GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Civil Engineering
Semester	VI	Version	2.0.0.0
Effective from Academic Year	2024-25	Effective for the Batch admitted in	July 2022
Course Code	2CI62OE1	Course Name	Metro System and Engineering

Teaching Scheme						Examination Scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	02	00	00	00	02	Theory	40	60	100
Hours	02	00	00	00	02	Practical	-	-	-

Pre-requisites

Transportation System

Course Outcomes

On successful completion of the course, the students will be able to:

CO1	To understand the need, evolution, planning, and financial aspects of metro rail systems with reference to Indian metro case studies.
CO2	Describe construction planning aspects of metro projects, including quality, safety systems, traffic integration, and passenger facilities.
CO3	Apply system selection criteria and geometric design parameters for metro alignment, stations, and associated services
CO4	To understand various construction methods used for elevated and underground metro systems, including stations, viaducts, depots, and surveys.
CO5	Analyze quality, safety, signaling, rolling stock requirements, and environmental impacts of metro rail projects for sustainable urban transport.

Theory Syllabus

Unit	Content	Hrs.
1	**General:** Overview of Metro Systems, Need for Metros, Routing Studies, Basic Planning and Financials, Case studies of Delhi Metro, Ahmedabad and Surat Metro: Overview, Plan & Development	5
2	**Construction Planning for Metro Construction**: Quality and Safety Systems, Traffic Integration, Multimodal transfers and Pedestrian facilities, Environmental and social safeguards, Track system-permanent way, Travel characteristics, Travel patterns, Overview of fare collection system, Overview of Disabled friendly features	5
3	**System Selection & Design Parameter**: Options for Public Transport System, Mode of selection, Geometric Design Parameter: Horizontal, Transitional and Vertical, Site selection criteria for stations, critical locations study, Design Parameters for Ventilation & Air-Conditioning System	6
4	**Construction Methods:** Overview and Characteristics of Elevated and Underground Stations, Cut and Cover Method of Construction of Underground Stations, Viaduct Spans and Bridges, Depots, Commercial and Service Buildings, Initial Surveys and Investigations	6
5	**Quality & Safety Systems**: Basics of Construction Planning & Management, Selection of Technology, Passenger Safety Features, Rolling Stock Maintenance Needs, Washing Needs of Rolling Stock, Need for Ventilation and Air Conditioning, Overview and need of Signaling and Train Control	5
6	**Environmental Impact Assessment:** Baseline Environmental Profile, Positive and negative impact of metro project, Environmental Management and Monitoring Plan, Socio-Economic profile.	3

Practical Content	
NA.	
Text Books	
1	B. G. Hutchino, “Principle of Urban Transportation System Planning” by McGraw hill, Newyork.
2	W. Dickey, “Metropolitan Transportation Planning” by Tata Mcgraw hill, New Delhi
Reference Books	
1	M. M. Agarwal & S. Chandra, “Metro Rail in India for Urban Mobility” by Prabha & Co
2	M. Ramachandran, “Metro Rail Projects in India” by Oxford Publication
3	Sharat Sharma, Amit Kumar & D. Sankalp, “Excellence in Metro Operations and Management: Best Practices World Over” by PHI learning.
ICT/MOOCs Reference	
1	https://onlinecourses.swayam2.ac.in/cec20_ar01/preview

Mapping of CO with PO and PSO:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	0	2	0	0	0	0	1	3	2	2	3	2	1
CO2	2	3	2	0	1	1	2	3	2	3	1	2	3	1	1
CO3	3	2	3	1	0	1	1	0	2	1	1	2	3	2	1
CO4	2	2	2	2	1	0	1	0	0	1	1	1	1	2	1
CO5	2	3	1	3	2	0	1	0	0	1	1	1	3	2	2