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Code No. : 16103

**VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD**  
**B.E. (Civil Engg.: CBCS) VI-Semester Main Examinations, May-2019**

**Highway Engineering**

Time: 3 hours

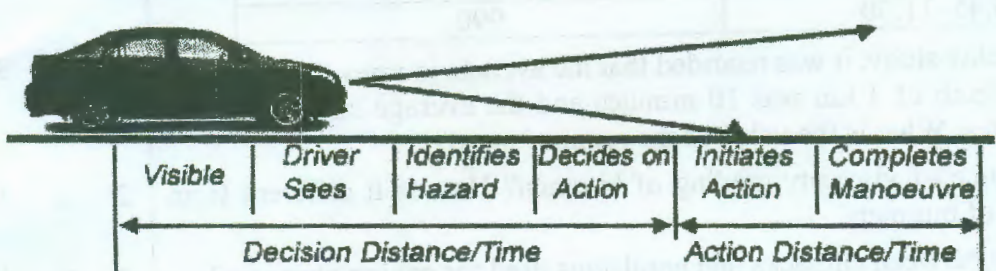
Max. Marks: 70

*Note: Answer ALL questions in Part-A and any FIVE from Part-B*

Q.No.	Stem of the question	M	L	CO	PO										
<b>Part-A (10 × 2 = 20 Marks)</b>															
1.	Write functional classification of roads as per IRC?	2	1	1	1										
2.	What are the functions of the following cross sectional elements i) Carriageway      ii) Shoulder      iii) Median	2	1	1	1,2										
3.	The following are the summary of traffic volume data obtained in a peak hour at a location. Calculate the Peak Hour Factor.	2	3	2	1,2										
<table border="1"> <thead> <tr> <th>Time duration within an hour</th> <th>Traffic volume (number of vehicles)</th> </tr> </thead> <tbody> <tr> <td>10:00–10:15</td> <td>950</td> </tr> <tr> <td>10:15–10:30</td> <td>1010</td> </tr> <tr> <td>10:30–10:45</td> <td>1050</td> </tr> <tr> <td>10:45–11:00</td> <td>990</td> </tr> </tbody> </table>		Time duration within an hour	Traffic volume (number of vehicles)	10:00–10:15	950	10:15–10:30	1010	10:30–10:45	1050	10:45–11:00	990				
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4.	During a speed and delay study, it was recorded that the average journey time taken to travel along a test stretch of 3 km was 10 minutes and the average stoppage delay observed was 2 minutes. What is the value of the running speed?	2	4	3	1,2										
5.	What is the significance of viscosity grading of bitumen? How is it different from conventional grading of bitumen?	2	2	4	1										
6.	What is the difference between cutbacks and emulsions used for paving purposes?	2	2	4	1										
7.	What does IRC 58 recommend between concrete slab and subgrade soil?	2	2	5	1,2										
8.	If cumulative fatigue damage for bottom up cracking and top down cracking is 0.356 and 0.301 respectively for a trial concrete pavement thickness of 300 mm on a National Highway in Telangana, determine whether design thickness is safe or not?	2	3	5	1,2										
9.	Write the causes of occurrence of stripping of binder in flexible pavement?	2	1	6	1										
10.	State the need of pavement maintenance during its design period?	2	2	6	1										
<b>Part-B (5 × 10 = 50 Marks)</b>															
11. a)	Calculate the length of transition curve using the following data: Design speed = 65 kmph Radius of circular curve = 220 m Width of carriageway = 7.5 m Allowable rate of introduction of super elevation = 1 in 150 Maximum allowable super elevation = 7% The super elevation is provided by rotating carriageway about the inner edge	5	3	1	2,3										
b)	Define super elevation and derive an expression based on radius of a curve, design speed, side friction and acceleration due to gravity.	5	3	1	1										
12. a)	Robust transport infrastructure is a key element to any smart city. Identify any such transport infrastructure project required for developing a smart transport system in Hyderabad city. Also develop a survey plan for integrating such a system in the city. Justify the technique adopted for checking the feasibility of the proposed project.	5	4	3	2,6,7										
b)	Write an overview on signal timing design as per IRC method?	5	2	3	2										

Contd... 2



13. a)	List out steps in the Marshall method of bituminous mix for determining optimum binder content. Also, write formulae for determination of volumetrics of the mix like percent air voids, VMA, VFB.	5	3	4	1,2																												
b)	Write the significance and test principle of Road aggregates by (i) Aggregate crushing test (ii) Los Angeles Abrasion Test (iii) Aggregate Impact Test.	5	2	4	1																												
14. a)	The following data were obtained from axle load survey. Determine VDF based on standard axle load of 80 kN.	5	4	5	1,2																												
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b)	Write the salient features of rigid pavement design as per IRC: 58-2015?	5	2	5	1,2																												
15. a)	Explain the procedure for construction of Dense bituminous macadam as per MORTH specifications	5	2	6	2																												
b)	Present the common distress modes in flexible pavement with their causes and their treatments suggested as per IRC	5	2	6	2																												
16. a)	 <p>Visible   Driver Sees   Identifies Hazard   Decides on Action   Initiates Action   Completes Manoeuvre</p> <p>Decision Distance/Time   Action Distance/Time</p>	5	3	1	2																												
<p>Explain the above model and derive the relevant equations</p>																																	
b)	Define the basic parking characteristics? What are the various types of parking studies? Present the sample survey format for any one parking study.	5	2	3	2																												
17.	Answer any <i>two</i> of the following:																																
a)	Write an overview on PAV and TFOT Test	5	1	4	2																												
b)	Joints in CC pavements	5	2	5	2																												
c)	Construction of Granular Sub base layer.	5	2	6	2																												

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	60%
2	Knowledge on application and analysis (Level-3 & 4)	40%
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	