TRANSPORTATION SYSTEMS
(16CV7DCTRS)

TRANSPORTATION SYSTEMS

UNIT - 1

- **Introduction:** Role of railways in transportation, Indian Railways, selection of routes. **(02 Hours)**

- **Permanent way:** Introduction, requirements for an ideal permanent way, typical cross sections of single and double line B.G. tracks – in cutting , embankment. Gauges and types of gauges with dimensions. Coning of wheels and tilting of rails. Rails functions requirements, types of rail sections. **(04 Hours)**

UNIT - 2

- **Ballast and Sleepers**: Functions, requirements, types, track fittings and fasteners, calculation of quantity of materials needed for laying a track.

- **Traction and tractive resistances**, tractive power, Hauling capacity. Problems on these. **(07 Hours)**

TRANSPORTATION SYSTEMS

UNIT - 3

- **Geometric Design of Track** – Necessity of Geometric Design of railway track, gradient and types of gradient. Speed of train, curve, transition curve, super elevation, cant-deficiency, negative cant- speed calculation based on Indian Railways Formulae for High speed tracks only-problems on above. **(08 Hours)**

UNIT-4

- **Introduction:** Introduction to airport engineering, Layout of an airport with component parts and functions of each, Aircraft Characteristics – Airport Classifications - Site selection- Regional Planning. **(03 Hours)**

- **Runway Design-** Orientation of runway by using wind rose diagram, the runway configurations- basic length of the runway –corrections to runway length by ICAO and FAA specification- runway cross sections- problems on above. **(05 Hours)**

- **Taxiway Design**: Factors affecting the layout of the taxiway-geometrics of taxiway-design of Exit taxiways- ICAO Specifications. Problems on above. **(03 Hours)**

TRANSPORTATION SYSTEMS

UNIT - 5

- **Tunnels**: Introduction – types of tunnels, advantages and disadvantages, Economics of tunneling. **(02 Hours)**

- **Harbours**: Introductions, classifications, natural phenomenon affecting the design of harbour viz. wind, wave, tide and currents. Harbor layout with component parts. **(02 Hours)**

- **Introduction to Traffic Engineering:** Definition, objectives and scope of Traffic Engineering, factors affecting road traffic; Concepts of passenger car units for mixed traffic flow. **(03 Hours)**

TRANSPORTATION SYSTEMS

Text Books:

- Saxena and Arora, “Railway Engineering”, Dhanpat Rai and Sons, New Delhi.
- Khanna, Arora and Jain – Airport Planning and Design – Nemchand Roorkee.
- Srinivasan R - Harbour, Dock & Tunnel Engineering, Charotar Publishing House.
- Kadiyali, L.R. - `Traffic Engineering and Transport Planning', Khanna Publishers

TRANSPORTATION SYSTEMS

PATTERN OF SEE QUESTION PAPER

- Units 1, 2 and 5 has one question
- Units 3 and 4 have TWO questions wherein a candidate has to choose ONE question from each of these two units.
- All questions will have maximum of Four sub divisions/questions.

