RAILWAYS, HARBOUR, TUNNELING AND AIRPORTS

Course Code	21CV643	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	(3:0:0)	SEE Marks	50
Total Hours of Pedagogy		Total Marks	100
Credits	03	Exam Hours	03

Course objectives:
- Understand the history and development, role of railways, railway planning and development based onessential criteria.
- Learn different types of structural components, engineering properties of the materials, to calculate the material quantities required for construction.
- Understand various aspects of geometrical elements, points and crossings, significance of maintenance of tracks.
- Design and plan airport layout, design facilities required for runway, taxiway and impart knowledge about visualaids
- Apply design features of tunnels, harbors, dock and necessary navigational aids; also expose them to variousmethods of tunneling and tunnel accessories.

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.
1. Blackboard teaching/PowerPoint presentations (if needed)
2. Regular review of students by asking questions based on topics covered in the class.

Module-1

Railway Planning: Significance of Road, Rail, Air and Water transports – Coordination of all modes to achieve sustainability
– Elements of permanent way, - Rails, Sleepers, Ballast, rail fixtures and fastenings, – Track Stress, coning of wheels, creep in rails, defects in rails
Route alignment surveys, conventional and modern methods- – Soil suitability analysis – Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings (Explanation & Sketches of Right- and Left-hand turnouts only).

Teaching-Learning Process	1.Blackboard teaching/PowerPoint presentations (if needed) 2.Regular review of students by asking questions based on topics covered in the class.

Module-2

Railway Construction and Maintenance: Earthwork – Stabilization of track on poor soil, Calculation of Materials required for track laying – Construction and maintenance of tracks – Modern methods of construct ion & maintenance – Railway stations and yards and passenger amenities- Urban rail – Infrastructure for Metro, Mono and underground railways.

Teaching-Learning Process	1.Blackboard teaching/PowerPoint presentations (if needed) 2.Regular review of students by asking questions based on topics covered in the class.

Module-3

Harbour and Tunnel Engineering: Definition of Basic Terms: Planning and Design of Harbours: Requirements,Classification, Location and Design
Principles – Harbour Layout and Terminal Facilities, Coastal Structures, Inland Water Transport – Wave action onCoastal Structures and Coastal Protection Works.
Tunneling: Introduction, size and shape of the tunnel, tunneling methods in soils, tunnel lining, tunnel drainage and ventilation.

Teaching-Learning Process	1.Blackboard teaching/PowerPoint presentations (if needed) 2.Regular review of students by asking questions based on topics covered in the class.

Module-4

Airport Planning: Air transport characteristics, airport classification, airport planning: objectives, components, layout characteristics, and socio-economic characteristics of the catchment area, criteria for airport site selection and ICAO stipulations, typical airport layouts, Parking and circulation area.

Teaching-Learning Process	1.Blackboard teaching/PowerPoint presentations (if needed) 2.Regular review of students by asking questions based on topics covered in the class.

Module-5

Airport Design: Runway Design: Orientation, Wind Rose Diagram, Runway length, Problems on basic and
Actual Length, Geometric design of runways, Configuration and Pavement Design Principles, Elements of TaxiwayDesign, Airport Zones, Passenger Facilities and Services, Runway and Taxiway Markings and lighting.

Teaching-Learning Process	1.Blackboard teaching/PowerPoint presentations (if needed) 2.Regular review of students by asking questions based on topics covered in the class.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

1. Acquires capability of choosing alignment and also design geometric aspects of railway system, runway andtaxiway.
2. Suggest and estimate the material quantity required for laying a railway track and also will be able to determinethe hauling capacity of a locomotive.
3. Develop layout plan of airport, harbour, dock and will be able relate the gained knowledge to identify requiredtype of visual and/or navigational aids for the same.
4. Apply the knowledge gained to conduct surveying, understand the tunnelling activities.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour)**
1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**
4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**
6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**
(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)
1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3

sub-questions), **should have a mix of topics** under that module.
The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:
Books
1. Saxena Subhash C and Satyapal Arora, "A Course in Railway Engineering", Dhanpat Rai and Sons, Delhi.
2. Satish Chandra and Agarwal M. M, "Railway Engineering", 2nd Edition, Oxford University Press, New Delhi.
3. Khanna S K, Arora M G and Jain S S, "Airport Planning and Design", Nemch and Brothers, Roorkee.
4. CVenkatramaiah, "Transportation Engineering", Volume II: Railways, Airports, Docks and Harbours, Bridges and Tunnels, Universities Press.
5. Bindra S P, "A Course in Docks and Harbour Engineering", Dhanpat Rai and Sons, New Delhi.
Web links and Video Lectures (e-Resources):
• . https://nptel.ac.in/courses/105107123
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
• Seminars/Quiz (To assist in GATE Preparations)
• Self-Study on simple topics
• Simple problems solving using Excel

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