Birla Institute of Technology & Science, Pilani- Pilani Campus

First Semester 2023-2024

Comprehensive Exam

Course No: CE G567 Course Title: Highway Design
Nature of Exam: Closed Book Max. Marks: 60 (Weightage: 35%)
Duration: 180 Min Date of Exam: 07/12/2023

Note:

1. All questions are compulsory.
2. Figures to the right indicate full marks
3. Assume suitable data if required.

<table>
<tr><td>Q.1</td><td>The width of approaches for a rotary intersection is 14 m. The entry and exit width of rotary is 9 m. Table below gives the traffic from the four approaches traversing the intersection. Find the capacity of the rotary using the IRC approach: [12]
<table>
<tr><th>Approach</th><th>Left Turn Traffic</th><th>Straight Traffic</th><th>Right Turn Traffic</th></tr>
<tr><td>North</td><td>455</td><td>455</td><td>390</td></tr>
<tr><td>South</td><td>500</td><td>400</td><td>100</td></tr>
<tr><td>East</td><td>360</td><td>270</td><td>270</td></tr>
<tr><td>West</td><td>540</td><td>900</td><td>360</td></tr>
</table>
</td></tr>
<tr><td>Q.2</td><td>Explain the key elements affecting the pedestrian facilities at the signalized intersection [6]</td></tr>
<tr><td>Q.3</td><td>Write the warrants for provision of grade separator as per the IRC criteria [4]</td></tr>
<tr><td>Q.4</td><td>A valley curve is formed by descending gradient n1= 1 in 20 and ascending gradient n2 = 1 in 30. Design the length of valley curve for V = 70 kmph to meet the comfort criteria by IRC and AASHTO method. Discuss the result. [6]</td></tr>
<tr><td>Q.5</td><td>Explain the advantages of provision of superelevation on curves [6]</td></tr>
<tr><td>Q.6</td><td>Design the superelevation for a horizontal curve of 120 m radius and design speed of 80 km/hr. [6]</td></tr>
<tr><td>Q.7</td><td>A vertical summit curve is formed by n_1= 1 in 30 and n_2= - 1 in 90. Design the length of summit curve to provide an overtaking sight distance for vehicle travelling at design speed of 60 kmph on one way and two way road. Maximum overtaking acceleration is 0.72 m/sec^2 and overtaking time is 2.0 sec. [14]</td></tr>
<tr><td>Q.8</td><td>Write the justification for
a) More chances of accidents at roundabout having oval or irregular shape inner island as compared to circular island.
b) Increase in rear-end and sidesweep crashes at intersection due to provision of channelized right turn lane
c) More chances of accidents at intersections having higher skew angle [6]</td></tr>
</table>