Course Code: 20CE0120 **R20**

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road – 517583
QUESTION BANK (DESCRIPTIVE)

Subject with Code: TRANSPORTATION ENGINEERING (20CE0120) **Course & Branch**: B.Tech - CE

Regulation: R20 **Year & Sem:** III-B.Tech & I-Sem

UNIT –I
HIGHWAY ALIGNMENT

1	a) Explain any four highway cross-sectional elements?	**[L1] [CO1]**	**[6M]**
	b) Derive an expression for extra widening in a horizontal curve?	**[L2] [CO1]**	**[6M]**
2	Write the basic requirements and factors controlling for ideal alignment between two terminal stations.	**[L1] [CO1]**	**[12M]**
3	What are the engineering surveys conducted to fix the alignment of a highway?	**[L1] [CO1]**	**[12M]**
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]**	**[12M]**
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]**	**[12M]**
6	Calculate the minimum sight distance required to avoid a head on collision of two cars approaching from opposite directions at 80 and 40 kmph. Assume a reaction time of 1.5 seconds, coefficient of friction of 0.6 and a brake efficiency of 40 per cent, in either case.	**[L3] [CO1]**	**[12M]**
7	(a) List the Factors affecting OSD. Explain Lag distance and Braking distance along with formulas. (b) Explain PIEV theory.	**[L1] [CO1]** **[L1] [CO1]**	**[8M]** **[4M]**
8	While aligning a highway in a built up area, it was necessary to provide a horizontal curve of radius 250 m for a design speed 55 km/hr, length of wheel base-4m 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]**	**[12M]**
9	A national highway having design speed 60 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]**	**[12M]**
10	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 120 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 1.5 sec and coefficient of friction 0.30	**[L3] [CO1]**	**[12M]**

Course Code: 20CE0120 **R20**

UNIT –II
TRAFFIC ENGINEERING

<table>
<tr><td>1</td><td>a) Expand PCU and Give Equivalent PCU for atleast two classes of vehicles.</td><td>[L1][CO2]</td><td>[4M]</td></tr>
<tr><td></td><td>b) Give the classification of road markings?</td><td>[L1][CO2]</td><td>[2M]</td></tr>
<tr><td></td><td>c) Define ‘Optimum Cycle Time’ used in Signal Design by Webster method.</td><td>[L1][CO2]</td><td>[2M]</td></tr>
<tr><td></td><td>d) Explain the significance of traffic studies.</td><td>[L1][CO2]</td><td>[2M]</td></tr>
<tr><td></td><td>e) What is the relationship between speed and Flow?</td><td>[L1][CO2]</td><td>[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>Frequency(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>[12M]</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>[12M]</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>[12M]</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>[12M]</td></tr>
<tr><td>6</td><td>Explain grade separated intersections, the advantages and limitations</td><td>[L1] [CO2]</td><td>[12M]</td></tr>
<tr><td>7</td><td>(a) Explain about the various types of on-street parking patterns possible.</td><td>[L1] [CO2]</td><td>[6M]</td></tr>
<tr><td></td><td>(b)What are the different types of off-street parking facilities that can be provided ina given area?</td><td>[L1] [CO2]</td><td>[6M]</td></tr>
<tr><td>8</td><td>Explain briefly about traffic control devices.</td><td>[L1] [CO2]</td><td>[12M]</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>[12M]</td></tr>
<tr><td>10</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><th></th><th>North</th><th>South</th><th>East</th><th>West</th></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>[12M]</td></tr>
</table>

Course Code: 20CE0120 **R20**

UNIT –III
PAVEMENT DESIGN

1	a) What are warping stresses? List out the stresses in rigid pavement.	**[L1][CO3]**	**[4M]**
	b) List out the types of pavement based on structural behaviour.	**[L1][CO3]**	**[4M]**
	c) Draw the stress distribution and cross section in flexible pavements and rigid pavements?	**[L1][CO3]**	**[4M]**
2	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]**	**[12M]**
3	With sketch show the different components of a rigid pavement and mention the functions of Each.	**[L2][CO3]**	**[12M]**
4	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]**	**[12M]**
5	What are the factors should be considered for the design of flexible and rigid pavements Discuss the significance of each.	**[L1][CO3]**	**[12M]**
6	What are the functions of tie bars and dowel bars in rigid pavements? What is the design principle?	**[L1][CO4]**	**[12M]**
7	A cement concrete pavement has a thickness of 25 cm and lane width of 2.5 m. Design the tie bars Along the longitudinal joints using the data given below: Allowable working stress in steel tie bars, Ss = 1050 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][CO4]**	**[12M]**
8	Classify different types of joints in CC pavements and mention the objects of each.	**[L1][CO4]**	**[12M]**
9	Explain CBR method of pavement design and discuss the method useful in determining the thickness of flexible pavement layers.	**[L1][CO4]**	**[12M]**
10	Differentiate between flexible pavements and rigid pavements.	**[L1][CO4]**	**[12M]**

