

**Advanced Highway Material,  
Construction and Maintenance**
**01TR1205**
**(PEC)**
**Objective of the Course:**

- To apply knowledge about pavement construction and maintenance.
- To introduce fundamental concept of highway construction.
- To introduce knowledge of various highway construction material.

**Credit Earned: 3**
**Students learning outcomes:**

After successful completion of the course it is expected that student will be able to,

1. Understand construction of Flexible Pavement.
2. Understand construction of Rigid Pavement.
3. Evaluate maintenance strategies of pavement.
4. Design thickness of overlay for pavement.

**Teaching and Examination Scheme**

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
03	0	0	03	50	30	20	25	25	150

**Detailed Syllabus**

Sr No.	Title of the unit	Number of hours
<b>1</b>	<b>High Performance Highway Construction Materials</b>	<b>06</b>
	Introduction, Use of waste materials: Fly ash, Slag, Recyclable waste, Other waste materials. Modified bituminous materials: PMB, EMB, NRMB, CRMB, IS requirements and testing procedures, Concrete: introduction, advantages, IS requirements, mineral admixtures, applications, Advances in pavement material, superpave, micro surfacing etc.	
<b>2</b>	<b>Embankment &amp; Sub Grade</b>	04
	Setting out, Clearing and Grabbing, Road formation Width, Borrow pits, Quarries, Construction under special case, Embankment construction, Subgrade construction,	
<b>3</b>	<b>Construction of Flexible Pavement</b>	<b>12</b>
	Sub base : Granular sub base (GSB), Unbound Courses : Water Bound Macadam (WBM), Wet Mix Macadam (WMM), Bound Courses : Bituminous Macadam (BM), Dense Bound Macadam (DBM), Wearing Courses : Bituminous Concrete (BC), Semi Dense Bituminous Concrete (SDBC)	
<b>4</b>	<b>Construction of Rigid Pavement</b>	<b>10</b>

**Transportation Engineering**

	Dry Lean Concrete (DLC), Roller Compacted Concrete Pavement (RCCP), Pavement Quality Control (PQC), Continuously Reinforced Concrete Pavement (CRCP), Cement Concrete Pavement Construction Techniques : Manual, Automated (Fixed form, Slip form)	
<b>5</b>	<b>Highway Maintenance</b>	<b>10</b>

**Transportation Engineering**

	Need of maintenance, Methods of maintenance for Flexible and Rigid Pavement layers, Types of Falling Weight Deflectometers, Distress modes, Benkelman Beam Test, Roughness measurement by Bump Integrator	
		<b>42</b>

**Suggested Theory Distribution**

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	5%	20%	25%	25%	20%

**Instructional Method and Pedagogy:**

1. Use of Learning Management system like canvas
2. Demonstration through presentations on power point and videos and lectures
3. Brainstorming and group discussion sessions
4. Collaborative learning

**Reference Book:**

1. Highway Engineering by S. K. Khanna, C.E.G Justo, em Chand and Bros, Roorkee.
2. Highway Construction and Maintenance by Avinash Gupta, Random Publications.
3. Bituminous road construction in India by Prithvi Singh Kandhal, PHI Learning Pvt. Ltd.
4. Robert D Krebs Richard; Highway Materials McGraw-Hill Education.1971
5. Atkins Harold N., Highway Materials, Soils, and Concrete, Prentice Hall,1996
6. Khanna S.K., Justo C.E.G., Highway Engineering, Nem Chand & Bros., Roorkee, 2001
7. Kadiyali L.R., Principles & Practice of Highway Engineering, Khanna Publishers,2001