IV Year II Semester   **L   T   P   C**
Code: 17CE837   **3   1   0   0**

RAILWAYS, AIRWAYS, PORTS & HARBORS

Course Learning Objectives
The objectives of this course are:

1. To know various components and their functions in a railway track
2. To acquire design principles of geometrics in a railway track.
3. To know various techniques for the effective movement of trains.
4. To acquired sign principles of airport geometrics and pavements.
5. To know the planning, construction and maintenance of Docks and Harbours.

Course Outcomes
At the end of course, Student will be able to
1. Identify various components of railway track
2. Design geometrics in a railway track.
3. Design Turnouts
4. Know about basics of airport designing elements
5. Gain the knowledge of design of runways.
6. Plan, construct and maintain Docks and Harbours.

SYLLABUS
A.RAILWAY ENGINEERING

UNIT-I
Components of Railway Engineering: Permanent way components-Railway TrackGauge-CrossSectionofPermanentWay-FunctionsofvariousComponentslike Rails, Sleepers and Ballast-Rail Fastenings-Creep of Rails-Theoriesrelatedtocreep-AdzingofSleepers-Sleeperdensity-Rail joints.

UNIT-II
Geometric Design of Railway Track: Alignment – Engineering Surveys - Gradients-GradeCompensation-CantandNegativeSuperelevation-CantDeficiency – Degree of Curve-safe Speed on curves–Transition curve -Compound curves–Reverse curves–Extra clearance on curves–widening of gauge on curves–vertical curves–cheek rails on curves.

UNIT–III
Turnouts & Controllers: Track lay outs-Switches-DesignofTongueRails-Crossings-Turnouts-LayoutofTurnout-DoubleTurnout-Diamondcrossing-Scissors crossing. Signal Objectives-Classification–Fixed signals- Stop signals-Signaling systems-Mechanical signaling system–Electrical signaling system–System for Controlling Train Movement –Interlocking– Modern signaling Installations.

B.AIRPORT ENGINEERING

UNIT–IV
Airport Planning & Design: Airport Master plan–Airportsite selection–Air craft characteristics–Zoning laws–Airport classification–Runway orientation–Windrose diagram–Runway length–Taxiway design–Terminal area and Airport layout–Visualaids and Airtraffic control.

UNIT –V
Runway Design: Various Design factors – Design methods for Flexible pavements–Design methods for Rigid pavements–LCN system of Pavement Design– Airfield Pavement Failures–Maintenance and Rehabilitation of Airfield pavements–Evaluation&StrengtheningofAirfieldpavements–AirportDrainage–Designofsurface and subsurface drainage.

C.DOCKS&HARBOURS

UNIT-VI
Planning, Layout, Construction & Maintenance Of Docks & Harbors: Classificationofports–Requirementofagoodport–classificationofHarbors–Docks-Dry&wetdocks–Transitionshed sand work houses–Layouts; Quays–construction of Quaywalls–Wharves–Jetties–Tides-TidaldataandAnalysis–Breakwaters–Dredging – Maintenance of Ports and Harbors – Navigational aids.

TEXT BOOKS:
1. RailwayEngineering,SatishChandraandAgarwalM.M.,OxfordUniversityPress,NewDelhi
2. Airport Engineering, Khanna& Arora- Nemchand Bros, New Delhi.
3. Docks and Harbor Engineering, Bindra S.P. – Dhanpathi Rai& Sons, New Delhi.

REFERENCES:
1. Railway Engineering, Saxena & Arora– DhanpatRai, New Delhi.
2. Transportation Engineering Planning Design, Wright P. H.&AshfortN. J., John Wiley&Sons.
3. Transportation EngineeringVolume II, C Venkatramaiah, 2016, Universities Press, Hyderabad.
4. Transportation Engineering, Railways, Airports, Docks &Harbours, Srinivasa KumarR, University Press, Hyderabad
5. AirportEngineeringPlanning&Design,SubhashC.Saxena,2016,CBSPublishers,New Delhi.
6. Highway, Railway, Airport and Harbor Engineering, Subramanian K. P, ScitechPublications (India)Pvt. Limited, Chennai
7. Airport Engineering, Virendra Kumar, Dhanpat Rai Publishers, New Delhi.