

Code No: R31016

R10

Set No: 1

III B.Tech. I Semester Supplementary Examinations, May - 2013

TRANSPORTATION ENGINEERING-I

(Civil Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. a) Briefly outline the highway development in India.
b) What are the uses of fact finding surveys? How are these used and interpreted.
2. a) What are the objectives of highway geometric design? List the various geometric elements to be considered while designing a highway.
b) An ascending gradient of 1 in 90 meets a descending gradient of 1 in 110. A summit curve is to be designed for a speed of 70 kmph so as to have an overtaking sight distance of 460 m. Calculate the true length of summit curve.
3. a) Explain the various aspects investigated during parking studies. What are the uses of these studies?
b) Compare with neat sketches (i) angle parking with parallel parking and (ii) ramp type with elevator type parking garages.
4. a) Explain the IRC method of designing traffic signals.
b) At a right angled intersection of two roads, road G has four lanes with a total width of 12.0 m and road H has two lanes with a total width of 6.6 m. The volume of traffic approaching the intersection during design hour are 850 and 729 PCU/hour on the two approaches of road G and 240 and 165 PCU/hour on the two approaches of road H. Design the signal timings as per IRC guidelines.
5. a) Briefly explain the Marshall method of mix design.
b) Write a note about the various tests that are performed on tar.
6. a) Explain how sub grade soil and climatic variation effects pavement design and performance.
b) Explain the CBR method of pavement design. How is this method used in determining the thickness of component layers?
7. a) Draw a sketch of rigid pavement cross section and show the component parts. Enumerate the functions and importance of each component of pavement.
b) Compute the equivalent radius of resisting section of 22 cm slab, given that the radius of contact area wheel load is 16 cm.
8. a) Enumerate the steps for preparation of sub grade.
b) Write short notes about sympathetic cracking, load transfer device and strengthening of corner slabs. Draw neat sketches, where ever necessary.

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TRANSPORTATION ENGINEERING-I

(Civil Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. a) What are the various methods of classifying the roads? Briefly outline the classification based on location and function as suggested in the Nagpur road plan.
b) Explain the necessity and objectives of highway planning.
2. a) Draw the typical cross sections of M.D.R. in embankment, O.D.R. cutting, a city road and a national highway in cutting, clearly indicating the width of pavement, road and land.
b) A vertical summit curve is formed at the intersection of two gradients, (+) 2.5 and (–) 4.5 percent. Design the length of summit curve to provide a stopping sight distance for a speed of 80 kmph. Assume suitable data.
3. a) Explain the various measures that may be taken to prevent accidents.
b) A vehicle moving at 40 kmph speed was stopped by applying the brake and the length of skid mark was 12.2 m. If the average skid resistance of the pavement is known to be 0.70, determine the brake efficiency of the test vehicle.
4. a) Draw a neat sketch of full clover leaf and show the movement of traffic.
b) Enumerate the advantages and limitations of traffic rotary.
5. a) Explain the desirable properties of aggregate to be used in different types of pavement construction.
b) What are the various tests that are performed on bitumen? Briefly mention the principle and uses of each test.
6. a) Enumerate the various methods of flexible pavement design. Briefly indicate the basis of design in each case.
b) Explain ESWL and the concept in the determination of the equivalent wheel load.
7. a) Write a note about general design considerations of rigid pavements.
b) Compute the radius of relative stiffness of 16 cms thick cement concrete slab from the following data: Modulus of elasticity of cement concrete = 2, 15,000 kg/cm², Poisson's ratio for concrete = 0.142 and modulus of sub grade reaction K = (i) 3.2 kg/cm³ and (ii) 7.4 kg/cm³.
8. a) Compare the following methods of bituminous road construction: (i) central plant mix and road mix, (ii) hot mix and cold mix.
b) What are the problems in the construction of high embankments over weak foundation soils? How are the various problems addressed?

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Set No: 3

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TRANSPORTATION ENGINEERING-I

(Civil Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. a) What are the uses of map study in engineering surveys for highway location?
b) Explain how the final location and detailed survey of a highway are carried out.
2. a) Explain curve resistance and compensation in gradient on horizontal curves.
b) There is a horizontal curve of radius 50 m on a stretch of hill road with a gradient of 5.0%. Determine the grade compensation.
3. a) What are the various types of traffic accidents? Discuss the method of analyzing the speed of vehicle involved in the accident.
b) A driver of a vehicle travelling at 60 kmph up a grade required 15 m less to stop after he applies the brakes than the driver travelling at the same initial speed down the same grade. If the coefficient of friction between tyre and pavement is 0.5, what is the percent grade and what is the braking distance down the grade.
4. a) Write a note about design speed, shape of Central Island, radius of rotary width and width of carriageway at entry and exit, while designing a rotary.
b) What are the advantages and disadvantages of grade separated intersections.
5. a) What are the desirable properties of bitumen? Compare tar and bitumen.
b) What are the desirable properties of bituminous mixes? What are the steps in bituminous mix design? Discuss briefly.
6. a) Draw a sketch of flexible pavement cross section and show the component parts. Enumerate the functions and importance of each component of pavement.
b) Discuss the advantages and disadvantages of CBR method of pavement design.
7. a) Discuss the critical combination of stresses due to wheel load and temperature effects.
b) Find the spacing between contraction joints for a 3.5 m slab width having a thickness of 22 cm for (i) plain concrete slab and (ii) R.C.C. slab. The allowable tensile stress values in concrete and steel are 0.9 and 1350 kg/m², coefficient of friction is 1.4.
8. a) Discuss the objectives of warping joints, contraction joints and construction joints. Draw neat sketches.
b) Briefly list the method of construction of gravel roads. Draw a neat sketch of a typical gravel road.

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Set No: 4

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TRANSPORTATION ENGINEERING-I

(Civil Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. a) What are the requirements of an ideal highway alignment? Discuss briefly.
b) Discuss the general principles in the re-alignment of a highway and explain how the work is carried out.
2. a) Discuss the problems associated with highway valley curves and the recommended best shape of a valley curve.
b) A vertical summit curve is formed when an ascending gradient of 1 in 25 meets another ascending curve of 1 in 100. Find the length of the summit curve to provide the required stopping sight distance for a design speed of 70 kmph.
3. a) Write short notes on traffic signal system, before and after studies and level of service.
b) What are the different causes of traffic accidents? Discuss briefly.
4. a) Write a note about width of rotary roadway, capacity of the rotary, sight distance and grade and provisions for cyclists and pedestrians, while designing a rotary.
b) Write a note about grade separated structures. Draw neat sketches where ever necessary.
5. a) Write a note about significance, characteristics and desirable properties of soil as highway material.
b) What are the different types of bituminous materials used in road construction? Under what circumstances each of these materials preferred.
6. a) Write a note about the objectives and requirements of pavements.
b) What are the various factors to be considered in pavement design? Discuss the significance of each.
7. a) Write a note about modulus of sub grade reaction, radius of relative stiffness and radius of resisting section.
b) Calculate the spacing of expansion joint from the following data: maximum width of joint = 3 cms, temperature of laying concrete = 19° C, maximum slab temperature expected = 56° C and coefficient of thermal expansion = 10×10^{-6} per ° C.
8. a) List the different methods of road construction. Enumerate their advantages and disadvantages.
b) Write short notes about surface dressing, seal coat, bituminous concrete and mastic asphalt.
