SARDAR RAJA COLLEGE OF ENGINEERING, ALANGULAM

DEPARTMENT OF CIVIL ENGINEERING

MICRO LESSON PLAN

SUBJECT NAME : RAILWAYS AIRPORTS AND HARBOUR ENGINEERING

SUBJECT CODE : CE 2303

YEAR/SEM : III / VI

STAFF NAME : J.GLORY SELVAMANO

ASST.PROF / CIVIL

CE2303 RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING L T P C
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OBJECTIVE

This course imparts the student's knowledge of planning, design, construction and maintenance of railway tracks. The students acquire proficiency in the application of modern techniques such as GIS, GPS and remote sensing in Railway Engineering. The student develops skills on airport planning and design with the prime focus on runway and taxiway geometrics. Students become conversant with the definition, purpose, location and materials of coastal structures such as piers, breakwaters, wharves, jetties, quays and spring fenders. The students acquire knowledge on site reconnaissance for location and planning of harbours.

UNIT I RAILWAY PLANNING AND DESIGN 12

Role of Indian Railways in National Development – Railways for Urban Transportation – LRT & MRTS - Engineering Surveys for Track Alignment – Obligatory points - Conventional and Modern methods (Remote Sensing, GIS & GPS, EDM and other equipments) - PermanentWay, its Components and their Functions: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks -Sleepers – Functions, Materials, Density – Functions, Materials, Ballastless Tracks - Geometric Design of Railway Tracks – Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal and Vertical Curves.

UNIT II RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION 12

Points and Crossings - Design of Turnouts, Working Principle - Signalling, Interlocking and Track Circuiting - Construction & Maintenance – Conventional, Modern methods and Materials, Track Drainage - Track Modernisation– Automated maintenance and upgrading, Re-laying of Track, Lay outs of Railway Stations and Yards, Rolling Stock, Tractive Power, Track Resistance, Level Crossings.

UNIT III AIRPORT PLANNING AND DESIGN 12

Role of Air Transport, Components of Airports - Airport Planning – Air traffic potential, Site Selection, Design of Components, Cost Estimates, Evaluation and Institutional arrangements Runway Design- Orientation, Cross wind Component, Wind rose Diagram (Problems), Geometric Design and Corrections for Gradients (Problems), Drainage - Taxiway Design – Geometric Design Elements, Minimum Separation Distances, Design Speed, Airport Drainage - Airport Zoning - Clear Zone, Approach Zone, Buffer Zone, Turning Zone, Clearance over Highways and Railways

UNIT IV AIRPORT LAYOUTS, VISUAL AIDS, AND AIR TRAFFIC CONTROL 12

Airport Layouts – Apron, Terminal Building, Hangars, Motor Vehicle Parking Area and Circulation Pattern, Case studies of Airport Layouts - Airport Buildings – Primary functions, Planning Concept, Principles of Passenger Flow, Passenger Facilities - Visual Aids – Runway and Taxiway Markings, Wind Direction Indicators, Runway and Taxiway Lightings - Air Traffic Control – Basic Actions, Air Traffic Control Network - Helipads, Hangars, Service Equipments

UNIT V HARBOUR ENGINEERING 12

Definition of Terms - Harbours, Ports, Docks, Tides and Waves, Littoral Drift, Sounding,Area, Depth, Satellite Ports - Requirements and Classification of Harbours - Site Selection &

Selection Investigation – Speed of water, Dredging, Range of Tides, Waves and TidalCurrents,

Littoral Transport with Erosion and Deposition, Soundings, Anchoring Grounds, Geological Characteristics, Winds & Storms, Position and Size of Shoals - Shore Considerations- Proximity to Towns/Cities, Utilities, Construction Materials, Coast Lines - Dry and Wet Docks, Planning and Layouts - Entrance, Position of Light Houses, Navigating - Terminal Facilities – Port Buildings, Warehouse, Transit Sheds, Inter-modal Transfer Facilities, Mooring Accessories, Navigational Aids - Coastal Structures- Piers, Breakwaters, Wharves, Jetties, Quays, Spring Fenders - Coastal Shipping, Inland Water Transport and Container Transportation.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Saxena Subhash C and Satyapal Arora, A Course in Railway Engineering, Dhanpat Rai and Sons, Delhi, 1998.

