

**SECOND SEMESTER 2018-2019**

# Course Handout

Date: 07-01-2019

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

*Course No.* : CE F425

## Course Title : Airport, Railways and Waterways

## Instructor-in-Charge : Bandhan Bandhu Majumdar

**Scope and Objective of the Course:**

This course introduces Airports, Railways and Waterways Engineering as a part of Transportation Engineering, including an introduction to Tunnel Engineering. The course deals with the characteristics of aircrafts related to airport design; runway and taxiway design, runway orientation, length, grading and drainage. It introduces the students to component of railway tracks, train resistance, crossing, signaling, high speed tracks and Metro Rail. It explains the classes of harbors, features, planning and design of port facilities. The student will be introduced to necessity of tunnels, ventilation, lighting and drainage.

**Course Outcome:** At the end of this course, the students will develop:

1. An ability to design of runways and taxiways.
2. An ability to design the infrastructure for large and small airports
3. An ability to design various crossings and signals in Railway Projects.
4. An ability plan the harbors and ports projects including the infrastructure required for new ports and harbors.
5. An ability to match drilling requirements for various tunnel projects.

Student Learning Outcomes (SLOs) assessed in this course – (a), (b), (c), (d), (e), (h), (j), and (k).

**Text Books:**

T1. Subhash C. Saxena (2008) Airport Engineering, Planning and Design, CBS Publishers and Distributors, New Delhi. (Reprint 2015)

T2. R. Srinivasan (2018), [Harbour, Dock and Tunnel Engineering](http://jainbookagency.com/newdetails.aspx?id=35694) 29th Edition, Charotar Publishing House Pvt. Ltd.

# T3. Saxena SC and Arora S C (2010) A Text Book of Railway Engineering Paperback – 2010, Dhanpat Rai Publications (Reprint 2015)

**Reference Books:**

R1. Robert Horonjeff, Francis X. McKelvey, Willian J Sproule, Seth B. Young (2010), Planning & Design of Airports, McGraw-Hill Professional.

R2. S C Saxena (2015), Tunnel Engineering, New Delhi, Dhanpat Rai Publications (P) Ltd.-New Delhi

R3. J S Mundrey, Railway Track Engineering (5th Edition) McGraw Hill Education 2017

