MANIPAL INSTITUTE OF TECHNOLOGY
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MANIPAL INSTITUTE OF TECHNOLOGY

IV SEMESTER B. TECH (CIVIL ENGINEERING)

END SEMESTER EXAMINATION, APRIL-MAY 2024

TRANSPORTATION ENGINEERING (CIE 2222)

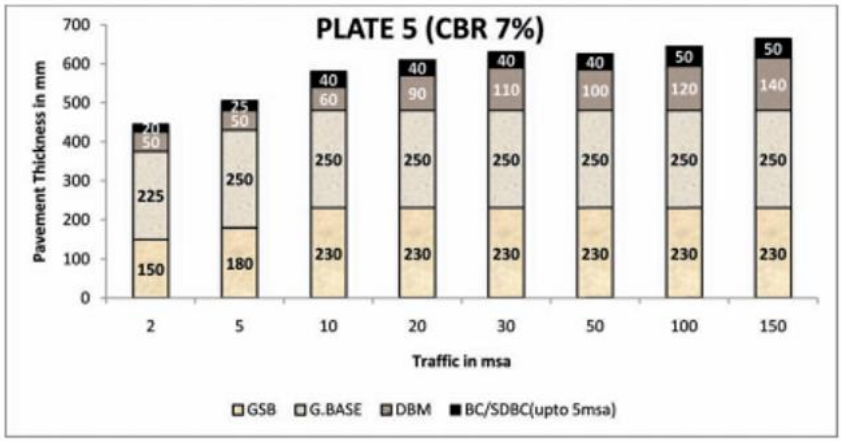
3/ 05/ 2024

TIME: 3 HRS. **MAX. MARKS: 50**

Note:

1. **Answer all questions.**
2. **Any missing data may be suitably assumed.**
3. **Use of a formula book is permitted.**

Q. NO	QUESTION	MARKS	CO	BL
1A	Describe the materials used in each flexible pavement layer and draw a neat sketch of flexible pavement.	**2**	**4**	**2**
1B	Deduce the expression for Stopping Sight Distance (SSD)	**3**	**2**	**4**
1C	Explain the process of measuring spot speed using an Enoscope with a neat illustration.	**5**	**5**	**2**
2A	Enumerate the basic requirements of an ideal highway alignment.	**2**	**2**	**1**
2B	A road with a design speed of 90kmph has a horizontal curve of 225m radius. Design the superelevation of the curve for mixed traffic if the side friction coefficient is 0.15. Also, find the coefficient of friction if no super elevation is provided.	**3**	**2**	**3**
2C	A train with 20 wagons weighing 18 tons each is to run at 50 kmph. The tractive effort of a 2-8-2 locomotive with a 22.5-ton load on each axle is 15 tons. The weight of the locomotive is 120 tons. The rolling resistance of wagons and locomotives are 2.5 kg/t and 3.5 kg/t, respectively. The resistance, which is dependent on speed, is 2.65 tons. Calculate the steepest gradient using the above data. Take coefficient of friction = 0.2	**5**	**2**	**4**
3A	List the various tests that are conducted on road aggregates. Explain any two.	**3**	**3**	**2**
3B	Briefly describe the construction of water bound macadam.	**4**	**3**	**2**
3C	Distinguish between semi dense bituminous concrete and bituminous macadam.	**3**	**2**	**2**
4A	With a neat sketch, explain the load distribution mechanism in flexible pavement.	**2**	**4**	**2**

<table>
<tr><td>4B</td><td>Explain the Equivalent Single Wheel Load (ESWL) with a neat sketch.</td><td>3</td><td>4</td><td>2</td></tr>
<tr><td>4C</td><td>Calculate the thickness of the flexible pavement layers and draw a neat sketch of the same. Use the data given below.
i. Initial traffic in the year of construction = 5800 CVPD
ii. Design life = 15 years
iii. Effective CBR = 7 %
iv. Traffic Growth rate = 7.5%
v. Vehicle Damage Factor = 4.5
vi. Lane Distribution Factor = 0.4
 
</td><td>5</td><td>4</td><td>4</td></tr>
<tr><td>5A</td><td>Define Traffic Engineering. Mention the six areas of traffic engineering.</td><td>2</td><td>5</td><td>1</td></tr>
<tr><td>5B</td><td>Define the following:
(i) spot speed
(ii) traffic capacity
(iii) traffic volume
(iv) passenger car unit
(v) volume capacity ratio
(vi) level of service.</td><td>3</td><td>5</td><td>1</td></tr>
<tr><td>5C</td><td>The consolidated data obtained from the speed and delay study using the floating car method is given below. The study was conducted on a road segment of 5 km. Calculate the average volume values, journey speed, and running speed of the traffic stream in both directions.
<table>
<tr><td rowspan="2">ction
trip</td><td colspan="2">Journey Time</td><td colspan="2">Total stopped delay</td><td colspan="3">No. of vehicles</td></tr>
<tr><td>Min</td><td>Sec</td><td>Min</td><td>Sec</td><td>overtaking</td><td>overtaken</td><td>o</td></tr>
<tr><td>-W</td><td>5</td><td>45</td><td>2</td><td>30</td><td>3</td><td>4</td><td></td></tr>
<tr><td>/-E</td><td>6</td><td>45</td><td>3</td><td>22</td><td>4</td><td>3</td><td></td></tr>
</table></td><td>5</td><td>5</td><td>4</td></tr>
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