**19CEXXΦ5– BASICS OF TRANSPORTATION ENGINEERING**

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

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| **Course Objectives** | 1. To present road network statistics along with highway alignment concepts. 2. To explain basics of highway cross sectional elements. 3. To illustrate various traffic signs and road markings. 4. To outline engineering aspects of railway engineering. 5. To prepare report of structural aspects regarding airport. 6. To identify basics components of harbour. | |
| **Course Outcomes** | CO1 | Understand various types of roads and road patterns. |
| CO2 | Comprehend the concepts of highway geometric design. |
| CO3 | Apply basic rules and regulations of traffic and be able to understand the purpose of road markings. |
| CO4 | Outline the basics of permanent way and its components. |
| CO5 | Be able to summarize the layout of airport. |
| CO6 | Demonstrate the structural components of airport. |
|  | **UNIT – I**  **IMPORTANCE OF TRANSPORTATION:** Modes of transportation, characteristics of road transport, methods of classification of roads, road patterns. Requirements of ideal alignment, factors controlling alignment, master plan and its phasing. Problems on saturating system concept.  **UNIT II**  **HIGHWAY GEOMETRIC DESIGN**: design controls and criteria, highway cross- section elements- pavement surface characteristics, camber, width of pavement, kerbs, road margins, right of way, formation width, site distance- stopping sight distance, PIEV theory, analysis of SSD, over taking sight distance and its analysis. Design of a horizontal alignment- horizontal curves- effect of centrifugal force at horizontal curve, derivation of super elevation, extra widening | |
|  | **UNIT III**  **TRAFFIC SIGNS**: Importance-Need for international standardization-Types of traffic signs-Warning signs-Prohibitory signs-Mandatory signs-Informatory signs-Indication signs-Direction signs, advance direction signs and place identification signs-Location height and maintenance of traffic signs  **ROAD MARKINGS**: Function-Types of road markings, material and color, centre lines, traffic lane lines, pedestrian crossings.  **UNIT IV**  **BASICS OF RAILWAY ENGINEERING:** Permanent way and its components, gauges, types of rails, functions of rails, types of sleepers, functions of sleepers, ballast, types of ballast, List of classification of stations, yards- types only.  **UNIT V**  **BASICS OF AIRPORT ENGINEERING:** Introduction to air transportation, characteristics of air transport, components of airports and functions- terminal area and landing area, parts of aircraft, classification of airports, different kinds of flights, factors affecting site selection for an airport, Airport terminal building, patterns of parking, aprons, hangers.  **UNIT VI**  **BASICS OF HARBOUR ENGINEERING:** Water transportation**-**Importance**,** types-inland and ocean transportation**,** Tides, Wind and waves – Currents, uses and effects of tides at harbor, Classification of harbour’s and ports, Site selection, requirements of good port, Loading and unloading facilities of harbour-Quays-wharves- piers- dolphins- Jetties – Fenders – Aprons, Transit sheds - Ware houses , Breakwaters(List of break waters only). | |
| **Textbooks**  **and**  **References** | **TEXTBOOKS:**   1. S.K Khanna, C.E.G Justo &Veeraraghavulu, ”*Highway Engineering”*, Nem Chand & Bros,10th edition, 2018. 2. S.C.Saxena & S.P. Arora, “*A text book of Railway Engineering”*, Dhanpat Rai publications, 7th edition, 2015. 3. R. Srinivasan, “*Docks and Harbour engineering”,* Charotar publishing hose Pvt. Ltd, 29th edition, 2018. | |
| **REFERENCE BOOKS:**   1. *Guidelines for the Design of flexible pavements*, IRC:37-2001. 2. Dr. L.R.Kadiyali, “*Principles and Practice of Highway Engineering”* Khanna publishers, 7th edition, 2019. 3. C.Venkatramaiah, “*Transportation Engineering Vol I&II”*, Universities Press (India) Private Ltd, 1st edition, 2016. | |

**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** |
| **CO1** | 1 | - | 1 | 1 | - | 2 | 1 | - | - | - | - | - |
| **CO2** | 3 | 2 | 2 | 2 | 1 | - | - | - | - | - | 2 | 3 |
| **CO3** | 1 | 2 | - | 1 | - | - | - | - | - | - | 3 | 1 |
| **CO4** | 3 | 2 | 2 | 1 | - | - | 1 | - | - | - | 2 | 2 |
| **CO5** | - | - | - | 1 | 2 | - | - | - | - | - | 2 | - |
| **CO6** | 2 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | - |