**20CE41E1 – PAVEMENT CONSTRUCTION AND MANAGEMENT**

**(Civil Engineering)**

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| **Course Category**  | Professional Elective | **Credits** | 3 |
| **Course Type** | Theory | **Lecture - Tutorial - Practical** | 3 - 0 - 0 |
| **Prerequisite** | Transportation Engineering  | **Sessional Evaluation**  | 40 |
| **Semester End Exam Evaluation** | 60 |
| **Total Marks** | 100 |

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| **Course Outcomes** | CO1 | Understand the construction procedure of embankment, gravel road and WBM road. |
| CO2 | Able to explain the construction procedure of bituminous and cement concrete pavements. |
| CO3 | Understand different methods of soil stabilization. |
| CO4 | Acquire knowledge about utilization of various highway construction machinery. |
| CO5 | Understand the need and methods of maintenance of different types of pavements. |
| CO6 | Understand methods of evaluation of different types of existing pavements and also different techniques to strengthen them.  |
| **Course****Content** | **UNIT – I****CONSTRUCTION OF EARTHEN ROADS AND W.B.M ROADS:** Typical components of highway on embankment and in cutting, steps for construction of new highway on embankments and in cutting, functions and design elements of embankment – construction of sub grade – materials, construction method and quality control check. Method of compaction of soil and equipment - construction of embankment – construction of gravel road and WBM road. **UNIT – II****CONSTRUCTION OF BITUMINOUS AND CEMENT CONCRETE PAVEMENTS:** Construction of bituminous roads – Interface treatments, Bitumen surface dressing and penetration macadam – Built up spray grout – Premix methods construction of cement concrete pavements – Construction of joints in cement concrete pavements – Types of joints, arrangement of joints, joint filler and scalar.**UNIT – III****SOIL STABILIZED PAVEMENT LAYERS:** Objectives, application of soil stabilization techniques, mechanics of stabilization and investigations for soil stabilized roads and soil stabilization methods. Mechanical soil stabilization properties of soil –Aggregate mixtures –Factors affecting mechanical stabilization – Minimum design in mechanical stabilization, construction procedure – Stabilization using soft aggregates – Mehras’s method of stabilization.**UNIT – IV****HIGHWAY CONSTRUCTION EQUIPMENT**: Various types of equipment for excavation, grading and compaction - their working principle, advantages and limitations. Paving equipment for bituminous and cement concrete pavement. Equipment for stabilized soil road construction.**UNIT – V****HIGHWAY MAINTENANCE:** Need – Causes of pavement failures – Classification of maintenance works maintenance management system – Failures in flexible pavements – Failures in sub grade – Failures in sub base or base course – Typical flexible pavement failures – Failures in cement concrete pavement – Typical rigid pavement failures –Different types of maintenance for Bituminous surfaces – Special repairs in flexible pavements – Waves and corrugations – Skidding of pavement surfaces – Maintenance of cement concrete pavements.**UNIT – VI****PAVEMENT EVALUATION:** Structural evaluation of pavements –need and application of structural evaluation studies- different methods- factors affecting pavement deflection, general principle deflection approach, principle of structural evaluation of flexible pavements - Evaluation of pavement surface condition – Strengthening of existing pavements -objectives– Flexible overlay over flexible pavement by conventional design method – Overlay design by Benkelman beam deflection studies- rigid overlay over rigid pavement – Flexible overlay over rigid pavement. |

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| **Textbooks and Reference Books** | **TEXTBOOKS:**1. S.K. Khanna and C.E.GJusto &Veeraraghavulu, *Highway Engineering*, Nemchand&bros, 10th edition, 2018.
2. Dr. L.R Kadiyali, *Principles and Practice of Highway Engineering,* Khanna publishers, 7th edition, 2019.
3. C.Venkatramaiah, *Transportation Engineering Vol. I,* Universities Press (India) Private Ltd, 1st edition, 2016.

**REFERENCE BOOKS:**1. Dr. L.R Kadiyali, *Traffic Engineering and Transport Planning,* Khanna publishers, 9th edition, 2017.
2. AnimeshDas, Analysis of pavement structures, CRC Press, 2nd edition, 2014.
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**CO-PO Mapping:** 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

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|   | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO 3** |
| **CO1** | 1 | - | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | - | 1 | 3 |
| **CO2** | 1 | - | 2 | 1 | 2 | - | - | 1 | 1 | 3 | 1 | 1 | - | 1 | 3 |
| **CO3** | 2 | - | 1 | 1 | 1 | 2 | - | 1 | 2 | 3 | 1 | 1 | - | 3 | 1 |
| **CO4** | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 1 | 1 | - | 2 | 1 |
| **CO5** | 3 | - | - | 1 | 1 | 1 | - | 1 | 2 | 2 | 2 | 1 | - | 1 | - |
| **CO6** | 1 | - | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | - | 1 | - |