Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2019-2020

Course Handout

Date: 25-12-2019

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 G546
Course Title : Highway Construction Practices
Instructor-in-Charge : *SRIDHAR RAJU*
Instructor *: PrasantaSahu*

Course Description:

Road planning and reconnaissance; right of way selection; fixing of alignment; road construction techniques: construction staking, clearing and grubbing of the road construction area; subgrade construction: excavation and filling, compaction, preparation of sub grade, quality control tests as per MORTH specifications; granular subbase and base course construction: gravel courses, WBM, WMM, stabilized soil subbases, use of geo-textiles and geo-grids; construction of bituminous layers; concrete pavement construction; field quality control ; road making machinery

Scope and Objective of the Course:

The course includes road planning along with reconnaissance, right of way selection, fixing of alignment; road construction techniques, clearing and grubbing of the road construction area. The road construction starting with subgrade construction, including the excavation and filling, followed by compaction, preparation of sub grade. This also includes quality control tests as per MORTH specifications. Theconstruction of unbound granular subbase and base course including the gravel road and stabilized soil subbases. The students will be introduced to topics on geo-textiles and geo-grids. Details regarding the construction of bituminous layers will be discussed in the course. The construction of concrete pavement including field quality control will be taught in this course. The students will be introduced to the advanced machineries used for road construction.

Text Books:

T1 Kandhal Text book on Bituminous Road Construction in India, PHI

T2 MoRTH Book of specifications for Roads and Bridge works published by the IRC, 5th Revision, 2013, New Delhi

Reference Books:

R1 Coleman O'Flaherty (ed.) (2015) Highways, The Location, Design, Construction and Maintenance of Road Pavements, ICE Publishing 5th edition, ISBN: 9780727759931

R2 Rajib B. Mallick and Tahar El-Korchi, (2014) Pavement Engineering Principles and Practice, Second Edition, CRC Press.

R3 Concrete Pavement Design, Construction, and Performance by Norbert J. Delatte, Second Edition, published by the CRC Press (2008).

R4 Relevant IRC publications.

Course Plan:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1-3	Compaction of embankment, earthworks and sub-grades	Compaction of sub-grade and embankment and other works, light and heavy laboratory compaction, compaction theory, factors affecting, compaction, quality control and quality assurance, field compaction, measurement of field density and moisture content, Compaction equipment for road works	T2-section 200 and 300 T2-900
4	Fly Ash in Embankment	Fly ash properties, construction procedure and specifications, quality control, precautions and protection against various hazards associated with fly ash embankment	T2-section 300 IRC:SP:58-2001 T2-900
5	Application of geo-synthetic in highway construction	Uses of Geosynthetics in road construction, different types of Geo-synthetic materials, QA/QC. Construction of reinforced earth wall for embankments including MoRTH Specifications. Construction procedures and practices including case studies.	T2-700 T2-900
6-8	Road construction in waterlogged areas and drainage	Road construction in waterlogged areas including the sub-surface drainage system for the capillary cut-off.	Ch.7 and 8-R1, Ch.6-R2, IRC:34-2011, IRC:SP:42-2014 and IRC:SP:50-2013
9-10	Granular and Stabilised Bases and Subbase Courses	Construction of Granular Sub Bases (GSB) as per the MoRTH Specifications with emphasis on QA/QC as a part of construction practice. Construction of lime, cement and chemical treated sub-base courses. Construction of WBM, WMM, CRM, DLC, Kerbs and Shoulders.	T2-section 400 Ch. 6, R1, Ch. 7, R2, IRC:SP:89-2010, IRC:75-2015

11-17	Surface Courses and Interface treatments	Construction and quality control of bituminous works including, Tack Coats and Prime Coats, Dense Graded Bituminous Macadam, Bituminous Concrete, Mix Sealed Surfacing, Open Graded Premixed Carpet with Seal Coat, Surface Dressing. Special Bituminous Mixtures like Gap Graded Bituminous Mixes like Stone Matrix Asphalt (SMA). Mastic Asphalt, Warm Mix Asphalt, Ready Pot Hole Patch Mixtures, Micro Surfacing, Porous Asphalt, Asphalt Mixtures with waste materials (waste plastic and crumb rubber).	T1-6,7, 8 R1 and R2
18-25	Hot mix asphalt (HMA) production with emphasis on the type of hot mix plant (HMP)	The production process from the Batch and Drum mix plants will be discussed and highlighted on the advantages and disadvantages of both the plants. Mixing and placing of Bituminous Mixtures, Surface Preparation, Paving Equipment and Paving Procedures, Mix and Mat inspection, Construction of joints. Asphalt mixture compaction – roller types, method of compaction, factors affecting compaction, rolling joints, inspection of compacted mat, segregation, measurement of density, density specifications. QC/QA of Asphalts – Methods, Statistically based end result specifications	T1, R1, R2 and Notes
26-32	Recycling of Asphalt Pavements	Advantages and disadvantages of recycling, full depth recycling, hot and cold in place recycling, milling and plant recycling. The use of double barrel drums for heating reclaimed asphalt pavement (RAP). Utilization of maximum percentage of RAP.	T1- 9, T2-section 519
33-40	Concrete Road Construction	Concrete road construction including the tests on Concrete mixes, Construction equipment, Method of construction of joints in concrete pavements, Quality Control in Construction of Concrete pavements, Construction of Continuously reinforced, Steel Fibre Reinforced (SFRC) Pavements. Unconventional Pavements – Porous concrete, SCC, Roller Compacted Concrete etc. including QC/QA. Recycled concrete pavements – Methods of recycling, issues with recycled concrete pavements.	T2-600, R2, R3, IRC:15 and IRC:SP:062-2014

Statistical analysis shall be a part of the course that has to be considered during construction for quality control and quality assurance test.
Awareness on the contract document and the preparation of tender document including Bill of Quantities shall be a part of the course
The practical aspects shall be given equal importance by taking the students for site visits.

Evaluation Scheme:

Component	Duration	Weightage	Date & Time	Nature of

		(%)		Component
Mid-sem	90	25	4/3 9.00 - 10.30AM	CB
Take Home Assignments	-	15	Shall be conducted Regularly	OB
Project	-	15		OB
Quiz	50	10	Shall be conducted Regularly	OB
Comprehensive Exam	180	35	06/05 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