Birla Institute of Technology & Science, Pilani
Hyderabad Campus

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 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	(a)

			to 19	
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	Timber lining, concrete lining, stone masonry	T2-Section II Chapter 7	(a) (c)

	tunneling projects			
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.

(a) an ability to apply knowledge of mathematics, science and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) 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
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) 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