

SHIV NADAR UNIVERSITY

UNDERGRADUATE COURSE PROPOSAL

- I. **COURSE TITLE:** Transportation Engineering-I
- II. **COURSE CODE:** CED 304
- III. **COURSE CREDITS (L:T:P):** 3:0:1
- IV. **COURSE TYPE:** MAJOR
- V. **PREREQUISITE/S (IF ANY):**None
- VI. **COURSE COORDINATOR/INSTRUCTOR(S):** Dr Shalini Rankavat
- VII. **SCHOOL/ DEPARTMENT:** SoE/Civil Engineering
- VIII. **DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:** All
- IX. **Objectives:** The main objective of the course is to describe the essential components of transportation engineering and basic elements of highway engineering and geometric design. This course provides information about the materials used for the pavement and the design concept of flexible and rigid pavements.
- X. **Learning Outcomes:** On completion of the course, the students will:
 - be aware about the basic components of transport system and infrastructure, their role and characteristics
 - have knowledge of - design and conduct of traffic surveys to collect traffic data; identification of traffic problems (like congestion, level of service); designing basic traffic signal phasing and timing plan
 - be able to estimate stopping and passing sight distance; have knowledge of the design of horizontal alignment and vertical alignment of the highway, design of horizontal and vertical curves
 - have knowledge of the materials used for the pavement and their tests and understanding of design of flexible pavement layers and calculation of deflection and stresses in pavements
 - be familiar with the four stages of the transport planning

XI. COURSE CONTENT:

- 1. Introduction:** Breadth and scope of Transportation Engineering, modes of transportation and their comparison, effect of transportation systems on economy, impact on environment; Road transport Characteristics, Classification of roads, Road development plans in India, network patterns.
- 2. Traffic Engineering:** Traffic Studies, Origin-Destination studies, speed and delay studies, accident analysis, volume studies, passenger car equivalent, etc.; Traffic control Devices, marking, Signs, Signals, Regulations; Speed-flow-density relationship, Greenshields model, signal timing estimation, capacity and Level-of-Service analysis.
- 3. Roadway Geometry:** Road, road user and vehicle characteristics, factors affecting design standards, cross-section elements, Stopping and overtaking sight distances, Road alignment, site selection, plan evaluation, Horizontal alignment, vertical alignment, design of summit and valley curves.
- 4. Materials:** Sub-grade soil, classification, group index, sub-grade soil stabilization; Aggregate, physical properties, mechanical properties, test on aggregates; Bituminous material, classification, tests on bitumen.
- 5. Pavement Design:** Necessity of pavement, types of pavements & characteristics, design parameters, wheel loads and axle loads, tyre pressure, load repetitions, ESWL; rigid and flexible pavement design, stresses in rigid pavement.

Lab Work based on various testing methods for materials such as soil, aggregates, and bitumen as well as exercises based on traffic engineering concepts.

XII. RECOMMENDED BOOK(S):

Text Book:

1. S. K. Khanna and C. E. G. Justo, "*Highway Engineering*", 9th Edition, Nem Chand and Brothers (2011).

Reference Books:

1. L. R. Kadiyali and N.B. Lal, "*Principles and Practices of Highway Engineering*", Khanna Publishers (2005)
2. L. R. Kadiyali, "*Traffic Engineering and Transport Planning*", Khanna Publishers (2011).
3. Paul H. Wright and Karen K. Dixon, "*Highway Engineering*", 7th Edition, Wiley India (2012).
4. Yang H. Huang, "*Pavement Analysis and Design*", Pearson Education India.
5. Ajay K. Duggal and Vijay P. Puri, "*Laboratory Manual in Highway Engineering*", New Age International.

XIII. ASSESSMENT SCHEME:

Theory: 75% of your grade

Lab Work: 25% of your grade

Theory

Assignments: 25%

Mid Term Exam: 20%

Final Exam: 30%

Lab Work

Performance/participation: 10%

Report writing: 7%

Viva voce: 8%

Total: 100%