RAILWAY ENGINEERING

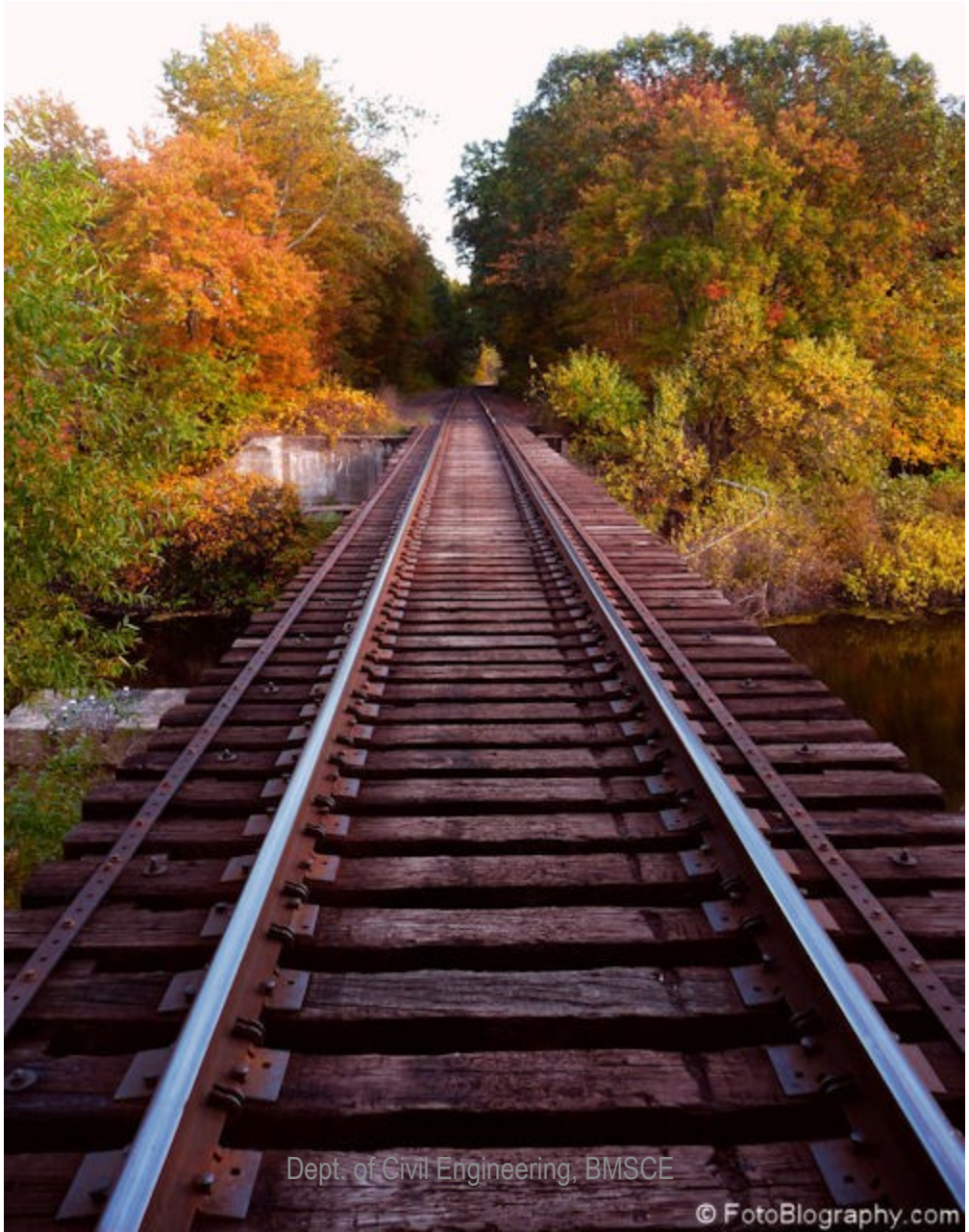
Darjeeling Himalayan Railway

RAILWAY ENGINEERING

The Golden Chariot - Karnataka

RAILWAY ENGINEERING

RAILWAY ENGINEERING



RAILWAY ENGINEERING

TRACK	Length, Kms
Broad Gauge (1676 mm)	1,19,018
Meter Gauge (1000 mm)	2,839
Narrow Gauge (762/610 mm)	1,685
Total Length	**Approx – 1,23,542**

RAILWAY ENGINEERING IN INDIA

- Runs around **20,000** trains everyday (both goods and passenger)
- **7,566** - locomotives
- **63,870** - Passenger Coaches
- **2,44,731** - Freight wagons
- **7,589** - Stations
- **300** - Yards
- **2,300** - Good sheds
- **700** - Repair shops
- **1.33 million** - Work force

ROLE OF RAILWAYS IN TRANSPORTATION

- It is regarded as an index of economic, social & commercial progress of a country.
- It is nothing but, the movement of persons & things from one place to another.
- Whole structure of industry & commerce rests on the well laid foundation of transport.
- No region or country can ever flourish if it lacks adequate transport facilities.

