Course Code: 18CE0124 **R18**

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR

Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : Transportation Engineering (18CE0124) **Course & Branch**: B.Tech - CE

Year & Sem : III- B.Tech & II- Sem **Regulation:** R18

UNIT I

HIGHWAY ALIGNMENT

1	a) Name any four highway cross-sectional elements. b) Define super elevation? c) Distinguish between 'lag distance' and braking distance. d) What is the need for extra widening in a horizontal curve? e) What are the factors to be considered for providing camber?	**[L1] [CO1]** **[L1] [CO1]** **[L1] [CO1]** **[L1] [CO1]** **[L1] [CO1]**	**[2M]** **[2M]** **[2M]** **[2M]** **[2M]**
2	Write the basic requirements and factors controlling for ideal alignment between two terminal stations.	**[L1] [CO1]**	**[10M]**
3	What are the engineering surveys conducted to fix the alignment of a highway?	**[L1] [CO1]**	**[10M]**
4	The speeds of overtaking and overtaken vehicles are 80 kmph and 60 kmph respectively on a two-way traffic road. If the acceleration of the overtaking vehicle is 0.80 m./s^2, calculate the safe overtaking sight distance. Sketch of the overtaking zone with location of sign posts.	**[L2] [CO1]**	**[10M]**
5	Enumerate the factors governing the width of carriage way. State the IRC specification for width of carriage way for various classes of roads.	**[L1] [CO1]**	**[10M]**
6	Calculate the minimum sight distance required to avoid a head on collision of two cars approaching from opposite directions at 90 and 60 kmph. Assume a reaction time of 2.5 seconds, coefficient of friction of 0.7 and a brake efficiency of 50 per cent, in either case.	**[L3] [CO1]**	**[10M]**
7	(a) List the Factors affecting OSD. Explain Lag distance and Braking distance. (b) Explain PIEV theory.	**[L1] [CO1]** **[L1] [CO1]**	**[5M]** **[5M]**
8	While aligning a highway in a built up area, it was necessary to provide a horizontal curve of radius 300 m for a design speed 65 km/hr, length of wheel base-6m and pavement width 10m. Assume rate of introduction of super elevation as 1 in 100 and super elevation is provided by rotating about centre line. Design super elevation, extra widening of pavement and length of transition curve.	**[L3] [CO1]**	**[10M]**
9	A national highway having design speed 80 kmph passing through rolling terrain in heavy rainfall area has a horizontal curve of radius 500 m. Design the length of transition curve assuming suitable data. Pavement is rotated about the center for super elevation.	**[L3] [CO1]**	**[10M]**
10	Explain the types of gradients with IRC recommendations.	**[L1] [CO1]**	**[10M]**

Course Code: 18CE0124 **R18**

11	A valley curve is formed by a descending gradient of 1 in 40 meeting with an ascending gradient of 1 in 30. Design the length of valley curve for a design speed of 100 kmph so as to fulfill both comfort conditions and head light sight distance requirements. Assume rate of change of change of centrifugal acceleration as 0.6 m/sec^3 , reaction time 2.5 sec and coefficient of friction 0.35	**[L3] [CO1]**	**[10M]**

Course Code: 18CE0124 **R18**

UNIT II

TRAFFIC ENGINEERING

<table>
<tr><td>1</td><td>a) Expand PCU and Give Equivalent PCU for atleast two class of vehicles.
b) Give the classification of road markings?
c) Define ‘Optimum Cycle Time’ used in Signal Design by Webster method.
d) Explain the significance of traffic studies.
e) What is the relationship between speed and Flow?</td><td>[L1] [CO2]
[L1] [CO2]
[L1] [CO2]
[L1] [CO2]
[L1] [CO2]</td><td>[2M]
[2M]
[2M]
[2M]
[2M]</td></tr>
<tr><td>2</td><td>The results of a speed study is given in the form of a frequency distribution table. Find the time mean speed and space mean speed.
<table>
<tr><th>No.</th><th>speed range</th><th>average speed (v_i)</th><th>volume of flow (q_i)</th></tr>
<tr><td>1</td><td>2-5</td><td>3.5</td><td>1</td></tr>
<tr><td>2</td><td>6-9</td><td>7.5</td><td>4</td></tr>
<tr><td>3</td><td>10-13</td><td>11.5</td><td>0</td></tr>
<tr><td>4</td><td>14-17</td><td>15.5</td><td>7</td></tr>
</table></td><td>[L3] [CO2]</td><td>[10M]</td></tr>
<tr><td>3</td><td>Explain the various road user characteristics to be considered in road design</td><td>[L1] [CO2]</td><td>[10M]</td></tr>
<tr><td>4</td><td>Explain the significance of traffic studies. Briefly explain any four types of traffic studies</td><td>[L1] [CO2]</td><td>[10M]</td></tr>
<tr><td>5</td><td>What are the objectives of Traffic Volume studies? What are the methods of presentation of Volume Data?</td><td>[L1] [CO2]</td><td>[10M]</td></tr>
<tr><td>6</td><td>Explain grade separated intersections, the advantages and limitations</td><td>[L1] [CO2]</td><td>[10M]</td></tr>
<tr><td>7</td><td>(a) Explain about the various types of on-street parking patterns possible.
(b) What are the different types of off-street parking facilities that can be provided in a given area?</td><td>[L1] [CO2]
[L1] [CO2]</td><td>[5M]
[5M]</td></tr>
<tr><td>8</td><td>Explain briefly about traffic control devices.</td><td>[L1] [CO2]</td><td>[10M]</td></tr>
<tr><td>9</td><td>Discuss about various Engineering measures that can help in reducing time accident rate.</td><td>[L2] [CO2]</td><td>[10M]</td></tr>
<tr><td>10</td><td>Normal flow of a traffic cross road A and B are 400 and 250 PCU/hour. The saturated flow is 1250 and 1000 PCU/hour. The red time is 12 seconds. Design a two phase traffic signal</td><td>[L3] [CO2]</td><td>[10M]</td></tr>
<tr><td>11</td><td>A fixed time 2-phase signal is to be provided at an intersection having four arms. The design hour traffic and saturation flow are
<table>
<tr><td></td><td>North</td><td>South</td><td>East</td><td>West</td></tr>
<tr><td>Design Hour flow (pcu/hr)</td><td>800</td><td>400</td><td>750</td><td>600</td></tr>
<tr><td>Saturation flow (pcu/hr)</td><td>2400</td><td>2000</td><td>3000</td><td>3000</td></tr>
</table>
Time lost per phase due to starting delay is 2 sec and All red period is 4 sec. Design two phase traffic signal using Webster’s method.</td><td>[L3] [CO2]</td><td>[10M]</td></tr>
</table>