**Course Plan:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Lecture No. | Learning objectives | | Topics to be covered | Chapter in the Text Book | SLO |
| **Airport Engineering** | | | | | |
| 1 | Study the history and development of aircraft operations | | Introduction : History of aviation, development of aircrafts and their operating characteristics | T1- chapter1 | (a) |
| 2-4 | Ability to design runways | | Airport Design, runway orientation : Orientation of runways, Geometric Design of runways and Geometric design of taxiways | T1-chapters 7 & 8 | (a) (b) (c) (d) (f) |
| 5-6 | Identify the components required for the terminal building | | Terminal building: Airport Terminal Building, functions | T1-chapter16 |  |
| 7-9 | Ability to design the subsurface drainage | | Drainage: Airport drainage, surface drainage, sub-surface drainage, environmental impacts | T1-Chapter 18 | (a) (b) (c) (d) ( |
| 10-13 | Ability to design runways using software | | Pavement design for Runways: Factors affecting runway designs, difference between highway and runway structural designs, FAA method of runway design | T1 – Chapter 19 | (a) (b) (c) (d) (k) |
| **Railway Engineering** | | | | |  |
| 14 | Study the history and development of railway transportation, identify the stresses in railway tracks, design the joints in rail sleepers | | Railway Transportation and its Development, Railway Terminology | T3 – Chapter1 to 3 | (a) |
| 15 | Stresses in Railway Track Traction and Tractive Resistances Rails | T3 – Chapter 4 | (a) |
| 16 | Rail Joints and Welding of Rails Creep of Rails Sleepers | T3 – Chapter 7 to 9 | (a) (f) |
| 17 | Track Fittings and Fastenings | T3 – Chapter 10 | (a) (i) |
| 18 | Ballast | T3 – Chapter 11 | (a) (b) (f) |
| 19 | Subgrade and Embankments | T3 – Chapter 12 | (a) (b) (c) |
| 20 | Points and Crossings | T3 – Chapter 16 | (a) (i) |
| 21 | Track Junctions | T3 – Chapter 17 | (a) (i) |
| 22 | Stations and Yards, Equipment in Station Yards | T3 – Chapter 18 to 19 | (a) |
| 23 | Signaling and Control System | T3 – Chapter 20 | (a) (f) (h) |
| 24 | Interlocking of Signals and Points | T3 – Chapter21 | (a) |
| 25 | Maintenance of Track | T3 – Chapter24 | (a) |
| 26 | Safety in Railways | T3 – Chapter26 | (a) (h) (i) |
| 27 | Design high speed railway system | | Modern Developments in Railways Development of High and Super High Speeds Modernization of Track for High Speeds Modern Methods of Track Maintenance | T3 – Chapter 28 – Chapter 31 | (a) (b) |
| 28 | Identify the components in Metro Rail | | Introduction to Metro Rail System | T3 – Chapter 28 – Chapter 31 | (a) (h) (i) (f) |
| Waterways Engineering | | | | | |
| 29-30 | Designing the facilities for good ports | | Ports and Harbours: Classification of Harbours and Ports, Requirements of a good port; facilities at a major port | T2 – Chapter 1 | (a) (h) |
| 31 | Design break waters | | Protection Facilities: Classification of break waters; brief description of each of the breakwaters including wall type and special breakwaters | T2 – Chapter 3, Chapter 4 | (a) (e) (h) |
| 32 | Identify the facilities for Ports | | Planning and layout of ports: Facilities at a port, layout of a typical port | T2 – Chapter 5 | (a) (c) |
| 33 | Identify the differences between wet docks and dry docks and their functions | | Introduction to docking facilities with special reference to wet docks, Introduction to Graving dry docks | T2 – Chapter 6 | (a) (c) |
| 34 | Identify difference between dolphins and jetties | | Approach, Loading and Unloading facilities: Introduction to entrance locks, quay walls, wharves, pier heads, dolphins, jetties, fenders, slip and moles | T2 – Chapter 8, Chapter 9 | (a) (c) |
| 35 | Study the functions of light signals | | Guiding facilities: Fixed and floating light stations, light signals, fog signals, audible signals, moorings | T2 – Chapter 12 | (a) (c) |
| **Tunnel Engineering** | | | | | |
| 36-37 | | Identify the alignment and grade for tunneling | Introduction and Methods of Tunneling : General aspects, advantages of tunneling, economics of tunneling, Tunnel approaches, alignment and grade, tunnel surveying, transferring center line, design shape and size; compressed air tunneling and tunneling in rocks | T2- Section II  Chapter 1 to 5 | (a) (c) |
| 38-39 | | Identify the advantages of lining in tunneling projects | Timber lining, concrete lining, stone masonry | T2-Section II  Chapter 7 | (a) (c) |
| 40-42 | | Identify the type of drainage for tunnels | Drainage of Tunnels, Tunnel ventilation and lighting | T2-Section II  Ch-8 & 9 | (a) (c) |

**\*Student Learning Outcomes (SLOs):**

SLOs are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.

1. an ability to apply knowledge of mathematics, science and engineering
2. an ability to design and conduct experiments, as well as to analyze and interpret data
3. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
4. an ability to function on multidisciplinary teams
5. an ability to identify, formulate, and solve engineering problems
6. an understanding of professional and ethical responsibility
7. an ability to communicate effectively
8. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
9. a recognition of the need for, and an ability to engage in life-long learning
10. a knowledge of contemporary issues
11. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Evaluation Scheme:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component** | **Duration** | **Weightage (%)** | **Date & Time** | **Nature of Component** |
| Mid-Sem | 90 | 25 | 12/3  11.00 -12.30 PM | CB |
| Take home Assignments | - | 10 |  | OB |
| Project/Seminar | - | 10 |  | OB |
| Quiz | 50 | 20 | Shall be announced | OB |
| Comprehensive Exam | 180 | 35 | 03/05 AN | CB |

**Chamber Consultation Hour:**

Will be announced in the class

**Notices:**

Notices will be displayed on CMS and few important notices will also be displayed on the notice board of Civil Engineering Department

**Make-up Policy:**

1. Make-ups will be granted only for genuine reasons like medical emergencies. However, prior permission is a must.
2. Applications received 24 hours after the test will not be entertained. Applications on informal forums like Face Book will be ignored
3. For medical cases, a certificate from the concerned physician of the Medical Centre must be produced in addition to the prescriptions and other investigation reports. Cross verification also will be done with Hostel Superintendent / Warden before proceeding further with the application.

**Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**INSTRUCTOR-IN-CHARGE**

**CE F425**