

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

**COURSE CURRICULUM
COURSE TITLE: BUILDING SERVICES
(COURSE CODE: 3360604)**

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	Sixth

1. RATIONALE

Building services are the essential services provided in the buildings for improving functioning of the buildings in efficient manner for the desired use of the building. The electrical services, mechanical services such as air conditioning, lighting, ventilation, fire protection, acoustics and sound insulations, elevators, escalators, as well as civil engineering services such as water supply, sanitary services, etc. have become most essential services for residential, industrial, high rise, hotels, motels, monumental buildings.

No building can be put into effective utilisation without all these services. In present scenario the eco friendly designs like green building, grey water management etc. are on demand. The new advanced construction is adopted by creators, engineers, architect, designer and interiors. It is therefore necessary for civil engineering students to understand the basic principles, installations, operations and maintenance of building services.

This course attempts to teach students about these services. However, services such as plumbing as well as sanitary services have been already taught in the course of 'Water Supply and Sanitary Engineering' in fifth semester and hence those are not included in this course..

2. COMPETENCIES

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

- **Plan various types of services required for different types of buildings.**
- **Supervise installation and testing of services such as lift, fire protection, elevators, escalators, acoustic and sound insulations, lightings, air conditioning and allied services.**

3. COURSE OUTCOMES (COs):

The theory should be taught and exercises should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- i. Manage building services provisions in big construction sites.
- ii. Synchronize the construction activities with installation of building services.

- iii. Select the suitable electrical as well mechanical services for particular requirements of buildings.
- iv. Ensure green building applications to the new constructions.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	150
3	0	2	5	70	30	20	30	

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit; ESE - End Semester Examination; PA - Progressive Assessment

5. COURSE CONTENT DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Introduction to Building Services	1a. Describe basics of building services. 1b. Apply various types of services as per needs of building. 1c Apply Lighting and Ventilation provisions	1.1 Definitions 1.2 Objective and uses of services 1.3 Applications of services for different types building considering 1.4 Classification of building services 1.5 Types of services and selection of services 1.6 Natural and artificial lighting-principles and factors 1.7 Arrangement of luminaries, Distribution of illumination, Utilization factors 1.8 Necessity of Ventilation Types – Natural and Mechanical Factors to be considered in the design of Ventilation
Unit – II Electrical Services and Layout	2a. Prepare electrical services requirement and Layout of a given building	2.1 electrical services in the building Technical terms and symbols for electrical installations and <i>Accessories of wiring</i> 2.2 Systems of wiring like wooden casing, cleat wiring, CTS wiring conduit wiring 2.3 Types of insulation 2.4 electrical layout for residence, small work shop, show room, school building, etc.

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – III Mechanical Services in Buildings	<p>3a. Identify the services like lift, elevators, conveyors and escalators, etc.</p> <p>3b. Plan various types of mechanical services as per requirements of building</p> <p>3c. Select the right type of air conditioning and the position of air conditioning</p>	<p>3.1 Introduction of mechanical services</p> <p>3.2 Lift</p> <p>3.2 (a) Definition, Types of Lifts, Design Considerations, Location, Sizes, Component parts- Lift Well, Travel, Pit, Hoist Way, Machine, Buffer, Door Locks, Suspended Rope, Lift Car, Landing Door, Call Indicators, Call Push</p> <p>3.3 Elevators & Escalators</p> <p>3.3 (a) Different types of elevators and Escalators, Freight elevators, Passenger elevators, Hospital elevators,</p> <p>3.3 (b) Uses of different types of elevators Escalators.</p> <p>3.4 Dumbwaiters</p> <p>3.4 (a) Different types of Dumbwaiters</p> <p>3.4 (b) Uses of different types of Dumbwaiter.</p> <p>3.5 Conveyors</p> <p>3.5(a) Different types of Conveyors</p> <p>3.5(b) Uses of different types of Conveyors</p> <p>3.7 Air Conditioning</p> <p>3.7(a) Definition, Purpose, Principles, Temperature Control, Air Velocity Control, Humidity Control, Air Distribution system, Cleaners, Filters, Spray washers, Electric preceptors,</p> <p>3.7(b) Types of Air Conditioners, (Central type, Window Type, Split Unit)</p>
Unit – IV Fire Protection, Acoustic and Sound Insulations	<p>4a. Identify the services of Fire</p> <p>4b. Apply various types of fire services as per requirements of building</p> <p>4c. Select the suitable type of Fire protection.</p> <p>4d Provide Acoustic and sound insulation as per needs</p>	<p>4.1 Introduction</p> <p>4.2 Causes of fire and Effects of fire</p> <p>4.3 General Requirements of Fire Resisting building as per IS and NBC 2005</p> <p>4.4 Characteristics of Fire resisting materials</p> <p>4.5 Maximum Travel Distance</p> <p>4.6 Fire Fighting Installations for Horizontal Exit, Roof Exit / Fire Lifts, External Stairs</p> <p>4.7 Requirement of good Acoustic</p> <p>4.8 Various sound absorbent</p> <p>4.9 Factors to be followed for noise control in residential building</p>
Unit – V Miscellaneous Services and	<p>5a. Plan for Rain Water Harvesting in the new buildings</p>	<p>5.1 Rain water Harvesting for buildings</p> <p>5.2 Concept of GREEN buildings</p> <p>5.3 Components of GREEN building.</p>