Course Code: 18CE0124 **R18**

UNIT III

PAVEMENT DESIGN

1	a) List out the stresses in rigid pavement. b) What are warping stresses? c) List out the types of pavement based on structural behaviour. d) Draw the stress distribution in flexible pavements and rigid pavements? e) Draw a cross section of flexible pavement showing different layers.	**[L1] [CO3]** **[L1] [CO3]** **[L1] [CO3]** **[L1] [CO3]** **[L1] [CO3]**	**[2M]** **[2M]** **[2M]** **[2M]** **[2M]**
2	Briefly outline the advantages and limitations of flexible and rigid pavements.	**[L1] [CO3]**	**[10M]**
3	Draw a sketch of flexible pavement cross section and show the component parts. Enumerate the Functions and importance of each component of the pavement.	**[L2] [CO3]**	**[10M]**
4	Explain CBR method of pavement design and discuss the method useful in determining the thickness of flexible pavement layers.	**[L1] [CO3]**	**[10M]**
5	Design a new flexible pavement for a two-lane undivided carriageway using the following data: Design CBR value of subgrade = 8.0%, Initial traffic on completion of construction = 1800 CV per day, Average growth rate = 6.0% per year, Design life = 15 years, VDF value = 2.5.	**[L3] [CO3]**	**[10M]**
6	What are the factors should be considered for the design of flexible and rigid pavements Discuss the significance of each	**[L1] [CO3]**	**[10M]**
7	What are the functions of tie bars and dowel bars in rigid pavements? What is the design principle	**[L1] [CO3]**	**[10M]**
8	A cement concrete pavement has a thickness of 26 cm and lane width of 3.5 m. Design the tie bars Along the longitudinal joints using the data given below: Allowable working stress in steel tie bars, Ss = 1250 kg/cm^2 Unit weight of CC, W = 2400 kg/cm^3 Maximum value of friction coefficient, f = 1.2 Allowable tensile stress in deformed tie bar, Ss = 2000 kg/cm^2 Allowable bond stress in deformed bars, Sb = 24.6 kg/cm^2	**[L3] [CO3]**	**[10M]**
9	Classify different types of joints in CC pavements and mention the objects of each	**[L1] [CO3]**	**[10M]**
10	With sketch show the different components of a rigid pavement and mention the functions of each.	**[L2] [CO3]**	**[10M]**
11	Differentiate between flexible pavements and rigid pavements.	**[L1] [CO3]**	**[10M]**

