

GUJARAT TECHNOLOGICAL UNIVERSITY
BE (CIVIL AND INFRASTRUCTURE ENGINEERING)
UTILITIES FOR CIVIL INFRASTRUCTURE
SUBJECT CODE: 2164002
6th SEMESTER

Type of Course: Core

Prerequisite: NIL

Rationale:

Utilities for Civil Infrastructure is providing conceptual understanding and applications of variety of utilities required for infrastructure projects. With the help of this knowledge students may be able:

1. To impart basic understanding and knowledge on various utility requirements of civil infrastructure.
2. To provide the knowledge on the various utility systems and practices used in civil infrastructure including MEP and IT systems
3. To aware of the methodology involved in costing the utility requirements

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
				ESE	PA(M)		ESE (V)		PA (I)	
			PA		ALA	ESE	OEP			
3	2	0	5	70	20	10	30	0	20	150

Sr.	Content	Total Hrs	Weightage
1	<p>Electrical Utilities:</p> <p>Electrical System: General overview of electricity demand & supply. Different types of electrical wiring system. AC & DC power supply, power modulator, and open loop and closed loop system, UPS and emergency lighting.</p> <p>Power requirement calculation for typical civil infrastructure: residential building, industrial building, commercial and social infrastructures.</p> <p>Power Distribution Systems for Township: Township power distribution system, substations, underground power distribution, overhead power distribution and electrical maintenance.</p> <p>Power Distribution Systems for Industrial Plant: Internal power distribution system, protection system and safety.</p> <p>Cost Estimate for Electrical System: Elements of Cost Estimation, cost estimate for typical residential building and township.</p> <p>Renewable Energy System for civil infrastructure: Introduction, Classification, Suitability of energy system.</p>	10	24%

2	<p>Mechanical</p> <p>Fire Fighting Systems: Installation requirements, components of Firefighting systems. Basics of Types of systems like Fire extinguishers, Fire hose reels, Fire hydrant systems & Automatic sprinkler systems. Cost Estimation of all firefighting system.</p> <p>HVAC (Heating, Ventilation and Air Conditioning): Basics, Types of HVAC, Capacity planning of HVAC, Types of Ducts, Duct Profiling. Cost Estimation of HVAC</p> <p>Building Lifts: Various types of lifts, Escalation system. Financial aspects of lift and escalators. Capacity planning of HVAC. Case study of mall escalator aspects like space design, capacity, material assembly, safety aspects and cost estimation. Safety precautionary Standards for lift and escalator standard.(To be covered in lab)</p> <p>Ventilation system in building: Mechanical ventilation system in building.</p>	12	27%
3	<p>Water and Waste Water System</p> <p>Water Distribution system: Design of Water Supply, Evaluation of water demand, water supply pressure, scope of water authority for permission for multi-story building, system for boosting water pressure. Pipe and fitting materials, pipe supports and hangers. Plumbing fixtures, appliances and equipment. Fixing and jointing pipes and accessories.</p> <p>Drainage System: Considerations, Classification, Vacuum drainage system, Traps.</p> <p>Sanitary system: Methods of sewage collection, , Sewer section, Sewer joint, Manhole, Flushing tank, catch basin, laying of sewer, appurtenances and its locations, Sanitary fittings, Hydraulic testing of sewer pipe.</p>	10	24%
4	<p>IT infrastructure</p> <p>Introduction to IT Infrastructure, Network Devices and hardware (Hub, Routers, Switches, Modems), Network Switching, Network Cables & Cable Types, Basics of Wireless Communication, Tracking systems - RFID and GPS, Securing Information Systems, Introduction to Home Automation System</p>	10	24%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	30	15	15	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above

References books:

1. N. Jenkins, J.B. Ekanayake, G. Strbac, Distributed Generation, IET, Renewable Energy Series, 2010
2. Gilbert M. Masters, Renewable and Efficient Electric Power Systems, Wiley, 2004.
3. J. J. Grainger and W.D. Stevenson Jr., Power System Analysis, Tata McGraw-Hill, (1994)
4. D. P. Kothari and I.J. Nagrath, Modern Power System Analysis, Tata McGraw-Hill, Third Edition, (2003)

5. A. J. Wood and B.F. Wollenberg, Power Generation Operation and Control, Wiley India Edition, Second Edition, (2003)
6. M. A. Pai, Computer Techniques in Power System Analysis, Tata McGraw-Hill, Second Edition, (2006)
7. Frank Harris, Modern construction and ground engineering equipment and methods, Longman Scientific & Technical, 1994.
8. R.J.Dossat, Principles of Refrigeration, Pearson Education (Singapore) Pte. Ltd. , 2008.
9. A. Ameen, Refrigeration and Air Conditioning, Prentice Hall of India Private Limited, New Delhi. 2006

COURSE OUTCOME:

1. To be aware of various utility requirements (primarily MEP and IT) in civil infrastructure
2. To be able to propose suitable utility systems required for civil infrastructure
3. To be able to evaluate the budgetary requirements for various utility systems mentioned above.

List of Open Source Software/learning website: www.nptel.iitm.ac.in/courses/

Active learning Assignments (AL) : Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The Power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.