CLASSIFICATION OF VARIOUS MODES OF TRANSPORT

CLASSIFICATION FROM SURFACE POINT OF VIEW

- Land Transport
- Water Transport
- Air Transport

CLASSIFICATION OF VARIOUS MODES OF TRANSPORT

CLASSIFICATION ACCORDING TO MEANS OF COMMUNICATION

- Human Porter
- Animal Transport
- Road Transport
- Rail Transport
- Air Transport
- Water Transport
- Pipeline Transport
- Conveyor Transport
- Cable and Ropeway Transport

CLASSIFICATION OF VARIOUS MODES OF TRANSPORT

CLASSIFICATION BASED ON FREEDOM TO MOVE LATERALLY AND VERTICALLY

- One Degree of Freedom
- Two Degree of Freedom
- Three Degree of Freedom

POLL - 1

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Mentimeter

Railways is an example for

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CLASSIFICATION OF VARIOUS MODES OF TRANSPORT

CLASSIFICATION ACCORDING TO ENERGY USED FOR MOVEMENT

- Human Energy
- Animal Energy
- Petrol and diesel Energy
- Steam Energy
- Electric Energy
- Solar Energy
- Atomic Energy
- Other non-conventional Energies

CHARACTERISTICS OF RAILWAYS

CHARACTERISTICS OF RAILWAYS

- Railways are the biggest undertaking in the world.
- Railways exist in all parts of the world.
- Railways are cheapest in preference to other modes of transport.
- Railways require least amount of power as compared to their weight.

CHARACTERISTICS OF RAILWAYS

- The direction of movement is controlled & practically no steering is required.
- Railways can carry lots of people quickly & safely through big towns full of crowded streets.
- Compared to car or bus, it is better to travel in a train for making long journeys.

ADVANTAGES OF RAILWAYS

- Political Advantages
- Social Advantages
- Economic Advantages
- Techno-Economic Advantages

POLITICAL ADVANTAGES

- Easy control of the central administration
- Development of a national mentality in the minds of people.
- Migrating population on a mass scale.
- Mobilising troops & war equipment in times of war & emergencies.
- Unity of people of different castes, customs & religion.

SOCIAL ADVANTAGES

- Easy access to religious places of importance.
- The feeling of isolation has been removed from the inhabitants of the Indian villages.
- Broadening the social outlook of masses.
- Providing convenient & safe mode of transport.
- By travelling together, the feeling of caste difference has reduced considerably.

ECONOMIC ADVANTAGES

- Employment to people in the form of staff required for the smooth working of railways.
- Encouragement to commercial farming.
- Increase in land values & thereby increase of national wealth.
- During famine, railways plays a vital role in transporting food and clothing.

ECONOMIC ADVANTAGES

- Mobility of people & thereby relieving the congestion of traffic.
- Industrial development & growth because of mobility of labour & raw materials.
- Stabilisation of prices due to easy, speedy & efficient mobility of products & natural resources.
- Trade developed has increased the earnings and standard of living of people.

TECHNO-ECONOMIC ADVANTAGES

- Cost saving in transportation of long haul bulk traffic.
- Energy – efficiency
- Environment friendliness
- Higher safety
- Efficient land use & ease in capacity expansion

INDIAN RAILWAYS

- It is an Indian state owned enterprise.
- Owned & operated by the Government of India through the Ministry of Railways.
- It is one of the world's largest railway networks.
- First introduced to India in 1853 from Bombay to Thane.
- Operates both long distance & suburban rail systems.

CLASSIFICATION OF INDIAN RAILWAYS

- Classified on the basis of the importance of route, traffic carried & maximum permissible speed on the routes: -
  - Trunk Routes
  - Main lines
  - Branch lines

TRUNK ROUTES

Items	B. G	M.G
Maximum Permissible Speed	120 kmph	80 kmph
Rail Section	52 kg/m or heavier	37.2 kg/m
Sleeper Density	n+7	n+7
Ballast Cushion	25cm below sleeper	25cm below sleeper
Degree of curvature	71/2°	Suitable degree
Design speed for new track	160 kmph	100 kmph

MAIN LINES

Items	B. G	M.G
GMT/Annum	≥ 10	≥ 2.5
Maximum Permissible Speed	100 kmph	75 kmph
Track Relaying period	20 years	30 years
Rail Section	52 kg/m	37.2 kg/m
Design speed for new track	120 kmph	75 kmph

BRANCH LINES

Items	B. G	M.G
GMT/Annum	< 10	< 2.5
Maximum Permissible Speed	< 100 kmph	< 75 kmph

POLL - 2

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Mentimeter

In which year Railways was first introduced in India

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1847	1853	1864	1857

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