SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
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QUESTION BANK

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.	**[L1]**	**[CO1]**	**[2M]**
	b) Define super elevation?	**[L1]**	**[CO1]**	**[2M]**
	c) Distinguish between 'lag distance' and braking distance.	**[L1]**	**[CO1]**	**[2M]**
	d) What is the need for extra widening in a horizontal curve?	**[L1]**	**[CO1]**	**[2M]**
	e) What are the factors to be considered for providing camber?	**[L1]**	**[CO1]**	**[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.	**[L1]**	**[CO1]**	**[5M]**
	(b) Explain PIEV theory.	**[L1]**	**[CO1]**	**[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]**
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]**

UNIT II- TRAFFIC ENGINEERING

1	a) Expand PCU and Give Equivalent PCU for atleast two class of vehicles.	**[L1]**	**[CO2]**	**[2M]**
	b) Give the classification of road markings?	**[L1]**	**[CO2]**	**[2M]**
	c) Define 'Optimum Cycle Time' used in Signal Design by Webster method.	**[L1]**	**[CO2]**	**[2M]**
	d) Explain the significance of traffic studies.	**[L1]**	**[CO2]**	**[2M]**
	e) What is the relationship between speed and Flow?	**[L1]**	**[CO2]**	**[2M]**
2	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.			

No.	speed range	average speed (v_i)	volume of flow (q_i)
1	2-5	3.5	1
2	6-9	7.5	4
3	10-13	11.5	0
4	14-17	15.5	7

[L3] [CO2] [10M]

3	Explain the various road user characteristics to be considered in road design	**[L1]**	**[CO2]**	**[10M]**
4	Explain the significance of traffic studies. Briefly explain any four types of traffic studies	**[L1]**	**[CO2]**	**[10M]**
5	What are the objectives of Traffic Volume studies? What are the methods of presentation of Volume Data?	**[L1]**	**[CO2]**	**[10M]**
6	Explain grade separated intersections, the advantages and limitations	**[L1]**	**[CO2]**	**[10M]**
7	(a) Explain about the various types of on-street parking patterns possible.	**[L1]**	**[CO2]**	**[5M]**
	(b) What are the different types of off-street parking facilities that can be provided in a given area?	**[L1]**	**[CO2]**	**[5M]**
8	Explain briefly about traffic control devices.	**[L1]**	**[CO2]**	**[10M]**
9	Discuss about various Engineering measures that can help in reducing time accident rate.	**[L2]**	**[CO2]**	**[10M]**
10	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	**[L3]**	**[CO2]**	**[10M]**
11	A fixed time 2-phase signal is to be provided at an intersection having four arms. The design hour traffic and saturation flow are			

	North	South	East	West
DesignHourflow(pcu/hr)	800	400	750	600
Saturationflow(pcu/hr)	2400	2000	3000	3000

[L3] [CO2] [10M]

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.

UNIT III – PAVEMENT DESIGN

1	a) List out the stresses in rigid pavement.	**[L1]**	**[CO3]**	**[2M]**
	b) What are warping stresses?	**[L1]**	**[CO3]**	**[2M]**
	c) List out the types of pavement based on structural behaviour.	**[L1]**	**[CO3]**	**[2M]**
	d) Draw the stress distribution in flexible pavements and rigid pavements?	**[L1]**	**[CO3]**	**[2M]**
	e) Draw a cross section of flexible pavement showing different layers.	**[L1]**	**[CO3]**	**[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]**

UNIT IV – RAILWAY ENGINEERING

1	(a) What are the functions of sleepers?	**[L1]**	**[CO4]**	**[2M]**
	(b) Bring out the differences between suspended and supported rail joints	**[L2]**	**[CO4]**	**[2M]**
	(c) What are the different types of rails used?	**[L1]**	**[CO4]**	**[2M]**
	(d) Explain the concept of Adzing of sleepers.	**[L1]**	**[CO4]**	**[2M]**
	(e) Discuss about methods of rectifying creep.	**[L1]**	**[CO4]**	**[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 yourAnswer with neat sketch.	**[L1]**	**[CO4]**	**[10M]**
9	Giving a typical cross section of a permanent way on an embankment, indicate variouscomponents. 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]**

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 BGyard. If the speed on the branch line is restricted to 35 kmph, determine the restrictedspeed 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]**
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]**