveyors, trucks, etc.

Subject Name: Estimation and Costing

Subject Code: ODSBT114T

(Semester–I)

Time:03Hours **Max.Marks:100Marks**

InternalAssessment:30 Marks

EndTerm:70Marks

InstructionsforthePaper-Setter/examiner:

1. Questionpapershallconsistof **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub- parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section – A

Estimates:
Types, complete set of estimates, working drawings, site plan, layout plan, index plan, plinth area, administrative approval, and Technical Sanction.

a) Estimate of buildings
b) Estimate of R.C.C. works
c) Estimate of sloped roof and steel structures
d) Estimate of water supply and sanitary works
e) Estimates of roads
   (a) Earthwork
   (b) Bridges and culverts
   (c) Pavement
f) Estimate of Irrigation works

Section – B

Analysis of Rates:
For earthwork, concrete works, D.P.C., brickwork, stone masonry, plastering, pointing, road work, carriage of materials.

Section – C

Specifications:
General specification for different classes of building, detailed specifications for various Civil Engineering Works.

Accounts:
Division of accounts, cash, receipts of money, cash book, temporary advance, imprest, and accounting procedure.

Section – D

Contracts:
Types of contracts, tender, tender notice, tender form, submission and opening of tender, earnest money, security money, measurement book, muster roll, piece work agreement, and work order.

Arbitration:
Arbitration, arbitrator and Arbitration Act, powers of arbitrator, arbitration awards.