

METRO SYSTEMS AND ENGINEERING
(Open Elective – I)

Course Code: 20CE11P2

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Pre-requisites: None.

Course Outcomes:

At the end of the course the student will be able to:

CO1: Explain the different metro systems

CO2: Discuss construction methods for elevated and underground section

CO3: .Explain the construction quality and safety

CO4: Apply electronic signaling systems and automatic fare collection

CO5: Discuss the SCADA, lifts and escalators

UNIT-I

(10Lectures)

OVERVIEW:

General: Overview of Metro Systems; Need for Metros; Routing studies; Basic Planning and Financials.

Learning outcomes:

1. Appraise metro systems(L4)
2. Explain the need for metros (L2)
3. Explain the routing of metros (L2)

UNIT-II

(10Lectures)

CONSTRUCTION METHODS:

Civil Engineering- Overview and construction methods for elevated and underground stations; Viaduct spans and bridges; Underground tunnels; Depots; Commercial and Service buildings. Initial Surveys & Investigations;

Learning outcomes:

1. Explain the construction methods of Metro Systems (L2)
2. Explain the requirements of commercial and service buildings for Metros(L2)
3. Describe various initial surveys and investigations for Metro construction (L2)

UNIT-III

(10Lectures)

QUALITY & SAFETY SYSTEMS:

Basics of Construction Planning & Management, Construction Quality & Safety Systems. Traffic integration, multimodal transfers and pedestrian facilities; Environmental and social safeguards; Track systems-permanent way. Facilities Management

Learning outcomes:

1. Explain the construction quality and safety systems of Metro (L2)
2. Describe the traffic integration to improve Metro efficiency (L2)
3. Explain environmental and social safeguards(L2)

UNIT-IV

(10Lectures)

OPERATION CONTROL CENTER:

Electronics and Communication Engineering- Signaling systems; Automatic fare collection; Operation Control Centre (OCC and BCC); SCADA and other control systems; Platform Screen Doors.

Learning outcomes:

1. Explain the signal systems of Metro (L2)
2. Describe the operation control centers (L2)
3. Explain about platform screen doors (L2)

UNIT-V

(10Lectures)

MECHANICAL & ROLLING STOCK:

Mechanical & TVS, AC: Rolling stock, vehicle dynamics and structure; Tunnel Ventilation systems; Air conditioning for stations and buildings; Fire control systems; Lifts and Escalators. ELECTRICAL: OHE, Traction Power; Substations- TSS and ASS; Power SCADA; Standby and Back-up systems; Green buildings, Carbon credits and clear air mechanics.

Learning outcomes:

1. Explain the tunneling ventilation systems, fire control systems of Metro (L2)
2. Describe the power SCADA (L2)
3. Explain about green buildings for Metro Systems (L2)

TEXT BOOKS:

1. Paul Garbutt, World Metro Systems, Capital Transport Pub; 2nd Edition, 1997.

REFERENCES:

1. General & Technical information of Hyderabad Metro
2. General & Technical information of Delhi Metro