Course Code: 20CE0120 **R20**

UNIT –IV
RAILWAY ENGINEERING

1	(a) Discuss briefly about the functions of different components of permanent way	**[L2][CO5]**	**[6M]**
	(b) What are the different types of rails used? Explain the concept of Adzing of sleepers and Discuss about methods of rectifying creep?	**[L1][CO5]**	**[6M]**
2	(a) Draw a typical cross section of permanent way and show various components.	**[L2][CO5]**	**[6M]**
	(b) What are the advantages and disadvantages of steel sleepers?	**[L1][CO5]**	**[6M]**
3	a) What are the functions of sleepers? Bring out the differences between suspended and supported rail joints	**[L2][CO5]**	**[6M]**
	(b) What are the advantages and disadvantages of concrete sleepers?	**[L1][CO5]**	**[6M]**
4	(a) Explain causes of creep.	**[L1][CO5]**	**[6M]**
	(b) What are the functions of ballast?	**[L1][CO5]**	**[6M]**
5	(a) Explain the concept of creep using percussion theory	**[L1][CO5]**	**[8M]**
	(b) What are the types of gauges used in railways?	**[L1][CO5]**	**[4M]**
6	(a) What are the requirements of an ideal permanent way?	**[L1][CO5]**	**[8M]**
	(b) Explain for coning of wheels.	**[L1][CO5]**	**[4M]**
7	(a) Define creep in the rails. Explain various causes of creep.	**[L2][CO5]**	**[6M]**
	(b) What are the requirements of good ballast?	**[L1][CO5]**	**[6M]**
8	Explain the role of chairs, keys and fish plates as track fittings and fastenings. Support your Answer with neat sketch.	**[L1][CO5]**	**[12M]**
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][CO5]**	**[12M]**
10	What are fastenings? What are the functions and requirements of fastenings	**[L1][CO5]**	**[12M]**

Course Code: 20CE0120 **R20**

UNIT –V
GEOMETRIC DESIGN OF RAILWAY TRACK

1	(a) Define grade compensation? If the ruling gradient is 1 in 120 on a particular section of MG and at the same time a 2.6 degree curve is situated on this ruling gradient, find out the allowable ruling gradient.	**[L2][CO6]**	**[6M]**
	(b)What are the operational classifications of stations?	**[L1][CO6]**	**[2M]**
	(b) Write about requirements of transition curve.	**[L1][CO6]**	**[2M]**
	(c) Difference between pusher gradient and momentum gradient.	**[L1][CO6]**	**[2M]**
2	(a) Discuss briefly the purpose for which railway stations are provided.	**[L2][CO6]**	**[6M]**
	(b) Discuss briefly about various components of turnouts.	**[L2][CO6]**	**[6M]**
3	(a) Explain briefly about wayside station on a single and double railway lines.	**[L2][CO6]**	**[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 0.8^0, amount of super elevation 6.0 cm, length of transition curve 125 m, maximum speed of the section likely sanction speed = 100 kmph.	**[L3][CO6]**	**[7M]**
4	(a)What is cant deficiency? Discuss briefly about the limits of cant deficiency.	**[L1][CO6]**	**[6M]**
	(b) Discuss about the requirement of passenger platforms.	**[L2][CO6]**	**[6M]**
5	(a) Explain briefly about types of Marshalling yards.	**[L1][CO6]**	**[6M]**
	(b) Explain about Signalling and interlocking with neat sketches.	**[L3][CO6]**	**[6M]**
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][CO6]**	**[6M]**
	(b) What is grade compensation in railway track design? Why is it necessary to provide grade compensation?	**[L1][CO6]**	**[6M]**
7	(a) Draw a neat sketch of Left hand turnout and show various parts of turnout.	**[L2][CO6]**	**[7M]**
	(b) Explain briefly about cant with equilibrium equation	**[L1][CO6]**	**[5M]**
8	(a) Explain about negative super elevation and the situation where negative super elevation required in Railway track. Also write limitations	**[L1][CO6]**	**[8M]**
	(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][CO6]**	**[4M]**
9	(a) Explain the classification of gradient in railways.	**[L2][CO6]**	**[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][CO6]**	**[6M]**
10	Discuss briefly about stations with different types.	**[L1][CO6]**	**[12M]**

Prepared by:
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