20CE4702B – RAILWAY AND HARBOR ENGINEERING

Offering Branches	CE		
Course Category:	Professional Elective	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-0-0
Prerequisites:	20BS1101- Engineering Mathematics I 20CE3502 - Highway Engineering	**Continuous Evaluation:**	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	**Explain** about planning and functions of railway, railway tracks and joints	K2
CO2	**Analyze** geometric design of track, sleepers, fishplates and ballast	K4
CO3	**Examine** points, crossing and signalling system	K3
CO4	**Analyze** the Design and plan of airport, air craft characteristics	K4
CO5	**Explain** the harbour engineering with plan and design	K2

Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2					2	2						2	2
CO2	2					3	3						2	3
CO3	3					2	2						3	2
CO4	2					3	3						2	3
CO5	2					2	2						2	2
Avg.	**2**					**2**	**2**						**2**	**2**

1- Low **2-Medium** **3-High**

Course Content

UNIT-1	**Transportation Systems:** Role of railways in transportation, Comparison of railway and highway transportation, Development of railway systems with particular reference to India **Railway Track, Rails & Rail Joints:** Permanent way, Gauges in Railway track, Railway track cross-sections, Coning of wheels, Functions of rails, Requirements of rails, Types of rails sections, Rail failures, Wear on rails, Types of rail joints, Welding of rails.	**CO1**
UNIT-2	**Sleepers, Fish Plates & Ballast:** Functions of sleepers, Requirements of sleepers, Classification of Sleepers, Comparison of different types of sleepers, failure of fish plates, Functions and requirements of ballast, Types of ballast, Renewal of ballast. **Geometric Design of Track:** Necessity, Gradients & Gradient Compensation, Elements of horizontal alignment, Super elevation, Cant deficiency	**CO2**
UNIT-3	**Points and Crossings:** Functions of components of turnout, Crossings. **Stations & Signalling System:** Site selection for railway station, Requirements of railway station, Classifications, Objects of signalling, Classification of signals, Controlling, absolute block system, Automatic block system	**CO3**
UNIT-4	**Airport Planning:** International Civil Aviation Organization, Directorate General of Civil Aviation, Airports Authority of India; Airport planning studies: airport system plan, airport site selection	**CO4**

	Airport Lighting & Marking: Runway lighting, taxiway lighting; Runway and taxiway marking	
UNIT-5	**Docks and Harbour Engineering:** Introduction, Types of water transportation, Economics and advantages of water transportation **Planning and Design of Port Facilities:** Pier and wharf structures, Fender systems and Apron, Docks, Light Houses.	**CO5**

Learning Resources

Text Books	1. Saxena S.C. and S.P. Arora, A text book of Railway Engineering, Dhanpat Rai, 2010. 2. Khanna, S. K., Arora, M. G., and Jain, S. S. Airport planning and Design, Sixth Edition, Nem Chand and Bros, Roorkee, India, 2012 3. Bindra, S.P.A Course in Docks and Harbour Engineering, Dhanpat Rai and Sons, New Delhi, India, 1992
Reference Books	1. Railway Engineering by Agarwal M.M., Prabha & Co, New Delhi, 2012. 2. Airport Engineering by Rao G.V., Tata Mc Graw Hill, New Delhi, 1992. 3. Dock and Harbour engineering by Oza H.P. and Oza G., Anand Chartor Publishing House Pvt , Gujarat, 2010.
e- Resources & other digital material	1. https://nptel.ac.in/courses/ 105/107/105107123