2. Khanna S K, Arora M G and Jain S S, Airport Planning and Design, Nemchand and Brothers, Roorkee, 1994.

3. S P Bindra, A Course in Docks and Harbour Engineering, Dhanpat Rai and Sons, New Delhi, 1993.

REFERENCES:

1. Rangwala, Railway Engineering, Charotar Publishing House, 1995.

2. Rangwala, Airport Engineering, Charotar Publishing House, 1996.

3. Oza.H.P. and Oza.G.H., "A course in Docks & Harbour Engineering". Charotar Publishing Co.1976.

4. J.S. Mundrey, "A course in Railway Track Engineering". Tata McGraw Hill, 2000.

MICRO LESSON PLAN

Week	Hours	Lecture Topics	Book
UNIT I RAILWAY PLANNING AND DESIGN			
I	1	Role of Indian Railways in National Development – Railways for Urban Transportation –LRT & MRTS -	T1,R1
	2	Engineering Surveys for Track Alignment – Obligatory points - Conventional and Modern methods (Remote Sensing, GIS & GPS, EDM and other equipments)	T1,RI
	3	Permanent Way, its Components and their Functions	T1,RI
	4	Rails - Types of Rails, Rail Fastenings,	T1,R1
	5	Concept of Gauges, Coning of Wheels, Creeps and kinks Sleepers – Functions, Materials, Density	T1,R1
	6	Functions, Materials, Ballast less Tracks	T1,R1
II	7	Geometric Design of Railway Tracks	T1,R1
	8	Geometric Design of Gradients and Grade Compensation,	T1,R1
	9	Geometric Design of Super-Elevation	T1,R1
	10	Widening of Gauges Transition Curves	T1,R1
	11	Widening of Gauges Horizontal	T1,R1
	12	Widening of Gauges Vertical Curves.	T1,R1
UNIT II RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION			
III	13	Points and Crossings	T1,R1
	14	Design of Turnouts	T1,R1
	15	Working Principle of Signalling - Construction & Maintenance	T1,R1
	16	Working Principle of Track Circuiting - Construction & Maintenance	T1,R1
	17	Working Principle of Interlocking -Construction & Maintenance	T1,R1
	18	Conventional, Modern methods and Materials, Track Drainage -	T1,R1

IV	19	Conventional, Modern methods and Materials -Track Modernisation	T1,R1
	20	Automated maintenance and upgrading	T1,R1
	21	Re-laying of Track	T1,R1
	22	Railway Stations and Yards	T1,R1
	23	Lay outs of Rolling Stock,Tractive Power,	T1,R1
	24	Lay outs of Track Resistance, Level Crossings.	T1,R1
UNIT III AIRPORT PLANNING AND DESIGN			
V	25	Role of Air Transport, Components of Airports - Airport Planning, Air traffic potential	T2,R2
	26	Site Selection, Design of Components	T2,R2
	27	Cost Estimates, Evaluation and Institutional arrangements	T2,R2
	28,29	Runway Design- Orientation, Cross wind Component, Wind rose Diagram (Problems),	T2,R2
	30	Geometric Design and Corrections for Gradients	T2,R2
VI	31	Geometric Design and Corrections for Gradients (Problems	T2,R2
	32	Drainage -Taxiway Design	T2,R2
	33	Geometric Design Elements, Minimum Separation Distances,	T2,R2
	34	Geometric Design Elements, Design Speed	T2,R2
	35	Airport Drainage - Airport Zoning - Clear Zone, Approach Zone, Buffer Zone, Turning Zone	T2,R2
	36	Clearance over Highways and Railways	T2,R2
UNIT IV AIRPORT LAYOUTS, VISUAL AIDS, AND AIR TRAFFIC CONTROL			
VII	37,38	Airport Layouts – Apron, Terminal Building, Hangars, Motor Vehicle Parking Area and Circulation Pattern, Case studies of Airport Layouts - Airport Buildings	T2,R2
	39,40	Primary functions, Planning Concept, Principles of Passenger Flow, Passenger Facilities	T2,R2
	41,42	Visual Aids ,Runway and Taxiway Markings,	T2,R2
VIII	43,44	Wind Direction Indicators, Runway and Taxiway Lightings	T2,R2

	45,46	Air Traffic Control – Basic Actions, Air Traffic Control Network	T2,R2
	47,48	Helipads, Hangars, Service Equipments	T2,R2
UNIT V HARBOUR ENGINEERING			
IX	49,50	Definition of Terms - Harbours, Ports, Docks, Tides and Waves, Littoral Drift, Sounding, Area, Depth, Satellite Ports	T3,R3
	51,52	Requirements and Classification of Harbours - Site Selection & Selection Investigation, Speed of water, Dredging, Range of Tides, Waves and Tidal Currents	T3,R3
	53,54	Littoral Transport with Erosion and Deposition,	T3,R3
X	55,56	Shore Considerations- Proximity to Towns/Cities, Utilities, Construction Materials, Coast Lines -	T3,R3
	57,58	Dry and Wet Docks, Planning and Layouts - Entrance, Position of Light Houses	T3,R3
	59,60	Navigating - Mooring Accessories, Navigational Aids – Coastal Structures- Breakwaters, Wharves.	T3,R3

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