Birla Institute of Technology & Science, Pilani
Hyderabad Campus

ACADEMIC – GRADUATE STUDIES AND RESEARCH DIVISION
BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI-HYDERABAD CAMPUS
SECOND SEMESTER 2021-2022

Course Handout

Date: 15-01-2022

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 G570
Course Title : Highway Construction Technology
Instructor-in-Charge : SRIDHAR RAJU

Scope and Objective of the Course:

Road planning and reconnaissance; right of way selection; fixing of alignment; road construction techniques: construction staking, clearing and grubbing; subgrade construction: excavation and filling, compaction, preparation of subgrade, quality control tests as per MoRT&H 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. Hot mix asphalt plants, road construction equipment, material placement and compaction methods, shoulders, highway drainage and roadside requirements; State of the art construction management techniques, construction standards, quality control and quality assurance including contract documents and arbitration.

Text Books:

T1 Kandhal Text book on Bituminous Road Construction in India, PHI, Revised Edition (2019).
T2 MoRTH Book of specifications for Roads and Bridge works published by the IRC, Latest 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.

R5 Pavement Drainage Theory and Practice by G L Sivakumar Babu, Prithvi S Kandhal, Nivedya Mandankara Kottayi, Rajib Basu Mallick and A Veeraragavan, CRC Press (2020).

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, light and heavy laboratory compaction, factors affecting the field compaction, quality control and quality assurance, compaction equipment for road works	T2-section 200 and 300 T2-900
4	Fly Ash in Embankment	Construction procedure, quality control, protection against various hazards	T2-section 300 IRC:SP:58-2001 T2-900
5	Application of geo-synthetic in highway construction	Uses of Geosynthetics in road construction, QA/QC, MoRTH Specifications. Construction practices and 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, QA/QC. Construction of stabilized sub-bases. Construction of WBM, WMM, CRM, DLC layers. Sub-sruface drainage construction will be emphasized.	T2-section 400 Ch. 6, R1, Ch. 7, R2, IRC:SP:89-2010, IRC:75-2015, R5
11-17	Surface Courses and Interface treatments	Spraying of prime coat and tack coat. Construction of dense, gap and open graded bituminous mixes. Construction of new mixes like warm mix asphalt, micro surfacing, and bituminous mixes with waste materials (RAP, and waste plastic and crumb rubber).	T1-6,7, 8 R1 and R2
18-25	Hot mix asphalt (HMA) production with	The production process of bituminous mixes using a batch mix and a drum mix plant. Advantages and disadvantages of both the plants. Surface preparation, mixing, laying and compaction of	T1, R1, R2 and Notes

	emphasis on the type of hot mix plant (HMP)	bituminous mixes. Paving equipment, QA and QC. Roller types, method of compaction, factors affecting compaction, rolling joints, inspection of compacted mat, segregation, measurement of density, density specifications. Statistical methods for arriving at the QA.	
26-30	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
31-35	Concrete Road Construction	Concrete road construction including the tests on Concrete mixes, Construction equipment, Method of construction of joints in concrete pavements, QA and QC. Unconventional Pavements – Porous concrete, SCC, Roller Compacted Concrete etc.	T2-600, R2, R3, IRC:15 and IRC:SP:062-2014
36-42	Contract documents and arbitration	Case studies shall be considered with the lectures from experts regarding the arbitration and the preparation of documents.	Guest Lecture from an Industry expert

Evaluation Scheme:

Component	Duration (mins)	Weightage (%)	Date & Time	Nature of Component
Midsem Exam	90	25	TBA	OB
Assignments		15	3 (minimum)	OB
Class Quizzes		10	2 (minimum)	OB
Project work		15	TBA	OB
Compre Exam	120	35	TBA	OB

Chamber Consultation Hour:
Tuesday and Wednesday 5:00 to 6:30 PM

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 Quiz/examinations will not be entertained.
3. For medical cases, a certificate from the concerned physician of the Medical Centre must be produced. Cross verification will be done with Hostel Superintendent.

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.

Sridhar Raju

INSTRUCTOR-IN-CHARGE
CE G570