Unit	Major Learning Outcomes	Topics and Sub-topics
Green Buildings Provisions	5b. Apply Green Building technology aspects	5.4 Introduction and Significance to Grey water 5.6 Components of Grey water system 5.7 Management of Grey water system

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (Theory)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to Building Services	8	2	4	4	10
II	Electrical Services and Layout	10	4	8	8	20
III	Mechanical Services in buildings	10	4	8	8	20
IV	Fire Protection, Acoustic and Sound Insulations	8	2	4	4	10
V	Miscellaneous Services and Green Buildings Provisions	6	2	4	4	10
Total		42	14	28	28	70

7. SUGGESTED LIST OF EXERCISES

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

*Note: Here only outcomes mainly 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** (as given in a common list at the beginning of curriculum document for this programme) 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.

Sr. No.	Unit No.	Practical/Exercise (outcomes in psychomotor domain)	Approx. Hours Required
1	II	Prepare electrical layout plan for given building	02
2	V	Prepare rain water harvesting layout plan for a building	02
		Assignment	
3	III	Prepare Lift standards as per norms	02
4	IV	Suggest noise control methods for a given commercial complex	02
5	IV	Prepare a plan for fire safety measures for a given multi story building	02
6	IV	Prepare Lighting plan for a commercial complex	02
7	III	Identify proper locations for Lift/ Escalator/ Elevator in a given commercial complex	02
8	V	Prepare a grey water management for a residential complex.	02
		Site Visit (Any one)	
9	I to V	Visit a residential building & commercial building under construction and prepare layout for electrical, water supply, sanitary and related allied services of civil engineering and prepare site visit detailed report	04
		Case Study	
10	IV	Prepare a case study for the fire fighting services for commercial building in the nearby area.	04
		Seminar	
11	I to V	Topic of seminar shall be given to a group of students not more than three . The students are required to submit and present / defended the seminar in the presence of students and teachers and the report including power point presentation to be attached with submission	04
		Total	28

8. SUGGESTED LIST OF STUDENT ACTIVITIES

- i. Prepare journal based on site visit, case study as well as on seminar.
- ii. Assignments based on the Units topics.
- iii. Prepare chart displaying various kinds of building services.
- iv. Prepare schematic diagram for various types of services.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any):

- i. Arrange expert lectures on different building services.
- ii. Discuss case studies of fire in multistoried buildings and lessons learnt from those experiences.
- iii. Arrange site visits to building complexes under construction to show different buildings services being installed.
- iv. Show video films/photographs etc. related to different building services.
- v. Ask students to explore the internet and present in seminar about latest trends in different building services and green building concepts.

10. SUGGESTED LEARNING RESOURCES

(A) List of Books:

S. No.	Title of Books	Author	Publication
1	A text book on Building Services	R. Udaykumar	Eswar Press, Chennai
2	Building Services	S. M. Patil	Seema Publication, Mumbai Revised edition
3	National Building Code of India - 2005	Bureau of Indian Standards	BIS, New Delhi
4	Building Construction	Dr. B. C. Punmia	Laxmi Publications (P) Ltd., New Delhi
5	Building Construction	P. C. Varghese	PHI Learning (P) Ltd., New Delhi
6	Building repair and Maintenance Management	P. S. Gahlot	CBS Publishers & Distribution(P) Ltd.
7	Green building		

(B) List of Major Equipment/Materials

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(C) List of Software/Learning Websites

www.academia.edu

www.nptel.iitm.ac.in

"[http://en.wikipedia.org/w/index.php?title=Dumbwaiter_\(elevator\)&oldid=621761813](http://en.wikipedia.org/w/index.php?title=Dumbwaiter_(elevator)&oldid=621761813)"
Categories:

www.bis.org.in/sf/nbc.htm

cpwd.gov.in/Units/handbook.pdf

<http://www.civilengineeringnews.tk/2014/07/methods-of-demolition-of-building.html>
thecontractor.org

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

1. **Prof. A. K. Popat**, Lecturer in Civil Engineering , Government Polytechnic, Dahod
2. **Prof. P. D. Gohil**, Lecturer in Civil Engineering , Sir B P T I , Bhavnagar
3. **Prof. H. K. Rana**, Lecturer in Civil Engineering , Government Polytechnic, Valsad
4. **Prof. D K Parmar** , Lecturer in APP. Mech. , B & B Institute of Tech. , V V Nagar

Coordinator and Faculty Members from NITTTR Bhopal

- **Prof. J. P. Tegar**, Professor & Head, Department of Civil and Environmental Engineering.
- **Prof. M.C. Paliwal**, Associate Professor, Department of Civil and Environmental Engineering.