Course Code: 18CE0124 **R18**

UNIT IV

RAILWAY ENGINEERING

1	(a) What are the functions of sleepers? (b) Bring out the differences between suspended and supported rail joints (c) What are the different types of rails used? (d) Explain the concept of Adzing of sleepers. (e) Discuss about methods of rectifying creep.	**[L1] [CO4]** **[L2] [CO4]** **[L1] [CO4]** **[L1] [CO4]** **[L1] [CO4]**	**[2M]** **[2M]** **[2M]** **[2M]** **[2M]**
2	(a) Draw a typical cross section of permanent way and show various components.	**[L2] [CO4]**	**[5M]**
	(b) What are the advantages and disadvantages of steel sleepers?	**[L1] [CO4**	**[5M]**
3	(a) Discuss briefly about the functions of different components of permanent way	**[L2] [CO4]**	**[5M]**
	(b) What are the advantages and disadvantages of concrete sleepers?	**[L1] [CO4**	**[5M]**
4	(a) Explain causes of creep.	**[L1] [CO4]**	**[5M]**
	(b) What are the functions of ballast?	**[L1] [CO4]**	**[5M]**
5	(a) Explain the concept of creep using percussion theory	**[L1] [CO4]**	**[5M]**
	(b) What are the requirements of sleepers?	**[L1] [CO4]**	**[5M]**
6	(a) What are the requirements of a ideal permanent way?	**[L1] [CO4]**	**[5M]**
	(b) Explain for coning of wheels.	**[L1] [CO4]**	**[5M]**
7	(a) Define creep in the rails. Explain various causes of creep.	**[L2] [CO4]**	**[5M]**
	(b) What are the requirements of good ballast.	**[L1] [CO4]**	**[5M]**
8	Explain the role of chairs, keys and fish plates as track fittings and fastenings. Support your Answer with neat sketch.	**[L1] [CO4]**	**[10M]**
9	Giving a typical cross section of a permanent way on an embankment, indicate various components. Also describe the functions of various components of a permanent way.	**[L2] [CO4]**	**[10M]**
10	What are the requirements of rail joint? Explain the different types of rail joint	**[L1] [CO4]**	**[10M]**
11	What are fastenings. What are the functions and requriements of fastenings	**[L1] [CO4]**	**[10M]**

Course Code: 18CE0124 **R18**

UNIT V

GEOMETRIC DESIGN OF RAILWAY TRACK

1	(a) If the ruling gradient is 1 in 140 on a particular section of MG and at the same time a 3.8 degree curve is situated on this ruling gradient, find out the allowable ruling gradient.	**[L3] [CO5]**	**[2M]**
	(b) What are the operational classifications of stations?	**[L1] [CO5]**	**[2M]**
	(c) What is the difference between pusher gradient and momentum gradient?	**[L1] [CO5]**	**[2M]**
	(d) Define grade compensation	**[L2] [CO5]**	**[2M]**
	(e) Write about requirements of transition curve	**[L1] [CO5]**	**[2M]**
2	(a) Discuss briefly the purpose for which railway stations are provided.	**[L2] [CO5]**	**[5M]**
	(b) Discuss briefly about various components of turnouts.	**[L2] [CO5]**	**[5M]**
3	(a) Explain briefly about wayside station on a single and double railway lines.	**[L2] [CO5]**	**[5M]**
	(b) Calculate the maximum permissible speed on a curve of high speed for the following data on a M.G track. Degree of curve 0.9^0, amount of super elevation 8.0 cm, length of transition curve 135 m, maximum speed of the section likely sanction speed = 120 kmph.	**[L3] [CO5]**	**[5M]**
4	(a)What is cant deficiency? Discuss briefly about the limits of cant deficiency.	**[L1] [CO5]**	**[5M]**
	(b) Discuss about the requirement of passenger platforms.	**[L2] [CO5]**	**[5M]**
5	(a) Explain briefly about types of Marshalling yards.	**[L1] [CO5]**	**[5M]**
	(b) Calculate the maximum permissible speed on a curve of high speed for the following data on a B.G track. Degree of curve 1.2∘, amount of super elevation 8.0 cm, length of transition curve 125 m, maximum speed of the section likely sanction speed = 150 kmph.	**[L3] [CO5]**	**[5M]**
6	(a) Compute the maximum permissible speed for the following data on a curve of high speed B.G for the following data. Degree of curve = 1.2^0, Amount of super elevation = 8 cm, Length of transition curve = 150 m, Maximum sanctioned speed likely to be 135 kmph.	**[L3] [CO5]**	**[5M]**
	(b) What are the advantages of automatic signalling in railways?	**[L1] [CO5]**	**[5M]**
7	(a) Draw a neat sketch of Left hand turnout and show various parts of turnout.	**[L2] [CO5]**	**[5M]**
	(b) Explain briefly about cant with equilibrium equation	**[L1] [CO5]**	**[5M]**
8	(a) Explain about negative super elevation and the situation where negative super elevation required in Railway track. Also write limitations	**[L1] [CO4]**	**[6M]**
	(b) A 5^0 curve diverges from a 3^0 main curve in a reverse direction in the layout of a BG yard. If the speed on the branch line is restricted to 35 kmph, determine the restricted speed on main line.	**[L3] [CO4]**	**[4M]**
9	(a) Explain the classification of gradient in railways.	**[L2] [CO4]**	**[6M]**
	(b) If a ruling gradient of 1 in 250 is fixed on a B.G section and a horizontal curve of 4^0 is also to be introduced over it. What should be the actual ruling gradient?	**[L3] [CO4]**	**[4M]**

Course Code: 18CE0124 **R18**

10	(a) What is grade compensation in railway track design? Why is it necessary to provide grade compensation?	**[L1] [CO4]**	**[5M]**
	(b) Define the degree of a curve. How is it expressed?	**[L1] [CO4]**	**[5M]**
11	Discuss briefly about stations with different types	**[L1] [CO4]**	**[10M]**

Prepared by:
K V Maruthish
Assistant Professor/ Civil