

PGDFLP11-Syllabus for Vertical and Horizontal Transportation Systems

LECTURE PER WEEK-3 IA-50 WR 25 TOTAL 75 CREDIT3 EXAM HOURS3

Course Objective

To provide in-depth knowledge of design, operation, maintenance, and advancements in vertical and horizontal transportation systems, including lifts, escalators, and conveyor belts, with a focus on their application in buildings, industries, and urban infrastructure.

Module 1: Introduction to Transportation Systems

- Overview of transportation systems: Vertical vs. Horizontal.
 - History and evolution of lifts, escalators, and conveyor belts.
 - Importance in building design, urban planning, and industrial logistics.
 - Key standards and codes: EN 81, ASME A17.1, IS 14665, etc.
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Module 2: Lifts (Elevators)

A. Components and Design

- Types of lifts: Passenger, service, freight, panoramic, and others.
- Components: Cabin, shaft, counterweight, guide rails, hoisting systems.
- Drive systems: Traction vs. Hydraulic elevators.
- Advanced systems: Gearless, machine-room-less (MRL) lifts.

B. Technical Aspects

- Load and speed calculations.
- Safety mechanisms: Over-speed governors, buffers, safety gears.
- Energy efficiency and regenerative braking.
- Noise and vibration considerations.

C. Installation and Maintenance

- Site planning for lifts.
 - Inspection and maintenance protocols.
 - Common issues and troubleshooting.
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Module 3: Escalators and Moving Walkways

A. Design and Functionality

- Types of escalators: Standard, spiral, curved.
- Components: Steps, balustrade, drive system.
- Moving walkways: Inclined and flat conveyor types.

B. Technical Aspects

- Load, speed, and inclination angle considerations.
- Safety devices: Comb plates, skirt brushes, handrail speed monitors.
- Energy-saving features: Variable speed drives, automatic standby mode.

C. Installation and Maintenance

- Integration in architectural layouts.
 - Maintenance practices and safety inspections.
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Module 4: Conveyor Systems

A. Types and Applications

- Belt conveyors, roller conveyors, chain conveyors, overhead conveyors.

- Industrial vs. public use: Factories, airports, shopping malls, etc.

B. Design and Components

- Components: Belts, pulleys, rollers, motors.
- Key considerations: Load, speed, inclination, material handling.

C. Safety and Efficiency

- Risk assessment and safety standards.
- Enhancing efficiency: Automation, IoT integration.

Module 5: Emerging Trends and Innovations

- Smart elevators and escalators: IoT, AI, and predictive maintenance.
- Integration of transportation systems in smart buildings.
- Sustainable practices: Energy-efficient designs and green certifications.
- Case studies of iconic transportation systems in mega projects.

Module 6: Practical Applications

- **Workshops and Site Visits:**
 - Visit to manufacturing units of elevators/escalators.
 - Inspection of systems in high-rise buildings, airports, or shopping complexes.
- **Design Project:**
 - Students design and present a transportation system for a specific building or industrial application.

Suggested reading

1. CIBSE Guide D – *Transportation Systems in Buildings*, CIBSE, UK
2. Strakosch, G. R. & Caporale, R. S. – *The Vertical Transportation Handbook*, Wiley
3. Barney, G. C. & Dos Santos, S. M. – *Elevator Traffic Handbook: Theory and Practice*, Routledge
4. IS 14665 (Part 1–5) – Indian Standard for Electric Traction Lifts
5. Strakosch, G. R. – *Escalators and Moving Walkways*, Wiley
6. EN 115 / EN 81 (Relevant Sections) – European Standards for Escalators and Moving Walks.
7. Spivakovsky, A. O. & Dyachkov, V. K. – *Conveying Machines*, MIR Publishers
8. CEMA – *Belt Conveyors for Bulk Materials*, Conveyor Equipment Manufacturers Association
9. ISO 25745 Series – Energy Performance of Lifts, Escalators and Moving Walks
10. KONE / OTIS / Schindler White Papers – Smart Elevators, IoT and Predictive Maintenance
11. NBC 2016 (India) – Part 4 (Fire & Life Safety) and Part 8 (Building Services)
12. Elevator World Magazine – Selected case studies and technical articles