FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2020-21

Programme: **Bachelor of Engineering (Information Technology)**

Semester: **VI**

Course Code: **102030621**

Course Title: **Infrastructure Utilities**

Course Group: **Open Elective - II**

Course Objectives: The objectives of this course are to impart the basic understanding and knowledge of various utility requirements for the infrastructure projects. The course covers various utility systems and practices used in infrastructure projects including MEP and IT systems. It will also cover the cost analysis of different utility systems.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	0	0	3	40/14	60/21	NA	NA	100/35

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Mechanical utilities:** a) **Fire Fighting Systems:** Installation requirements, components, importance, basics of types of systems like Fire extinguishers, Fire hose reels, Fire hydrant systems & Automatic sprinkler systems, Cost Estimation of all firefighting system, Important features of "The Gujarat Fire Prevention and Life Safety Measures Act, 2013" b) **Heating, Ventilation and Air Conditioning (HVAC):** Need, processes, types of HVAC, capacity planning of HVAC, types of Ducts, duct Profiling, Cost Estimation of HVAC, capacity planning of HVAC **Ventilation system in building:** Mechanical ventilation system in building Lifts: Various types of lifts, escalation system, financial aspects of lift and escalators, important provisions of "The Gujarat Lift and Escalators Act 2000"	12

2	**Electrical Utilities:** a) **Electrical System:** General overview of electricity demand & supply, Different types of electrical wiring system, AC & DC power supply, power modulator, open loop and closed loop system, UPS and emergency lighting. b) **Power requirement calculation for typical civil infrastructure:** Residential building, industrial building, commercial and social infrastructures. c) **Power Distribution Systems for Township**: Township power distribution system, substations, underground power distribution, overhead power distribution and electrical maintenance. d) **Power Distribution Systems for Industrial Plant:** Internal power distribution system, protection system and safety. e) **Cost Estimate for Electrical System:** Elements of Cost Estimation, cost estimate for typical residential building and township. **Renewable Energy Systems:** Introduction, classification, need, advantages, suitability of energy systems.	**12**
3	**Water and Waste Water System:** a) **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 **Drainage System:** Considerations, Classification, Vacuum drainage system, Traps.	**06**
4	**IT infrastructure:** 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	**07**
5	**Infrastructure Utility Planning:** Planning and organization of utility for various infrastructure projects, case study of utility management for large infrastructure project	**05**
	Total	**42**

Reference Books:

1	A. Ameen, “Refrigeration and Air Conditioning”, Prentice Hall of India Private Limited, New Delhi. 2006
2	R.J. Dossat, “Principles of Refrigeration”, Pearson Education (Singapore) Pte. Ltd., 2008.
3	D. P. Kothari and I.J. Nagrath, “Modern Power System Analysis”, Tata McGraw-Hill, Third Edition, (2003)
4	A. J. Wood and B.F. Wollenberg, “Power Generation Operation and Control”, Wiley India Edition, Second Edition, (2003)
5	M. A. Pai, “Computer Techniques in Power System Analysis”, Tata McGraw-Hill, Second Edition, (2006)

Supplementary learning Material:	
1	NPTEL courses:

	1. https://onlinecourses.nptel.ac.in/noc21_ar13/preview 2. https://nptel.ac.in/courses/105106115 3. https://nptel.ac.in/courses/105106188, Infrastructure planning and management course, IIT Madras

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Industrial/ Field visits

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
10%	40%	35%	15%	---	---	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand mechanical utility systems and understand its cost analysis.	**30**
CO-2	Understand electrical utility systems and understand its cost analysis.	**30**
CO-3	Analyze the water and waste water utility systems.	**15**
CO-4	Evaluate IT related utility systems for civil infrastructure projects.	**15**
CO-5	Analyze Infrastructure utility planning.	**10**

Curriculum Revision:	
Version:	1.0
Drafted on (Month-Year):	June-2020
Last Reviewed on (Month-Year):	-
Next Review on (Month-Year):	June-2025