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**Question Paper Code:U9176**

B.E./B.Tech. DEGREE EXAMINATION, NOV 2025

Open elective

21UCE976 ROAD SAFETY

(Common to All Engineering Branches)

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Outline the fundamentals of traffic engineering. CO1-U
2. Interpret the highway capacity in traffic engineering. CO1-U
3. Demonstrate the main causes of an accident. CO1-U
4. Sketch an example for collision diagram with assumed data. CO1-U
5. What are the key elements of a road cross section? CO1-U
6. Define road alignment and explain its role in geometric road design. CO1-U
7. Differentiate between at-grade and grade-separated intersections. CO1-U
8. What role do junctions play in urban road safety? CO1-U
9. Mention the role of Intelligent Transportation Systems (ITS) in road safety management. CO1-U
10. What are the key steps involved in the Road Safety Audit process? CO1-U

PART – B (5 x 16= 80 Marks)

11. (a) Organize the concept of highway capacity in traffic engineering and its importance in ensuring safe and efficient traffic flow. CO2 – App (16)  
Or  
(b) Explain in detail about the classification of vehicles by type and size and how to determine occupancy rates. Also discuss the challenges and limitations associated with data collection and analysis. CO2 – App (16)

12. (a) Execute in detail about the major factors that contribute to accidents on the road, & the remedial measures to prevent accidents. **CO2 – App (16)**
- Or
- (b) Demonstrate the steps involved in the assessment of road safety and elaborate the methods to Identify and Prioritize Hazardous Locations and Elements. **CO2 – App (16)**
13. (a) Illustrate how protective devices such as seatbelts, airbags, and crash barriers can be applied to reduce fatalities in real-world crash scenarios. **CO3-App (16)**
- Or
- (b) Discuss the relationship between vehicle design characteristics and accident severity. **CO3-App (16)**
14. (a) Explore innovative strategies to improve bicycle safety, including protected bike lanes, bike-sharing programs, and traffic calming measures. **CO4-Ana (16)**
- Or
- (b) Examine the effectiveness of traffic calming measures (like speed humps, raised crosswalks, and chicanes) in accident reduction. **CO4-Ana (16)**
15. (a) Analyze the significance of horizontal curves in urban road design with respect to driver safety. **CO5–Ana (16)**
- Or
- (b) Suggest improvement strategies for accident-prone locations based on traffic data analysis. **CO5–Ana (16)**