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Code No. : 16131

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD***Accredited by NAAC with A++ Grade***B.E. (Civil Engg.) VI-Semester Main & Backlog Examinations, June-2022****Highway Engineering**

Time: 3 hours

Max. Marks: 60

*Note: Answer all questions from Part-A and any FIVE from Part-B***Part-A (10 × 2 = 20 Marks)**

Q. No.	Stem of the question	M	L	CO	PO
1.	Find out the stopping sight distance for a two lane highway with design speed of 100 kmph, take $f = 0.35$ .	2	3	1	1
2.	State any two main recommendations of Jayakar committee for development of road network in India.	2	1	1	1,6
3.	Write the importance of 85 <sup>th</sup> and 98 <sup>th</sup> percentile speeds in traffic engineering.	2	3	2	2,6
4.	What do you mean by channelization? What are the purposes of channelization?	2	1	2	1,6
5.	Write the importance of softening point of bitumen in bituminous road construction.	2	1	3	1
6.	Differentiate between bitumen and tar.	2	1	3	1
7.	Distinguish between rigid and flexible pavements.	2	1	4	1
8.	State fourth power rule.	2	1	4	1
9.	Distinguish between prime coat and tack coat of bituminous materials used in road construction.	2	1	5	1
10.	What are the various types of cracks in flexible pavement?	2	1	5	1
<b>Part-B (5 × 8 = 40 Marks)</b>					
11. a)	Why the highway geometrics play an important role in highway engineering? Derive an expression for finding the super elevation required if the design coefficient of lateral friction is 'f'. Design the super elevation required at a horizontal curve of radius 380 m for the design speed of 100 kmph.	5	3	1	1,2,6,7
b)	For economic road alignment, shortest length is usually the best. What circumstances justify a deviation from this principle?	3	2	1	1,6,7
12. a)	What are the details collected in Origin and Destination survey/ describe the most commonly adopted methods of origin and destination survey.	4	2	2	1,6
b)	Explain how road and road user are the major factors contributing to road accidents? By what measures the road safety can be increased? Explain.	4	3	2	1,6

13. a)	List standard physical tests to which road metal is subjected in order to ascertain its suitability. Describe with a sketch crushing test and state the minimum standard requirements for the suitability.	4	2	3	1,5												
b)	Explain the procedure for conducting Marshall stability test? Also explain how optimum binder content is obtained.	4	2	3	1,5												
14. a)	State the worst condition of loading considered for design of rigid pavements. Clearly explain the design parameters and inputs considered for the design of rigid pavements with a step by step procedure for design to resist topdown and bottom up cracking.	5	3	4	2,6												
b)	Explain how pavement materials and traffic are characterized in the design of flexible pavement. Also, explain how design traffic is computed.	3	3	4	1,7												
15. a)	Explain the procedure for construction of the following layers as per IRC MORTH specifications (i) Granular sub base (ii) Any bituminous layer	4	2	5	1												
b)	Explain in brief flexible pavement failures with respect to their causes and maintenance measures.	4	2	5	1,6												
16. a)	A summit curve is formed when an ascending gradient of 1 in 22 meets another ascending gradient of 1 in 75. Calculate the total length of the summit curve when the value of SSD = 110 m . Determine the RL of various points on summit curve assuming a suitable offset.	4	3	1	2												
b)	Design the timings of an isolated signal to be installed at a right angled intersection when roads P and Q cross. The data available are:	4	3	2	2												
<table border="1"> <thead> <tr> <th></th> <th>Road P</th> <th>Road Q</th> </tr> </thead> <tbody> <tr> <td>Width, meter</td> <td>14.0</td> <td>10.5</td> </tr> <tr> <td>Peak hour traffic volume, vehicles per hour per lane</td> <td>200</td> <td>120</td> </tr> <tr> <td>Approach speed, kmph</td> <td>50</td> <td>35</td> </tr> </tbody> </table>			Road P	Road Q	Width, meter	14.0	10.5	Peak hour traffic volume, vehicles per hour per lane	200	120	Approach speed, kmph	50	35				
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Assume any other suitable data.																	
17.	Answer any <i>two</i> of the following:																
a)	Job mix formula by Rothfuch method.	4	2	3	1												
b)	Any four Cross sections of various design alternatives given by IRC in flexible pavement design and their critical locations.	4	3	4	1												
c)	Construction of Wet mix macadam and Water bound macadam layers.	4	2	5	1												

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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Civil